

3656

**IMPACTED MATERIALS PLACEMENT PLAN  
ON-SITE DISPOSAL FACILITY**

**Revision 2  
May 2001  
20100-PL-007**

**INFORMATION  
ONLY**

**United States Department of Energy**

**Fernald Environmental Management Project  
Fernald, Ohio**

*Prepared by*

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*Under*

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Contract 95PS005028**

**000001**

## REVISION SUMMARY

<u>Revision</u>	<u>Dated</u>	<u>Description of Revision</u>
0	1/19/98	Initial issuance of Revision 0, <i>Impacted Material Placement Plan, On-Site Disposal Facility</i> (20100-PL-007)
PCN 1	7/7/98	Added Revision Summary page and revised physical waste acceptance criteria for debris (Page 4-1) to reflect that transite panels will not be size reduced before disposal in the On-Site Disposal Facility
0 ADD 1	2/17/99	Addendum 1: Issuance of Revision 0, <i>Specialized Placement Plan for Bagged Impacted Material</i> to discuss placement of bagged material into the On-Site Disposal Facility
1	10/99	Issuance of Revision 1 based on page changes approved by the U.S. EPA and OEPA. Addendum 1 incorporated into Appendix C
1ADD2	3/00	Addendum 2: Issuance of Revision 1, <i>Specialized Placement Plan for Thorium and Non-Bagged Impacted Material</i> to discuss placement of thorium debris and non-bagged material into the On-Site Disposal Facility
1ADD3C	3/00	Addendum 3: Issuance of Revision 1, <i>Alternative Trenching Method for Placement of Category 2 Impacted Material</i> to discuss placement of Category 2 items by trenching method into the On-Site Disposal Facility
1TBL1	3/00	Added <i>Placement Restrictions for Specialized Placement Plans</i> table to be inserted in front of Addendum 1 of Appendix C.
1 PCN 1	12/19/00	Revised Category 4 material definition to replace the words "very compressible" with "prone to decomposition" (page 5-2 and 8-5).
2	5/01	Issuance of Revision 2 to incorporate lessons learned from OSDF Phase I and II and DCN 20102-033 dated 1 July 1998. Addenda 2 and 3 incorporated into Appendix C.

FINAL  
IMPACTED MATERIAL PLACEMENT PLAN  
  
ON-SITE DISPOSAL FACILITY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

REVISION 2  
MAY 2001  
20100-PL-007

Approved by:



J.F. Beech, Ph.D., P.E., GeoSyntec, OSDF Principal-In-Charge

8 May 2001

Date

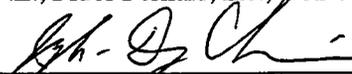
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**APPENDICES**

Appendix A	Impacted Materials Placement Quality Assurance Plan
Appendix B	Best Available Technology Determination for Remedial Construction Activities on the Fernald Environmental Management Project
Appendix C	Addenda to Impacted Materials Placement Plan (see Revision Summary)

## ACRONYM LIST

ACM	Asbestos Containing Material
ALARA	As Low As Reasonably Possible
ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Society of Testing and Materials
BAT	Best Available Technology
CFC	Certified-for-Construction
CM	Construction Manager
CQA	Construction Quality Assurance
CQC	Construction Quality Control
D&D	Decontamination and Dismantlement
DOE	Department of Energy
FEMP	Fernald Environmental Project
H&S	Health and Safety
IMP	Impacted Materials Placement
LCS	Leachate Collection System
MTL	Material Tracking Location
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
OEAP	Ohio Environmental Protection Agency
OSDF	On-Site Disposal Facility
OU2	Operable Unit 2
OU3	Operable Unit 3
OU5	Operable Unit 5
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RDWP	Remedial Design Work Plan
ROD	Record of Decision
SWMEC	Surface-Water Management and Erosion Control
TBC	To Be Considered Criteria
WAC	Waste Acceptance Criteria
WAO	Waste Acceptance Organization

## 1.0 INTRODUCTION

### 1.1 Overview

This Impacted Materials Placement (IMP) Plan describes the impacted materials acceptance, placement, compaction, and quality assurance/quality control (QA/QC) activities that will be undertaken throughout construction, filling, and closure of the On-Site Disposal Facility (OSDF) at the Fernald Environmental Management Project (FEMP), Fernald, Ohio.

### 1.2 Project Description

The OSDF will be constructed to contain impacted materials derived from remediation of the operable units at the FEMP. These materials will be required to meet OSDF waste acceptance criteria (WAC) prior to disposal in the OSDF. The estimated total volume of impacted material destined for OSDF disposal is 2.5 million cubic yards (1.9 million cubic meters) bank/unbulked. Approximately 85 percent of this material is impacted soil or soil-like material, with the remainder consisting of building demolition debris, lime sludge, municipal solid waste, and small quantities of miscellaneous other materials.

The construction, filling, and closure of the OSDF is currently scheduled to occur over a period of approximately seven years, as described in the Accelerated Remediation Plan [\$276 million case] (276 Plan). However, due to the potential for variations in the pace of remedial action activities, the OSDF has been designed to be constructed, filled, and closed in phases for up to 25 years.

The design approach for the OSDF is presented in the document, "*Final Remedial Design Work Plan for Remedial Actions at Operable Unit 2 (OU2 RDWP)*" [DOE, 1995b]. The design of the OSDF, as currently developed, is presented in the "*Final Design Package, On-Site Disposal Facility*" [GeoSyntec, 1997c]. The design of the OSDF includes a liner system, final cover system, leachate management system, and surface-water management system.

### 1.3 Plan Scope

This plan establishes the operational procedures to be used by the Contractor to place and compact impacted material in the OSDF in a manner that protects the underlying geosynthetics. The scope of this IMP Plan includes:

- presenting radiological/chemical and physical waste acceptance criteria applicable to OSDF impacted materials;
- categorizing impacted material types based on handling, placement, and compaction requirements;

- developing acceptable proportions of the various impacted material types to be placed within any area of the OSDF to achieve satisfactory OSDF performance;
- developing procedures for placing and compacting impacted materials in the OSDF; and
- developing QA/QC procedures for impacted material placement in the OSDF.

#### **1.4 Plan Organization**

The remainder of this plan is organized as follows:

- the criteria used in establishing the requirements of this IMP Plan are presented in Section 2.0;
- the design features of the OSDF applicable to this IMP Plan are presented in Section 3.0;
- impacted material waste acceptance criteria are described in Section 4.0;
- descriptions of the impacted materials to be placed in the OSDF are presented in Section 5.0;
- general procedures for handling, placement, and compaction of impacted materials in the OSDF are presented in Section 6.0;
- specific procedures for handling, placement, and compaction of soil and soil-like impacted materials are presented in Section 7.0;
- specific procedures for handling and placement of special impacted materials are presented in Section 8.0;
- measures to be taken for the control of impacted runoff and fugitive dust related to, or resulting from, the placement of impacted materials are described in Section 9.0;
- required documentation procedures are presented in Section 10.0;
- seasonal cover requirements are presented in Section 11.0; and
- regulatory and technical references cited in this plan are listed in Section 12.0.

Appendix A to this IMP Plan contains an IMP Quality Assurance Plan. The IMP Quality Assurance Plan describes those activities that the Construction Quality Control (CQC) Consultant will undertake to establish that the Contractor complies with this IMP Plan and approved addenda. Appendix B presents best

available technology (BAT) for remediation construction activities. Appendix C presents Addenda to the IMP Plan that describe specialized placement plans for specific impacted materials.

This IMP Plan uses several key phrases, which are critical to the development of a complete understanding of the Plan. The terms and their usage within this plan are briefly explained as follows:

- "lift" Usage common to earthwork.
- "grid" Refers to a 100 ft by 100 ft grid system for each cell, which provides the control for management of impacted material placement.
- "horizon" A horizontal stratum limited horizontally to a 100 ft by 100 ft grid element, and limited vertically by either the maximum thickness of the item(s) therein or by the total thickness of the maximum number of lifts therein.

#### 1.5 Plan Responsibilities

This plan describes work to be conducted by four separate organizations:

- *Construction Manager (CM)* – Responsibilities include: overall coordination between all parties as it relates to OSDF; directing the construction management team; technical contractual management responsibility over the Contractor; coordinating with WAO to specify the materials requiring OSDF disposal; providing coordination of security for OSDF operations; implementing construction safety; coordinating emergency health and safety response teams; and oversight of the CQC Consultant.
- *Contractor* – Responsibilities include: separating impacted materials into categories at the excavation areas; loading and hauling impacted materials to the OSDF; routing impacted materials within the OSDF battery limit; placing impacted material in the OSDF; obtaining final grade lines as shown on the Certified-For-Construction (CFC) Drawings; compacting (or compacting around and over) impacted material in the OSDF; identifying impacted material to be placed as select and protective layers; and controlling the generation of fugitive dust and managing impacted stormwater runoff.
- *Waste Acceptance Organization (WAO)* – Responsibilities include: checking the impacted material category classification at the OSDF battery limit, reviewing manifest, recording placement locations on manifest following communication with CQC Consultant, and signing manifest.

- *CQC Consultant* - Responsibilities include: checking the impacted material category classification as material is placed in the designated OSDF cell grid; spot-checking impacted material shipments for conformance with the OSDF WAC; verifying the Contractor's choice of location for impacted material placement; documenting that the Contractor followed the placement and compaction procedures required by this IMP Plan; conducting performance tests on materials placed in the OSDF; and reviewing and signing manifests.

## 1.6 Related Plans

Several other plans have been prepared and should be used in conjunction with this IMP Plan. The other plans containing information relevant to this IMP Plan are listed below along with a brief statement of the relationship to this plan.

- "*Construction Quality Assurance (CQA) Plan, On-Site Disposal Facility*" [GeoSyntec, 1997a]: describes the quality assurance procedures that will be followed by CQC Consultant during construction, placement of non-impacted materials for protective and contouring layers, and closure of the OSDF;
- "*Systems Plan* [FDF, 1997b]: contains procedures for inspecting and monitoring the OSDF including the leachate management system, final cover system, and temporary facilities;
- "*Surface Water Management and Erosion Control (SWMEC) Plan, On-Site Disposal Facility*" [GeoSyntec, 1997d]: provides procedures for the management of surface water in and around the OSDF and details of temporary and permanent erosion and sediment controls for the OSDF;
- "*Waste Acceptance Criteria Attainment Plan for the On-Site Disposal Facility*" [DOE, 1997c]: establishes the strategies for ensuring that the OSDF WAC presented in this IMP Plan are met upon disposal in the OSDF.
- "*Permitting Plan and Substantive Requirements for the OSDF*" [DOE, 1997a]: identifies and addresses permitting requirements for the OSDF; and
- "*Leachate Management Contingency Plan for OSDF*" [DOE, 1998]: identifies and addresses leachate management during periods when the Leachate Transmission System is not operational.

## 2.0 PERTINENT REQUIREMENTS

### 2.1 Overview

Regulatory and other requirements pertinent to this plan primarily 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. In general, these criteria are intended to result in impacted material management activities that: (i) are protective of the OSDF liner system, leachate management system, and final cover system; (ii) result in an OSDF waste mass that is stable and does not undergo unacceptable levels of differential settlement; and (iii) provides acceptable management of the generation of fugitive dust and the routing and containment of impacted runoff.

### 2.2 ARARs and TBCs

ARARs and TBCs that should be addressed by this plan are provided here, as obtained from the "Final Record of Decision for Remedial Actions at Operable Unit 2 (OU2 ROD)" [DOE, 1995a], the "Final Record of Decision for Remedial Actions at Operable Unit 5 (OU5 ROD)" [DOE, 1996a], the "Operable Unit 3 Record of Decision for Final Remedial Action (OU3 ROD)" [DOE, 1996b], or the "Permitting Plan and Substantive Requirements for the On-Site Disposal Facility (OSDF Permitting Plan)" [DOE, 1997a], as identified.

	Citation	Requirement	OU2 ROD	OU5 ROD	OU3 ROD	OSDF Permitting Plan
1	Ohio Particulate Matter Standards-Restriction of Emission of Fugitive Dust OAC 3745-17-08	Requires the use of reasonably available dust control measures to prevent fugitive dust from becoming airborne and defines "reasonably available control measures".	✓	✓	✓	
2	Ohio Permit to Install New Sources of Air Pollution-Best Available Technology (BAT)	Requires the installation or modification and operation of an air contaminant source to employ the best available technology for pollution control.	✓	✓	✓	
3	Ohio Solid Waste and Infectious Waste Regulations-Operational Criteria for a Sanitary Landfill Facility OAC 3745-27-19(E)(30)	Prohibits disposal of whole scrap tires and shredded whole scrap tires in a sanitary landfill facility.			✓	✓

<p>4 Ohio Asbestos Emission Control-Standard for Active Asbestos Waste Disposal Sites        OAC 3745-20-06</p>	<p>Prohibits visible emissions from asbestos-containing materials during placement, and requires at least 12 inches of cover of compacted non-asbestos containing material over that asbestos-containing material as soon as practicable but no less often than at the end of each operating day.</p>			<p>✓</p>	<p>✓</p>
<p>5 Ohio Asbestos Emission Control-Standard for Inactive Asbestos Waste Disposal Sites        OAC 3745-20-07(A)&amp;(C)</p>	<p>Prohibits visible emissions from asbestos-containing materials from an inactive asbestos waste disposal site, and requires at least 6 inches of cover of compacted non-asbestos containing material over that asbestos-containing material and growth and maintenance of a cover of vegetation on an area adequate to prevent exposure of the asbestos-containing waste material, or at least 2 feet of cover of compacted non-asbestos containing material, and maintenance of that cover to prevent exposure to the asbestos-containing waste material.</p>	<p>✓</p>		<p>✓</p>	<p>✓</p>
<p>6 Ohio Solid Waste and Infectious Waste Regulations-Sanitary Landfill Facility Construction        OAC 3745-27-08(C)(6)</p>	<p>Requires placement of impacted materials to be performed such that the cell always stores runoff from active and open portions of the cell resulting from the 25-year, 24-hour storm event.</p>	<p>✓</p>	<p>✓</p>	<p>✓</p>	<p>✓</p>
<p>7 Radiation Protection of the Public and the Environment        DOE Order 5400.5, Chapter I(4) and II(2)</p>	<p>Requires application of "As Low As Reasonably Achievable" (ALARA) goals to all activities in the excavation, removal, handling, and placement of impacted materials.</p>	<p>✓</p>	<p>✓</p>	<p>✓</p>	

### 2.3 Functional Requirements

A variety of functional requirements have been established by DOE for the OSDF. The functional requirements applicable to this plan are given below:

- Facilities for impacted material management should:
  - be located in areas that can easily and efficiently accommodate receipt of impacted material from the various FEMP operable units;
  - be separated from non-impacted areas;
  - limit the uncontrolled discharge of fugitive dust to acceptable levels;
  - limit the generation of wastewaters to acceptable levels;
  - comply with project health and safety requirements;
  - be removed at the completion of impacted material management activities, with the disposal of affected materials in the OSDF; and
  - be designed to minimize the generation of new impacted material.
- Impacted materials should be placed in the OSDF in a safe and cost-effective manner that prevents the uncontrolled release of impacted materials to the environment.
- This plan, in conjunction with the various operable unit remedial action planning documents, must only allow the placement of material satisfying the OSDF WAC.

### 2.4 General Design Criteria

A number of general design criteria have also been identified for the OSDF. The general design criteria applicable to this plan are:

- To the extent the stockpiling of impacted soil is necessary, the soil should be stockpiled in the FEMP former production area in order to use the existing storm drainage control system.
- Procedures should be employed that reduce the need for the use of respirators by on-site workers.

- Material transport procedures should cause minimal disturbance to the site and work area and be coordinated with impacted material removal and placement activities.
- Material transport equipment requirements should address the need to transport a variety of materials so that the number of pieces of equipment required to implement the design is minimized and should address the control of airborne particulate emissions.
- The Contractor must control the release of fugitive emissions (including dust, radiological, chemical, and asbestos materials) so that air quality standards are not violated on the site and so that releases are controlled to acceptable levels at the fence line. The Contractor shall control emissions to assist in controlling airborne exposures to personnel.
- Fugitive dust should be controlled through the implementation of the Best Available Technology (BAT) determination for remedial construction activities on the FEMP site. The BAT is presented in Appendix B.
- Acceptable emission control methods during placement operations include:
  - transporting in dump trucks;
  - using closed containers with metal or tarp lids;
  - keeping impacted material moist; and
  - spraying earthen material with a crusting agent when necessary.
- Impacted material placement procedures should take into account:
  - the rate and time at which impacted material will be available for placement in the cell;
  - the types of impacted material available for disposal (*i.e.*, soil, flyash, lime sludge, solid waste, or building demolition debris);
  - the potential for bulking/shrinkage of impacted material during placement;
  - the availability of temporary stockpile capacity;
  - the extent to which the disposal cell is constructed and available to receive impacted material; and

- the need for suspended or reduced impacted material placement activities during winter and the need for seasonal (winter) cover.
- Impacted material placement activities should be organized to achieve the following design objectives:
  - Impacted material should be placed in the OSDF in such a manner that the OSDF will achieve design life goal of 1,000 years to the extent reasonable, and in any case at least 200 years.
  - Impacted material should be placed in a manner that is protective of the liner system and final cover system.
  - Impacted material should be placed to minimize differential settlement to the extent reasonably achievable.
  - Impacted material should be placed so that it will remain stable under both static and earthquake loading conditions.
  - A minimum of 3 ft thickness of select impacted material should be placed directly over the protective layer component of the liner system, and beneath the contouring layer component of the final cover system, to provide protection of these systems from damage by impacted materials. The thickness of select impacted material over the protective layer may be decreased to 2 ft with approval from Construction Manager, if the first lift of material to be placed over the select impacted material consists of Category 1 material that can be placed in controlled lifts.
  - To limit particulate emissions, generation of wastewaters, and erosion of impacted material, the sequence of placement should minimize the area of exposed impacted material.
  - Materials should be placed in a manner that results in a disposal pile with relatively homogenous large-scale mechanical properties (*i.e.*, compressibility and shear strength), to the extent possible. Homogeneity should be achieved by distributing impacted materials throughout the OSDF to avoid large pockets or distinct concentrations of any one type of impacted material in a particular area. In particular, building demolition debris and other material with solids should be mixed with impacted soils as much as practicable during placement activities. The objective is to minimize the potential for differential settlement.

- At the end of each work day, the impacted material surface should be graded and maintained to control precipitation runoff and impacted material erosion.

### 3.0 OSDF FEATURES

#### 3.1 General

The primary features of the OSDF related to the placement of impacted materials are the liner and final cover systems and certain support elements. These features are briefly described in this section. The Contractor shall be responsible for implementing the requirements of this section and for the protection and safety of the systems described in this section during OSDF construction, filling, and closure.

#### 3.2 Impacted Materials Placement Zones

Control of the placement of impacted material in the OSDF during construction, filling, and closure is required in order to: (i) protect the OSDF liner system, final cover system, and leachate management system from damage; (ii) maintain the impacted material in a stable configuration; (iii) limit fugitive dust to an acceptable level; (iv) allow containment of impacted runoff within the active OSDF cell; and (v) limit differential settlement of the OSDF final cover system to an acceptable level. Details of the liner system and final cover system proposed for the OSDF are shown on the CFC Drawings.

Within each OSDF cell, four zones exist in which impacted material may be placed. These zones and their relative locations with respect to the OSDF liner system and final cover system are shown in Figure 3-1. The four zones are as follows:

- *Protective layer* – a protective layer of impacted or non-impacted soil material, according to Technical Specifications, shall be placed directly over the geotextile filter overlying the leachate collection system (LCS) on the base of each OSDF cell; the soil used for the protective layer shall be either: (i) on-site till or fly-ash material with a maximum particle size not exceeding 3 in. (ASTM C 136 or D 422); or (ii) granular drainage material meeting the material requirements of the project specifications and placed in specified areas of each cell to facilitate vertical percolation of impacted runoff into the underlying LCS;
- *Select impacted material layer* – select impacted material shall be placed both on top of the protective layer and beneath the contouring layer to provide a physical barrier between debris and other “large-size” impacted material and the OSDF liner and final cover systems; the select impacted material shall consist of impacted soil or soil-like material with a maximum particle size not exceeding 6 in. (ASTM C 136 or D 422);
- *Impacted material layers* – a variety of different impacted materials can be placed on top of the select impacted material layer in the central portions of an OSDF cell; the impacted material in this zone need only meet the radiological/chemical waste acceptance criteria established for the

OSDF, the physical waste acceptance criteria established in this IMP Plan, and the placement and compaction criteria established in this IMP Plan; and

- *Contouring layer* - a contouring layer of non-impacted soil material shall be placed directly over the select impacted material layer, prior to installation of the OSDF final cover system; the soil used for the contouring layer shall be a till material with a maximum particle size not exceeding 4 in. (ASTM C 136 or D 422). An impacted soil material may also be used if approved by the Construction Manager. The Contractor shall submit an alternative placement plan if impacted material is selected for the contouring layer.

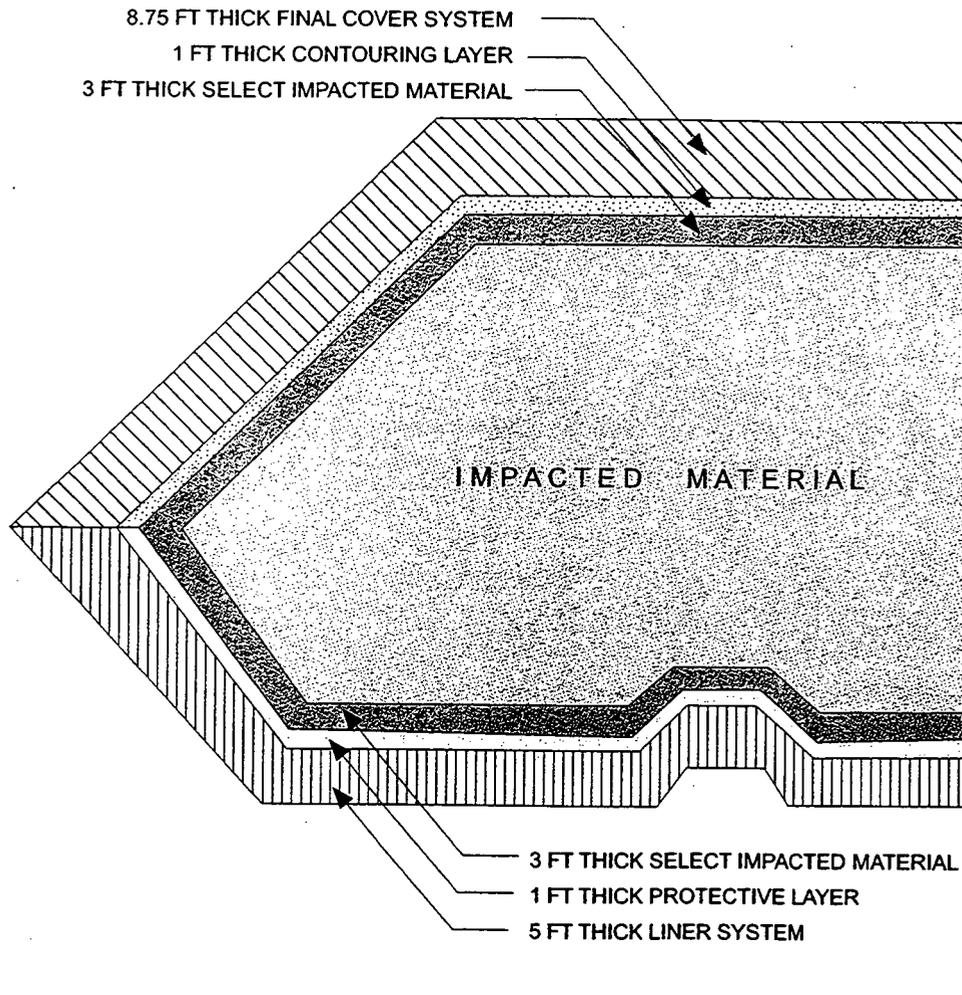
### 3.3 OSDF Support Facilities

#### 3.3.1 Impacted Material Haul Roads

The impacted material haul roads within the OSDF battery limit are designed to laterally contain material that may spill from trucks during transportation and also impacted runoff resulting from precipitation falling onto the roads. Trucks used for impacted material transport shall be suitable for the roadway design. Surfacing for the impacted material haul roads is designed to provide adequate support to the hauling units and a relatively tight texture to promote runoff. Surfacing materials used in the construction of impacted material haul roads shall be removed and disposed in the OSDF when the segment of roadway is no longer needed for impacted material placement activities.

Runoff from impacted material haul roads within the OSDF battery limit shall be managed as impacted runoff (*i.e.*, a form of wastewater). This water shall be contained, collected, and discharged to the storm drainage control system of the FEMP former production area, or to other on-site wastewater collection/conveyance points acceptable to the Construction Manager. Impacted material haul roads outside the OSDF battery limit are addressed as part of other plans prepared for the integrated FEMP remediation.

**IMPACTED MATERIAL ZONES  
(NORTH - SOUTH CROSS SECTION SHOWN)**



NOTE: THIS FIGURE FOR ILLUSTRATION ONLY. CONSTRUCTION CONTRACTOR SHALL PLACE IMPACTED MATERIAL LAYERS TO THE LIMITS SHOWN ON CONSTRUCTION DRAWINGS



FIGURE NO.	3 - 1
PROJECT NO.	GQ1001-03
DOCUMENT NO.	F9620002.2
FILE NO.	FIGS.cdr

### **3.3.2 Impacted Soil Stockpile Areas**

During initial construction of the OSDF, and periodically during filling and closure, it will be necessary to temporarily stockpile impacted soil resulting from OSDF excavation activities. An impacted soil stockpile area shall be developed to temporarily stockpile this material. The area used for stockpiling shall be graded flat and separated from surrounding areas by a 2-ft high soil berm. At the end of each day's work, the impacted soil stockpile shall be lightly compacted and rolled smooth to reduce precipitation infiltration into the pile and control fugitive dust. Any stockpile that will remain inactive for more than 30 days shall be covered with either a crusting agent or geosynthetic cover. Vegetation of impacted soil stockpile areas may be considered if the soil is suitable for establishment of a vegetative cover. Runoff from the stockpile shall be controlled and routed to the FEMP former production area storm drainage control system, or to other on-site wastewater collection/conveyance points acceptable to the Construction Manager.

Impacted soil excavated during construction of the first and subsequent OSDF cells and related support facilities shall be used for construction of the liner system protective layer and the select impacted material layer for those cells if meeting the requirements for those layers. Any geosynthetic cover used in the impacted soil stockpile area and other impacted soils from the operation shall be disposed in the OSDF as part of the impacted material placement activities described later in this plan.

### **3.3.3 On-Site Disposal Facility Material Transfer Area (OMTA)**

Impacted material transfer areas consist of gravel or concrete hardstands constructed to temporarily store impacted structural members and other building demolition debris. These areas shall be used to temporarily stage any material not able to go directly from the material source to an active OSDF cell. Impacted material staging areas constructed outside the limits of the FEMP former production area shall have positive runoff control. Any runoff from these areas shall be directed to the storm drainage control system of the FEMP former production area, or to other on-site wastewater collection/conveyance points acceptable to the Construction Manager.

## 4.0 WASTE ACCEPTANCE CRITERIA

### 4.1 General

This section of the IMP Plan presents information regarding the waste acceptance criteria applicable to the OSDF. Radiological/chemical waste acceptance criteria developed by the individual operable units at the FEMP are identified and made a part of this plan. Other physical criteria are established in this plan.

### 4.2 OSDF Chemical/Radiological Waste Acceptance Criteria

The OU2 ROD has established a radiological waste acceptance criteria of 346 picoCuries/gram (pCi/g) of uranium-238 or 1,030 milligrams per kilogram (mg/kg) of total uranium for operable unit remediation materials destined for the OSDF. Similarly, the OU5 ROD has established additional radiological and chemical waste acceptance criteria for Operable Unit 5 remediation soils destined for the OSDF. Similarly, the OU3 ROD has established a radiological waste acceptance criteria of 105 grams technetium-99 for Operable Unit 3 remediation debris materials. These waste acceptance criteria have been compiled and are presented in Table 4-1. The remediation materials sent to the OSDF from Operable Unit 3 (see Table 5-1) may also include small material contributions from Operable Units 1 and 4; any structural debris material resulting from decontamination and dismantlement of the remediation facilities from these latter operable units destined for the OSDF must meet the Operable Unit 3 waste acceptance criteria.

### 4.3 Physical Criteria

The physical criteria (dimensions given are considered nominal) that shall be applied to material destined to the OSDF are:

- materials from various building components (*i.e.*, steel, concrete, masonry rubble, finish components, *etc.*) shall be segregated at the staging area by the Contractor;
- due to health and safety considerations associated with generating friable asbestos, size reduction of transite panels will not be required; transite shall be bundled, wrapped or encapsulated, and banded to a pallet;
- the maximum length of irregularly shaped metals or other components of a building superstructure or finish component shall be 10 ft;
- the maximum width of irregularly shaped metals or other components of a building superstructure or finish component shall be 10 ft;
- the maximum thickness of irregularly shaped metals or other components of a building superstructure or finish component shall be 18 in.;

- when the materials are part of a load of similar material, the maximum thickness of concrete or other components of a building slab or substructure shall be 18 in. and having a maximum length of 10 ft;
- the maximum cross-sectional dimension of an individual concrete member or other component of a building slab or substructure shall be 4 ft when the item is handled individually and is a regular, rectangular shape having no concrete protrusions greater than 18 in.;
- concrete reinforcement bars shall be cut within a nominal 12 in. of the concrete mass;
- the maximum thickness of uniform pallets of building cladding (*e.g.*, transite panels) properly banded into rectangular shapes shall be 4 ft;
- regulated asbestos containing material (ACM) shall be double-bagged at the source and delivered unmixed with other materials;
- ACM brick and commingled debris shall be double-contained and segregated at the source;
- piping having insulation of ACM shall be segregated at the source and delivered unmixed with other materials;
- general building rubble consisting of wood, drywall, HVAC systems, electrical systems, plumbing systems, and minor equipment shall be sufficiently reduced in size to be gradeable into a 21 in.  $\pm$ 3 in. lift by equipment similar to a Caterpillar D-8 bulldozer;
- the maximum thickness of general building rubble consisting of concrete, masonry, and other similar materials shall be 18 in.;
- equipment and equipment parts shall be drained of all oils and liquids;
- process piping with a nominal diameter of 12 in. or greater shall be split in half; and
- piping used as a surface water drainage conduit (*e.g.*, corrugated metal pipe, concrete pipe, vitrified clay pipe) and non-process piping shall be crushed or split in half in length to reduce void space; maximum size shall be 10 ft in length and 18 in. thickness.

Impacted materials brought to the OSDF should not be at such a high moisture content that impacted material placement and compaction activities are impeded. Generally, Category 1 soil should have a moisture content that allows the material to be compacted to the required relative compaction using standard soil compaction equipment and procedures. Soil should also have a moisture content that does not result in

excessive "bleeding" of liquids. As necessary, the Construction Manager will direct the Contractor to dry the soil by disking and air drying, by blending with drier soil, or by other means so that the soil can be compacted to the required percent of standard Proctor maximum dry density. The Contractor shall limit the use of in-cell drying to the extent necessary to not restrict the placement of impacted material in the OSDF.

#### 4.4 Prohibited Items

The following are specifically prohibited from disposal in the OSDF:

- impacted material exceeding WAC presented in Table 4-1;
- impacted material that is "characteristically hazardous" ("RCRA characteristic waste", as defined in the OU2, OU3, and OU5 ROD (Excluded from this prohibition is impacted material that has been treated so that it is no longer "characteristically hazardous".));
- material from any off-site source, including any other DOE site, except as provided in the *OU5 ROD*, which states "*Specifically excluded from this prohibition are laboratory wastes generated at off-site facilities resulting directly from the chemical, radiological and engineering analysis of FEMP waste materials/contaminated media or wastes generated at off-site facilities during the conduct of treatability or demonstration type studies on FEMP material*";
- pressurizable gas cylinders;
- process-related metals (OU3-ROD Category C materials);
- product, residues, and other special materials (a subset of OU3-ROD Category J materials);
- materials containing free liquids (The intent of the exclusion of free liquids is to prevent contaminated liquid waste from being directly disposed of in the OSDF (e.g., drum of solvent). Materials that contain rainwater or that have an inherent moisture content like sludges are not excluded from disposal in the OSDF. If a material that arrives at the OSDF for disposal is too wet for proper placement and compaction, the material will be mechanically processed before placement.);
- intact drums (*i.e.*, drums must be empty and crushed);
- acid brick (OU3-ROD Category F materials);
- transformers, which have not been either crushed or had their void spaces filled with grout (or other material approved by the Construction Manager);

**Table 4-1  
ON-SITE DISPOSAL FACILITY  
WASTE ACCEPTANCE CRITERIA**

	Constituent of Concern	Soil <sup>a</sup>		Debris <sup>b</sup>
		OU2	OU5 <sup>d</sup>	OU3
	<b>Radionuclides:</b>			
1	Neptunium-237		3.12 x 10 <sup>9</sup> pCi/g	
2	Strontium-90		5.67 x 10 <sup>10</sup> pCi/g	
3	Technetium-99		29.1 pCi/g	105 g
4	Uranium-238	346 pCi/g		
	Total Uranium	1,030 mg/kg	1,030 mg/kg	
	<b>Inorganics:</b>			
5	Boron		1.04 x 10 <sup>3</sup> mg/kg	
6	Mercury <sup>c</sup>		5.66 x 10 <sup>4</sup> mg/kg	
	<b>Organics:</b>			
7	Bromodichloromethane		9.03 x 10 <sup>-1</sup> mg/kg	
8	Carbazole		7.27 x 10 <sup>4</sup> mg/kg	
9	Alpha-chlordane		2.89 mg/kg	
10	Bis(2-chloroisopropyl)ether		2.44 x 10 <sup>-2</sup> mg/kg	
11	Chloroethane		3.92 x 10 <sup>5</sup> mg/kg	
12	1,1-Dichloroethene <sup>c</sup>		11.4 mg/kg	
13	1,2-Dichloroethene <sup>c</sup>		11.4 mg/kg	
14	4-Nitroaniline		4.42 x 10 <sup>-2</sup> mg/kg	
15	Tetrachloroethene <sup>c</sup>		128 mg/kg	
16	Toxaphene <sup>c</sup>		1.06 x 10 <sup>5</sup> mg/kg	
17	Trichloroethene <sup>c</sup>		128 mg/kg	
18	Vinyl chloride <sup>c</sup>		1.51 mg/kg	

**NOTES:**

<sup>a</sup> maximum concentration

<sup>b</sup> maximum total mass

<sup>c</sup> RCRA-based constituent of concern

<sup>d</sup> constituents which have established maximums which serve as Waste Acceptance Criteria; other compounds which will not exceed designated Great Miami Aquifer action levels within 1000-year performance period, regardless of starting concentration in the OSDF, are not listed.

**SOURCES:**

OU2 ROD [DOE, 1995a]

OU5 ROD [DOE, 1996a]

OU3 ROD [DOE, 1996b]

- whole or shredded scrap tires (as defined by Ohio Environmental Protection Agency);
- used oils; and
- materials not accompanied by the transportation “manifest” information specified in this plan.

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## 5.0 IMPACTED MATERIAL DESCRIPTIONS

### 5.1 General

The OSDF will be the final repository for a majority of the impacted material from the five operable units of the integrated FEMP remediation. Construction debris (*i.e.*, waste originating during the construction of the OSDF) will also be disposed in the OSDF. The materials requiring OSDF disposal are expected to vary considerably in their composition, handling, placement, and compaction characteristics. Given this variability, it is useful to develop a categorization framework wherein materials with similar characteristics are assigned to the same category. The purpose of this section of the IMP Plan is to describe and categorize the various impacted materials using a common categorization framework.

### 5.2 Impacted Material Categories

Impacted materials to be disposed in the OSDF shall be assigned to one of five categories, depending on the procedures that will be used to place them into the OSDF:

- Category 1 - Category 1 impacted materials are soils and soil-like materials that do not contain hard agglomerations greater than 12 in. in greatest dimension. Category 1 soil and soil-like materials that contain a minimum of 80 percent, by volume, of soil, and soil-like materials that are finer than 1 in. particle size can also contain a maximum of 20 percent, by volume, of non-soil-like Category 2 and/or Category 4 materials that are not greater than 12 in. in greatest dimension. If the material is other than till or ash, it must also have at least 80 percent of its particles finer than a 1 in. particle size. If this latter criterion is not met, the material should be classified as a Category 2 material. These impacted materials are expected to be readily compactable using standard construction equipment.
- Category 2 - Category 2 impacted materials are materials that can be transported, placed, spread, and compacted *en masse*. These materials can be spread in loose lifts of 21 in.  $\pm$ 3 in. thick and are moderately compactable under the action of equipment similar to the Caterpillar 826 landfill compactor or approved equal. Examples of these materials include broken-up concrete foundations or impacted soil mixed with broken-up concrete. This category also includes general building rubble and debris of irregularly shaped metals or other components of the superstructure or substructure with a maximum length of 10 ft and a maximum thickness of 18 in. which can be transported, placed, spread, and compacted *en masse*.
- Category 3 - Category 3 impacted materials are materials that must be individually handled and placed in the OSDF, and that are suitable for having Category 1 material placed around and against them. These impacted materials have maximum cross-sectional

dimension of no more than 4 ft, are shaped such that Category 1 material can be compacted around and against them, and are essentially incompressible using standard compaction equipment. Examples of these materials include bundles of transite panels, and broken concrete foundation members that meet the physical criteria defined in Section 4.3 of this IMP Plan.

- Category 4 - Category 4 impacted materials are high in organic content and/or prone to decomposition. Examples of these materials are municipal solid wastes from the Solid Waste Landfill, and green waste from clearing, stripping, and grubbing operations around the FEMP.
- Category 5 - Category 5 impacted materials are materials that require special handling due to their specific nature. Examples of these materials include double-bagged asbestos and sludges.

The categories given above shall be used by the Contractor to categorize each load of impacted material to be brought to the OSDF for disposal. The Construction Manager will use this categorization in establishing disposal limitations and instructions for each truck load of material destined for the OSDF.

### **5.3 Specific Impacted Materials**

#### **5.3.1 General**

This section of the IMP Plan contains background information on the types and approximate quantities of specific impacted materials that may require special handling and/or placement activities. These impacted materials primarily consist of landfill waste, water treatment plant sludge, and demolition debris. The purpose of this section of the IMP Plan is to provide the Contractor with a physical description of these specific materials.

#### **5.3.2 Solid Waste Landfill**

The Solid Waste Landfill is a rectangular disposal area of approximately 1 acre that has been inactive since 1986. A soil cover has been placed over the disposal area. A drainage ditch serving the northwest portion of the former production area is located in the northern portion of the Solid Waste Landfill. The volume of waste material in the landfill is estimated to be approximately 14,400 yd<sup>3</sup>.

The operational history of the Solid Waste Landfill is not well documented. It is thought that the landfill was organized with one to five individual waste disposal cells and an evaporation pond, which also served as a surface-water management basin. Materials reportedly buried at the Solid Waste Landfill include non-burnable and nonradioactive solid waste generated on FEMP property, nonradioactive construction-related rubble, and double-bagged and bulk quantities of nonradioactive asbestos. Field

investigation results, however, indicate that some process waste may have been placed in the landfill. The following wastes were encountered during a trenching investigation in 1992:

- burnable wastes - bagged trash and wood;
- potentially burnable wastes - respirator cartridges, asphalt roofing materials, medical wastes, fire hoses, and rubber hoses/belts; and
- non-burnable wastes - unidentified high-activity waste, medicine vials, bagged asbestos, ceramic tiles, possible magnesium fluoride, glass acid bottles, steel cables/cans, paint cans, and copper tubing.

### 5.3.3 Lime Sludge Ponds

The Lime Sludge Ponds are two unlined, rectangular ponds, each measuring approximately 125 by 225 ft. Wastes that were disposed in the Lime Sludge Ponds originated from water treatment plant operations, coal pile stormwater runoff, and boiler plant blowdown. Although this waste is from three distinct waste streams, the bulk of the slurry is lime sludge from the water treatment process. Over time, the solids in the slurry settled in the Lime Sludge Ponds and the remaining decant was pumped from the ponds. The lime sludge is, therefore, considered to be relatively homogenous.

The volume of sludge and berm material contained within the two lime sludge ponds is estimated to be approximately 16,500 yd<sup>3</sup> of lime sludge and 5,600 yd<sup>3</sup> of berm material making a total of 22,100 yd<sup>3</sup> of material. The South Lime Sludge Pond is full and has been inactive since the mid-1960's. The North Lime Sludge Pond is not currently active, but was in use as late as January 1995. The west side of the North Lime Sludge Pond is usually covered with 1 to 2 ft of water, depending mainly on precipitation. The remaining area is dry and covered with sparse vegetation.

### 5.3.4 Building Debris

Debris from demolition of buildings in the FEMP former production area is expected to constitute the largest volume of impacted material for OSDF disposal after soil and soil-like material. The OU3 ROD indicates that impacted debris can be assigned to one of ten material categories. The OU3 ROD indicates that material from seven of these categories will be disposed in the OSDF; material from three other categories (C, F, and J) are to be dispositioned off-site (*i.e.*, expressly prohibited in total from on-site disposal), while a subset of a fourth category (D) cannot be disposed in the OSDF without first undergoing treatment (lead flashing). Description of the seven OU3 debris material categories resulting from decontamination and dismantlement (D&D) of the former production and associated process facilities that can be disposed of in the OSDF are defined in Table 5-1.

### 5.3.5 Inactive Flyash Pile

The Inactive Flyash Pile is located approximately 2,000 ft southwest of the former production area. The Inactive Flyash Pile received flyash and bottom ash from boiler plant operations starting in 1951. It has been inactive since the mid-1960s and is covered with soil and natural vegetation.

The total quantity of ash disposed in this area has been estimated at 43,600 yd<sup>3</sup>. Materials such as building rubble, concrete, asphalt, steel rebar, and asbestos-containing transite were also discarded in this area. These materials are visible at the surface along the Inactive Flyash Pile's western and southern edge.

### 5.3.6 South Field

The South Field disposal area is located approximately 2,000 ft southwest of the former production area and covers approximately 11 ac. The South Field was used as a burial site for construction rubble and as a disposal area for soil excavated from the former production area. Disposal activity ceased during the mid 1960s. Soil, building rubble, concrete, asphalt, flyash, and steel rebar were encountered during sampling operations within the soil fill in the South Field. The estimated volume of fill disposed in the South Field is approximately 120,000 yd<sup>3</sup>.

### 5.3.7 Active Flyash Pile

The Active Flyash Pile disposal area is located about 3,000 ft southwest of the former production area and east of the South Field. Past operations at the FEMP have relied on boiler-produced steam. Ash waste is comprised primarily (70 percent) of bottom ash collected below the boilers. Precipitator ash collected from pollution control devices and flyash removed from the middle levels of the boiler comprise the remaining 30 percent of the ash waste. Until recently, ash waste has been loaded into dump trucks and transported to the Active Flyash Pile disposal area. Estimates established indicate that approximately 65,000 yd<sup>3</sup> of ash have been disposed in this area. The pile has a surface area of approximately 4 ac.

**Table 5-1**  
**OU3 MATERIAL CATEGORIES/DESCRIPTIONS**

Category A Accessible Metals	Category B Inaccessible Metals	Category D Painted Light-Gauge Metals	Category E Concrete	Category G Non-Regulated ACM	Category H Regulated ACM	Category I Miscellaneous Materials
Structural & miscellaneous steel	<ul style="list-style-type: none"> <li>• Doors</li> <li>• Conduit/wire/cable tray</li> <li>• Electrical wiring &amp; fixtures</li> <li>• Electrical transformers</li> <li>• Miscellaneous electrical items</li> <li>• HVAC equipment</li> <li>• Material handling equipment</li> <li>• Process equipment</li> <li>• Miscellaneous equipment</li> <li>• Piping</li> </ul>	<ul style="list-style-type: none"> <li>• Ductwork</li> <li>• Louvers</li> <li>• Metal wall &amp; roof panels</li> </ul>	<ul style="list-style-type: none"> <li>• Asphalt</li> <li>• Slabs</li> <li>• Columns</li> <li>• Beams</li> <li>• Foundations</li> <li>• Walls</li> <li>• Masonry</li> <li>• Clay piping</li> </ul>	<ul style="list-style-type: none"> <li>• Ceiling demolition</li> <li>• Feeder cable</li> <li>• Fire brick</li> <li>• Floor tile</li> <li>• Transite wall &amp; roof panels</li> </ul>	<ul style="list-style-type: none"> <li>• Ductwork insulation</li> <li>• Piping insulation</li> <li>• Personal protective equipment</li> <li>• Copper scrap metal pile</li> </ul>	<ul style="list-style-type: none"> <li>• PVC conduit</li> <li>• Basin liners</li> <li>• Fabric</li> <li>• Drywall</li> <li>• Building insulation</li> <li>• Miscellaneous debris</li> <li>• Personal protective equipment</li> <li>• PVC piping</li> <li>• Roofing build-up</li> <li>• Process trailers</li> <li>• Non-process trailers</li> <li>• Windows</li> <li>• Wood</li> </ul>

SOURCE: Table 4-2, OU3 Material Categories/Description, *OU3 ROD* [DOE, 1996b].

NOTE: Only those OU3 material categories allowed for on-site disposal per the *OU3 ROD* are presented.

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## 6.0 GENERAL PLACEMENT PROCEDURES

### 6.1 Introduction

This section of the IMP Plan describes the general procedures that the Contractor shall follow for placement of impacted material in the OSDF. Specific procedures for placement of Category 1 materials (soils and soil-like materials) are presented in Section 7.0 of this IMP Plan. Specific placement procedures for Category 2 through 5 materials (non soil-like materials) are addressed in Section 8.0 of this IMP Plan.

### 6.2 Contractor's Safe Work Plan

The Contractor shall be responsible for preparing a Contractor's Safe Work Plan (SWP) defining placement methods, and safety controls, and other appropriate safety standards that meet all health and safety requirements identified in the FEMP Project Specific Health and Safety Requirements Matrix (PSHSRM) and Technical Specifications. In addition, FEMP H&S personnel will perform periodic audits of the Contractor to ensure compliance. Personnel will have stop-work authority (in the event of threat to worker and/or public safety) until the proper corrective action is taken. The H&S Officer assigned to the OSDF project will be the single point of contact for all safety, industrial hygiene, fire protection, and radiological issues or concerns.

In addition to H&S personnel assigned to the project, the Contractor shall be required to provide an H&S field representative who shall be responsible for the Contractor's compliance with all H&S requirements. The Contractor shall be required to report all safety concerns and incidents to the H&S Officer.

Radiological technician(s) will also be assigned to the OSDF project. In conjunction with the H&S Officer assigned to the project, the radiological technician(s) will help to ensure radiological compliance throughout the project. Radiological compliance includes the radiological monitoring of equipment and materials entering and leaving the job site, radiological monitoring of soil during excavations to help ensure proper segregation, storage, or disposition; radiation work permit compliance, routine inspection, monitoring, and recording of area radiation detection monitors, and radiological monitoring of personnel, if necessary. The PSHSRM, Technical Specifications, and other appropriate safety standards will be the basis for the required monitoring and will identify the action levels that will ensure personnel safety by limiting exposure.

### 6.3 Manifesting

The Waste Acceptance Organization (WAO) shall prepare an impacted material transportation "manifest" for each load of material to be transported to the OSDF. The purpose of the "manifest" is to provide a tracking mechanism for impacted material from the remediation project of origin to placement in the OSDF. WAO will be responsible for providing the required information on the "manifest" as detailed in Section 10.2 of this IMP Plan.

Upon entering the OSDF battery limits, WAO will check that the impacted materials are accompanied by a "manifest", if a special concerns form is attached, and that the hauling unit has been properly identified as to the impacted material category, in accordance with Section A.3 of Appendix A of this IMP Plan. WAO will review the "manifest" for completeness prior to releasing the hauling unit to the cell for placement and inform OSDF personnel of special concerns. The CQC Consultant will be required to verify accuracy and sign the "manifest" at the end of the day following placement and retain a copy. The CQC Consultant verifies accuracy of manifest and placement location based on field notes from communication with WAO who receives impacted material and signs the manifest at the OSDF battery limit. The Contractor shall fully comply with these quality control activities and account for them in its planning and scheduling.

After trucks/containers are cleared at the OSDF battery limit by WAO, the Contractor shall route the impacted material to a location within the OSDF (*e.g.*, the active face, a stockpile area, or designated grid) for disposal. The Contractor shall be provided with flexibility in routing trucks/containers for efficient operations. However, the Construction Manager will provide the Contractor with specific instructions for routing of impacted materials in Categories 2 through 5. The Contractor shall be responsible for following the instructions provided by the Construction Manager.

The placement and compaction procedure to be used by the Contractor for each load of impacted material shall be based on the impacted material category. Placement and compaction procedures for the five material categories listed in Section 5.2 of this IMP Plan are presented in Sections 7.0 and 8.0 of this plan.

#### **6.4 Protection of Facilities**

Impacted material placement activities shall be conducted in a manner that protects and maintains the integrity of the OSDF liner system, leachate management system, final cover system, and all OSDF ancillary facilities and equipment. Impacted material placement activities shall not commence in a cell until liner system construction has been completed in accordance with the Contract Documents and only after cell construction has been certified in accordance with the requirements of the *OSDF CQA Plan* and all other contract requirements.

#### **6.5 Placement Oversight and Quality Assurance**

Impacted material placement for all categories of material shall be conducted under the direct oversight of Contractor personnel versed in all aspects of this plan and having qualifications meeting the requirements of the *OSDF CQA Plan*. The Contractor shall provide on-the-ground spotters who shall observe each load that is placed to monitor that the work is performed in compliance with the requirements of this plan. The Contractor shall be assisted by surveyors and quality control personnel, as required, to control lift thickness and grades, record the coordinates of the impacted material placement, and perform other necessary functions.

The Contractor shall be aware that monitoring of the placement and performance testing of impacted material for specified compaction in the OSDF will be performed by the CQC Consultant in accordance with the requirements of the Contract Documents. The Contractor shall also be aware that the CQC Consultant will perform required testing prior to Contractor placing additional lifts above the area being tested.

#### **6.6 Conformance with OSDF Specifications**

The Contractor shall comply with the Technical Specifications, which shall be used in conjunction with this plan, and these shall be referenced for specific details regarding the labor, material, and supervision at the OSDF.

#### **6.7 Standard Operations Procedures**

##### **6.7.1 General**

The Construction Manager will have the authority to halt impacted material placement operations if placement operations are not in accordance with the project specifications and this IMP Plan.

Salvaging of materials being deposited in the OSDF is strictly prohibited. Fluor Fernald, Inc. personnel will examine, on a random basis, trucks leaving the OSDF for salvaged materials.

Placement of impacted materials shall only occur during daylight hours unless specifically approved by the Construction Manager. The last unit load of waste typically will not be accepted less than 45 minutes prior to sundown.

Impacted material placement activities shall cease for the winter when the Construction Manager determines that satisfactory compaction of impacted material and/or safe working conditions are no longer possible due to weather conditions.

##### **6.7.2 Inclement Weather Operations**

Placement of impacted material in the OSDF shall cease when the average wind speed measured at or near the working face of the active OSDF cell is in excess of 20 mph or when wind gusts exceed 30 mph for more than 1 minute in the previous 60 minutes. Fluor Fernald, Inc., will provide and maintain a weather station at the FEMP site to provide a continuous record of wind speed and temperature during the working day; the station will also be equipped with a rain gauge. The Construction Manager will determine when unacceptable wind conditions exist.

Impacted material shall not be placed during periods of significant precipitation. Significant precipitation will be determined by the Construction Manager in consultation with the CQC Consultant.

The Contractor may prepare an inclement weather deck within the OSDF active cell. The purpose of this deck is to provide an area where placement activities can occur when precipitation has left other areas of the OSDF unsuitable (due to mud or soft surfaces) for impacted materials placement activities. The inclement weather deck may be used for placement of Category 2 materials (*en masse* placement).

Impacted material placement activities shall not restart after an inclement weather shutdown until verbal approval to do so is provided by the Construction Manager. Factors that will be considered by the Construction Manager in restarting operations include:

- weather forecasts;
- condition of haul roads;
- if operations could lead to additional erosion of impacted materials;
- ability to decontaminate the impacted material hauling trucks;
- nature of impacted materials to be placed; and
- conditions within the OSDF.

### 6.7.3 As-Placed Records

The Contractor shall be aware that the CQC Consultant and Fluor Fernald, Inc. will maintain records showing the locations of placement of all categories of impacted materials. The records will provide locations of the impacted material placement within the cell by grid, lift, and Category. The Construction Manager will use these records to decide where subsequent loads of Category 2 through 5 impacted material can be placed. For example, the Contractor shall not be allowed to place multiple lifts of Category 4 impacted material on top of each other so as to avoid creating a compressible zone in the OSDF that could induce future differential settlements in the OSDF final cover system.

As an example, if a load of double-bagged asbestos comes to the OSDF for disposal, the Construction Manager will first consult the as-placed records or plans to determine a suitable place to dig a trench for disposal (as required by Section 8.6.3 of this Plan). Consultation of the as-placed records or plans will ensure that placement restrictions are followed and that the trench for asbestos disposal will not be excavated into anything except Category 1 material. Following identification of a suitable location, the trench shall be excavated, the double-bagged asbestos placed, and the trench backfilled and compacted according to requirements presented in this Plan. The Contractor shall then note the location (grid and elevation), depth, and length of the trench and submit to Construction Manager.

## 6.8 Spreading and Grading

The Contractor shall be aware that an important objective of this IMP Plan is to achieve uniform settlement of the impacted materials placed within the OSDF and to limit the total magnitude of such settlement. Thus, the Contractor shall, as much as possible, maintain homogeneity of the physical characteristics of the impacted materials placed across horizons of the OSDF. The Contractor will be directed by the Construction Manager to route impacted materials in such a fashion that each lift is relatively uniform over its lateral extent. To the extent possible, compressible materials (such as green wastes, double-bagged asbestos, and Solid Waste Landfill materials) shall not be piled vertically but shall be spread laterally (except for double bagged asbestos, which shall be handled in accordance with Section 8.6.3). Incompressible materials shall not be placed directly above other incompressible items without appropriate intervening horizons of Category 1 materials. Materials of higher permeability (such as demolition debris) shall not be placed directly above other high permeability materials without appropriate intervening horizons of lower permeability Category 1 materials.

Impacted material placement shall generally proceed from east to west and north to south within each OSDF cell. Vertical slope of an existing grid shall be benched prior to placement of impacted material in an adjacent grid. Maximum compacted lift thicknesses for soil, soil-like-materials, and other impacted materials shall be 1.0 ft, except as provided in Section 8.0 of this IMP Plan. Each lift of topmost select impacted material shall be controlled to line and grade such that cell perimeter contours are within 0.2 ft of the design grade for the bottom of the contouring layer.

Figure 6-1 illustrates the sequencing of impacted material placement and slope development within the first OSDF cell, looking west to east. Select impacted material layers on the cell base and sideslopes shall be advanced at least 2 ft ahead of general impacted material layers. Similarly, Figure 6-2 illustrates the sequencing of impacted material placement and slope development in subsequent cells.

## 6.9 Compaction

Each lift of Category 1 impacted material placed in the OSDF shall be compacted by the Contractor to the minimum criteria given in Sections 7.0 and 8.0 of this IMP Plan. Monitoring and testing activities are described in Appendix A of this IMP Plan.

## 6.10 Surface Conditions and Drainage

On a daily basis, the Contractor shall maintain the impacted material surface in the active OSDF cells to limit fugitive dust and control and retain impacted runoff. The Contractor shall establish surface-water runoff routing in each active cell to convey runoff to the impacted runoff catchment area within the cell. The Contractor shall use smooth rolling to seal the surface, silt fences, and other means to limit impacted material erosion. At the end of each working day, the uppermost layer of impacted material shall be sloped at a minimum grade of 0.5 percent toward the impacted runoff catchment area. The southern impacted material

face and faces adjacent to the impacted runoff catchment area shall be constructed to a slope not steeper than 3.5H:1V (horizontal:vertical). The Contractor shall perform temporary erosion control requirements in accordance with the *OSDF SWMEC Plan*.

At the end of each working day, the Contractor shall prepare exposed surfaces of soil and soil like Category 1 and Category 2 material in a manner that satisfactorily controls the generation of fugitive dust. Preparation may include smooth rolling to seal the surface, application of water, application of crusting agents, or covering with geosynthetics. Fugitive dust control actions shall be sufficient to achieve compliance with the BAT determination for remedial construction activities on the FEMP site. At all times, the Contractor shall be prepared to implement the measures mentioned in this paragraph to reduce fugitive dust based on the Contractor's approved fugitive dust control plan or as directed by the Construction Manager.

The following daily surface conditions shall apply for Categories 2, 3, and 4:

1. Category 2 (D&D) debris not containing soil like material shall be covered with Category 1 material no later than 5 calendar days, weather permitting, after initial placement of the Category 2 D&D debris.
2. Category 3 material shall not require a daily cover but shall be covered with Category 1 material on a continuous basis once the Category 3 grid is full. The Contractor shall cover the Category 3 material within 5 calendar days, weather permitting. Banded transite panels that have been "locked down" to mitigate friable asbestos shall be inspected during placement and daily until covered with soil to ensure the "lock down" integrity is maintained. If exposed friable asbestos is observed, additional "lock down" shall be applied to the suspected area.
3. Category 4 material shall require a cover of approximately 12 in. of Category 1 material, which shall be sealed with a smooth drum roller daily.

Impacted material slopes shall be protected from excessive material erosion through the use of silt fences spaced at a maximum vertical spacing of 10 ft as shown in Figure 6-3. Cell perimeter ditches which contribute runoff to the catchment areas, shall be protected by the use of straw bales, or other approved methods, placed in accordance with Ohio Department of Natural Resources (ODNR) Rainwater and Land Development Standards to impede velocity of runoff. The base of the slope of impacted material, along the perimeter of the impacted runoff catchment area in the cell shall be lined with straw bales to limit the washing of fines into the cell impacted runoff catchment area. The impacted runoff catchment area at the southwest corner of each cell has been sized to provide adequate capacity for the detention of the impacted runoff from the 25-year, 24-hour storm event, with 6 in. of freeboard. The catchment area in a current active cell shall be fully maintained until the next active, but adjacent, cell becomes operational and the Contractor has routed all impacted runoff from the current active cell such that impacted runoff from the 25-year, 24-hour storm event will always be contained within the cells. Specifically, the catchment area in each active cell shall remain open until: (i) the catchment area in the adjacent downgradient cell is constructed and operational; and (ii) the

final cover system for the adjacent upgradient cell is constructed to such an extent that the non-impacted surface water runoff is directed to the OSDF surface water management system. An impacted runoff catchment area in each cell is designed to contain runoff from the drainage areas from two cells.

Runoff in the impacted runoff catchment area may be pumped into the FEMP former production area stormwater management system or be allowed to percolate through the granular protection layer into the underlying cell leachate collection system. Requirements for maintaining unimpeded infiltration from the impacted runoff catchment area into the leachate collection system are given in Section 11.2 of the IMP Plan and the *Systems Plan*.

### 6.11 Materials Staging

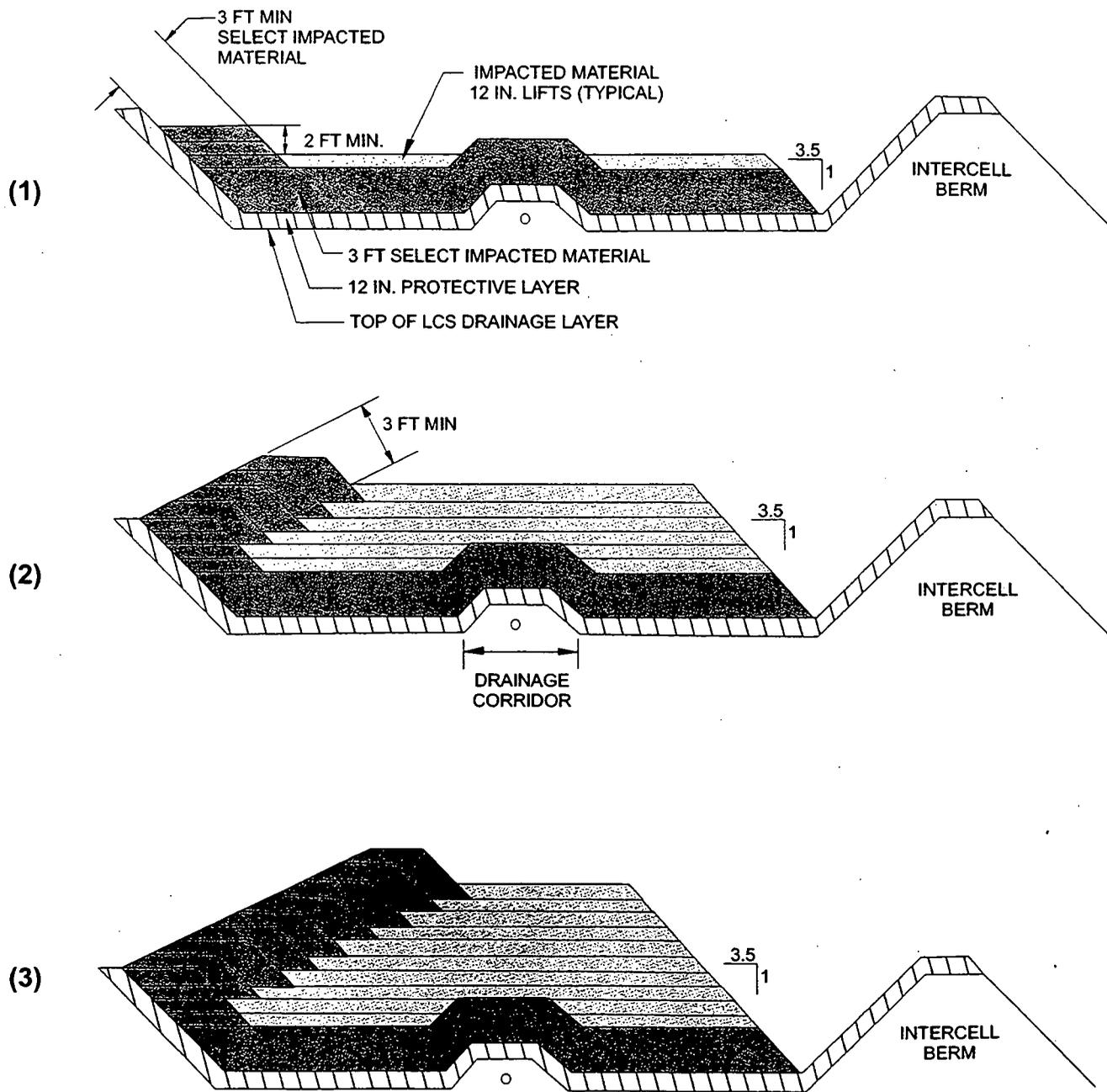
During the active construction season, March through December, Category 2 material that may be staged in the cell(s) is readily available for building cell roads and ramps. Only material for road and ramp construction may be staged (e.g., gravel, asphalt, concrete, rock and similar aggregate materials). This Category 2 material shall be staged in one grid per cell to a maximum height of 5 ft. Grids in the cells for staging of this Category 2 material shall be identified and inspected weekly by the Contractor to assure that the staging configuration has remained the same.

Category 1 material may be temporarily stockpiled in active cells. Stockpiling within the cell will help to achieve optimization of Category 1 material. Stockpiling is warranted when adequate debris is not available for placement, or when Category 1 material is not available for debris cover, for example.

The Contractor shall request and propose location(s) for the Category 1 material stockpile on a written form that will be approved by the Construction Manager. The form will include the proposed location(s) for the stockpiles, placement date, starting and proposed finished elevations for the stockpiles, and estimated volume(s). Approved stockpile forms will be transmitted to the regulatory agencies by Fluor Fernald, Inc. A maximum of two different locations shall be used for stockpiles at one time and the stockpiles shall cover a maximum area of four grids. Total quantity of stockpiles at one time shall not exceed 6,000 cubic yards. Each stockpile shall be separated by a 2-ft high soil berm and conform to the requirements of this IMP Plan. Maximum pile height shall be limited to 10 ft and sideslopes limited to 4H:1V unless approved in writing by the Construction Manager. A stockpile shall be depleted and placed in a grid within 30 days from the commencement of constructing the stockpile.

Stockpiled areas within the cell shall be surveyed prior to beginning of stockpiling activities. Slopes (perimeter berm, intercell berm or impacted material working face) shall not be used as the bottom base of stockpiles (safety concerns and IMP Plan non-conformance). No lifts of impacted material shall be placed in a spent stockpile area until a survey showing depletion of the stockpile is completed and reviewed. Approval to place lifts shall be in accordance with this IMP Plan. Disturbed areas may require re-compaction and re-testing, as determined by the CQC Consultant. Stockpiles shall be removed prior to the end of each construction season.

# IMPACTED MATERIAL PLACEMENT SEQUENCE - CELL 1

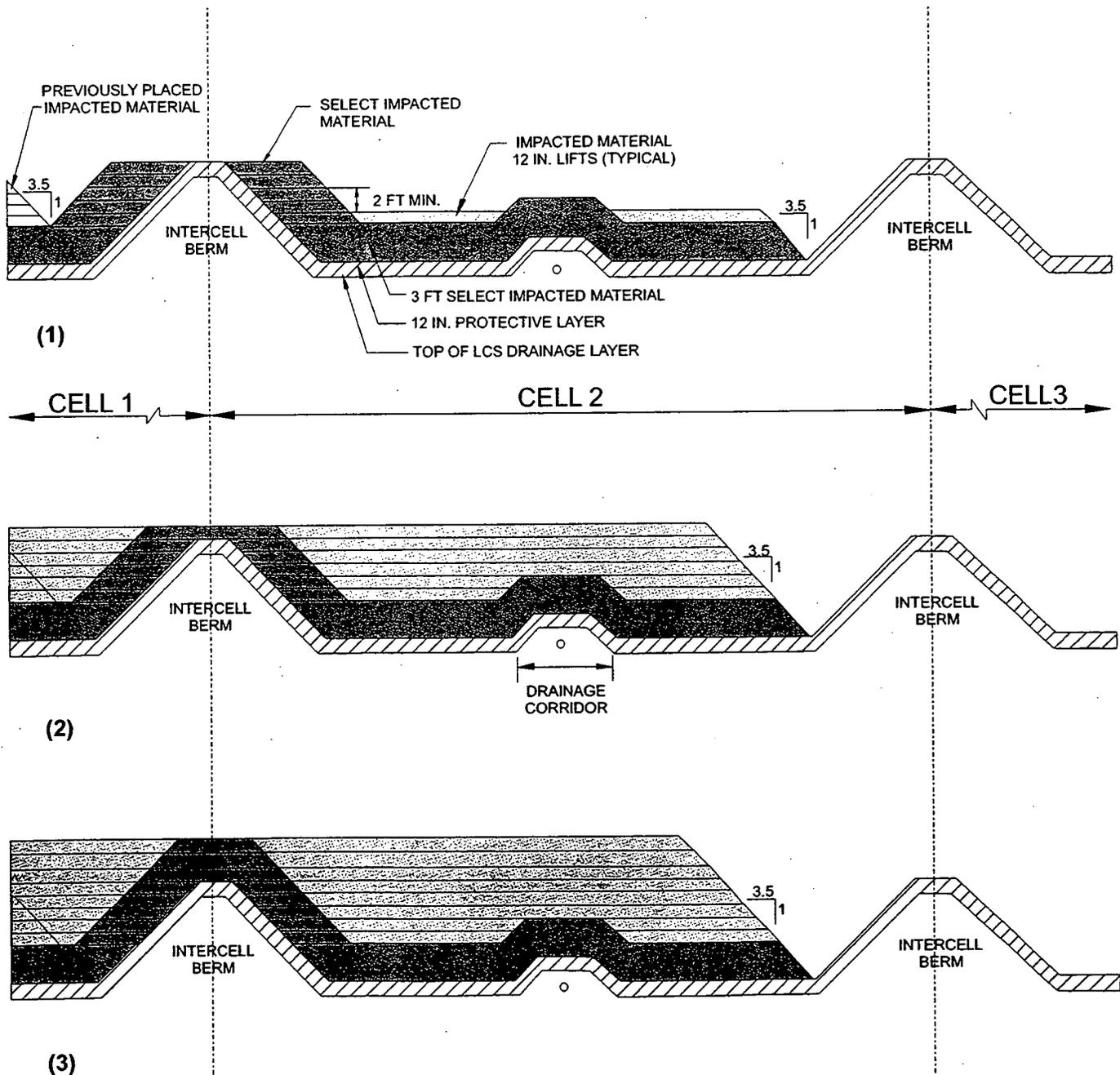


NOTE: THIS FIGURE FOR ILLUSTRATION ONLY. CONSTRUCTION CONTRACTOR SHALL PLACE IMPACTED MATERIAL LAYERS TO THE LIMITS SHOWN ON CONSTRUCTION DRAWINGS



FIGURE NO.	6 - 1
PROJECT NO.	GQ1001-03
DOCUMENT NO.	F9620002.2
FILE NO.	FIGS.cdr

# IMPACTED MATERIAL PLACEMENT SEQUENCE - INTERIOR CELLS

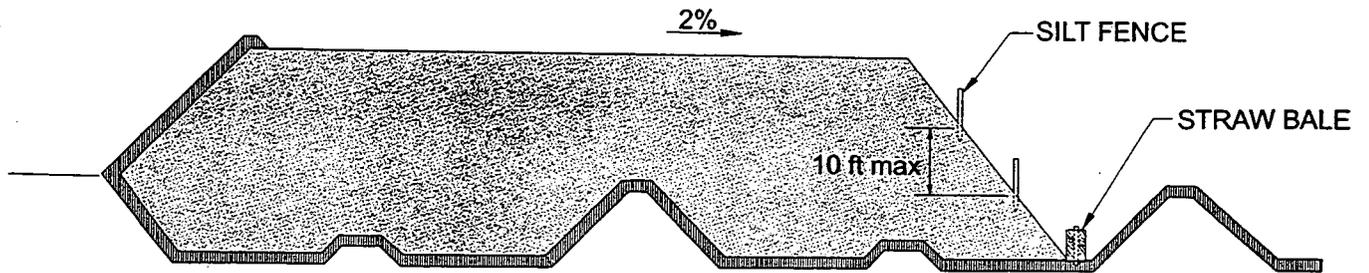
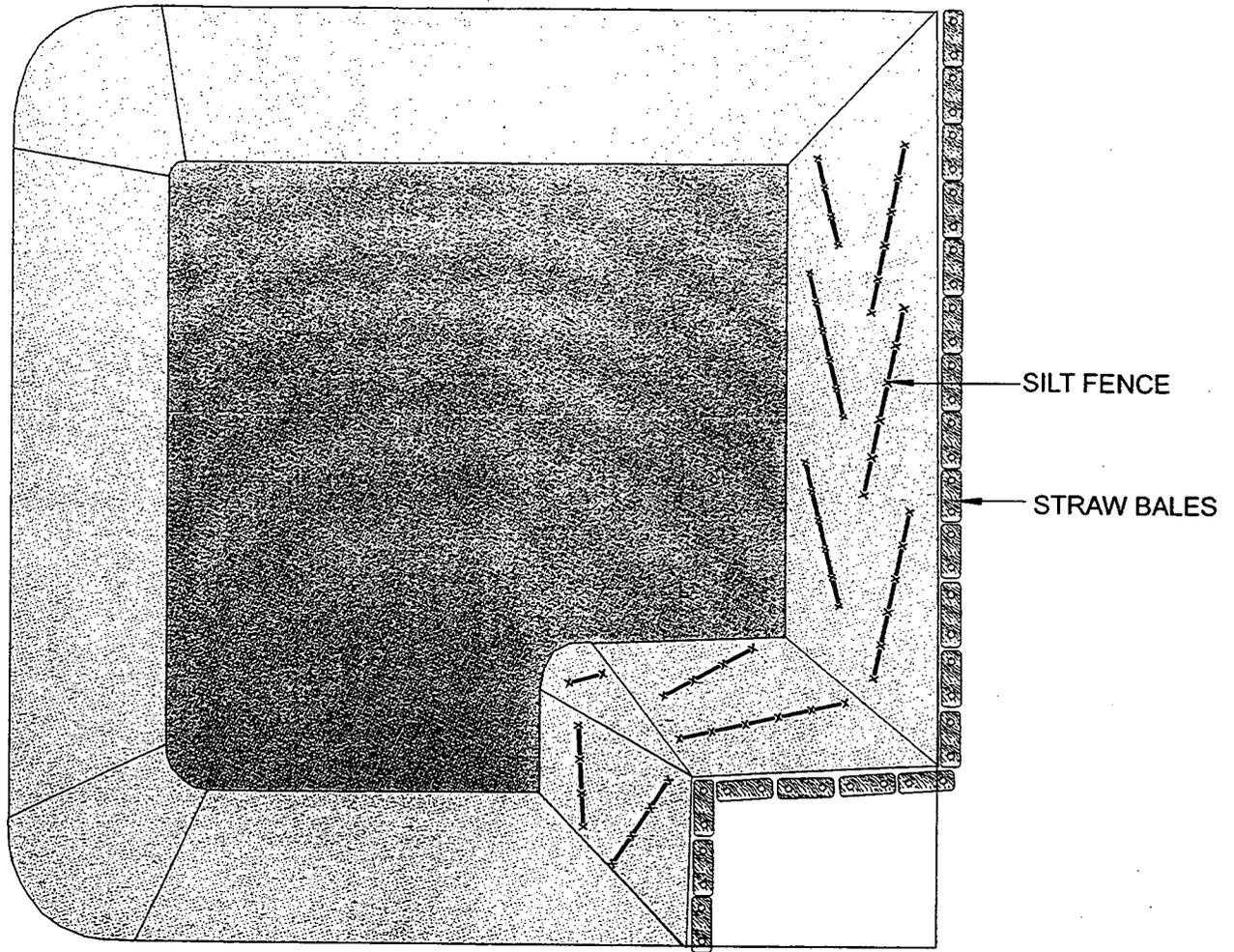


NOTE: THIS FIGURE FOR ILLUSTRATION ONLY. CONSTRUCTION CONTRACTOR SHALL PLACE IMPACTED MATERIAL LAYERS TO THE LIMITS SHOWN ON CONSTRUCTION DRAWINGS



FIGURE NO.	6 - 2
PROJECT NO.	GQ1001-03
DOCUMENT NO.	F9620002.2
FILE NO.	FIGS.cdr

# IMPACTED MATERIAL EROSION PROTECTION AND SEDIMENT CONTROL



NOTE: THIS FIGURE FOR ILLUSTRATION ONLY. CONSTRUCTION CONTRACTOR SHALL PLACE IMPACTED MATERIAL LAYERS TO THE LIMITS SHOWN ON CONSTRUCTION DRAWINGS



**GEOSYNTEC CONSULTANTS**

ATLANTA, GEORGIA

FIGURE NO.	6 - 3
PROJECT NO.	GQ1001-03
DOCUMENT NO.	F9620002.2
FILE NO.	FIGS.cdr

000044

## 7.0 SOILS AND SOIL-LIKE MATERIAL PLACEMENT

### 7.1 General

Approximately 85 percent of the impacted material volume to be placed in the OSDF will be Category 1 material (soil and soil-like). Category 1 material may be further divided into: (i) protective and contouring layer materials; (ii) select impacted material layer materials; and (iii) general soil and soil-like material. The placement of this material is expected to be accomplished using similar methods for spreading, grading, and compaction associated with earthwork for OSDF construction. This section of the IMP Plan addresses those activities associated with the placement and compaction of these soils and soil-like Category 1 materials within the OSDF.

### 7.2 Protective and Contouring Layer

#### 7.2.1 Placement Procedures

As indicated in Section 3.2 of this IMP Plan, the protective layer shall consist of on-site impacted till or flyash or non-impacted till having a maximum particle size not exceeding 3 in. (ASTM C 136 or D 422). The contouring layer shall consist of non-impacted till having a maximum particle size not exceeding 4 in. (ASTM C 136 or D 422). An impacted soil material may be used in contouring layer construction if approved by the Construction Manager. The protective and contouring layer shall also meet the requirements of the Technical Specifications. Topsoil shall not be used for either the protective or contouring layer. Contractor shall submit plans to construct protective and contouring layers as specified in the Technical Specifications.

The protective layer shall be placed in a 12- to 15-in. thick loose lift. The contouring layer shall be placed in two loose lifts in accordance with the Technical Specifications.

#### 7.2.2 Compaction Procedures

To protect the underlying liner system from construction-induced damage, the protective layer shall not be compacted with conventional compaction equipment but rather shall be tracked with a medium-sized bulldozer with ground pressure less than 5 psi. The protective layer shall be constructed in conformance with the Technical Specifications.

The contouring layer shall be compacted to at least 95 percent of the standard Proctor maximum dry density (ASTM D 698). A standard Proctor maximum dry density and optimum moisture content will be established by the CQC Consultant for non-impacted material used for the contouring layer. These material types will be composited prior to establishing compaction parameters. These parameters will be obtained by the CQC Consultant in an on-site geotechnical laboratory established for OSDF construction. The contouring layer shall be constructed in conformance with the Technical Specifications.

### **7.3 Select Impacted Material Layers**

#### **7.3.1 Placement Procedures**

As indicated in Section 3.2 of this IMP Plan, select impacted material shall have a maximum particle size not exceeding 6 in. (ASTM C 136); for material other than impacted till, at least 80 percent of the material shall be finer than a 1 in. particle size. Impacted topsoil may be included in the select impacted material layer but it should not be placed in quantities that deleteriously affect compaction.

The select impacted material layer at the base of the landfill shall be placed in 12-in. to 15-in. thick loose lifts and compacted to a minimum total thickness of 3 ft (*i.e.*, three lifts of roughly equal thickness). The thickness of select impacted material over the protective layer may be decreased to 2 ft upon approval by the Construction Manager, if the first lift to be placed over the select impacted material is Category 1 impacted material. The select impacted material layer below the final cover system shall be placed in a similar manner to a minimum total thickness of 3 ft measured perpendicular to the exterior slope (see Figure 6-1).

#### **7.3.2 Compaction Procedures**

A standard Proctor (ASTM D 698) maximum dry density and optimum moisture content will be established for impacted material used in the select impacted material layers. These material types will be composited prior to establishing compaction parameters. These parameters will be obtained by the CQC Consultant in an on-site geotechnical laboratory established for OSDF construction. Each lift of select impacted material shall be compacted to 85 percent of the standard Proctor maximum dry density if adjacent to the protective layer and to 90 percent of the standard Proctor maximum dry density if adjacent to the contouring layer in the final cover system. It is anticipated that the compaction moisture content will be within  $\pm 3$  percentage points of the optimum moisture content. Specific requirements for compaction moisture content will be established by the Construction Manager during construction.

### **7.4 Category 1 Soil and Soil-Like Material**

#### **7.4.1 Placement Procedures**

Category 1 (soil and soil-like) material shall be placed in 12-in. to 15-in. thick loose lifts and then compacted as indicated below. Prior to placement of a new lift of Category 1 material, the previous lift shall be tracked to leave the surface in a rough condition. The purpose of this preparation is to promote adhesion of the previous and new lifts and to mitigate preferential seepage pathways forming between adjacent lifts.

**7.4.2 Compaction Procedures**

Category 1 (soil and soil-like) material shall be compacted to at least 85 percent of the maximum dry density based on the standard Proctor compaction test, with a running average of at least 90 percent based on the previous 10 tests. The CQC Consultant will establish the standard Proctor maximum dry density (ASTM D 698) and optimum moisture content for Category 1 material requiring compaction. These materials will be composited prior to establishing these parameters. These parameters will be obtained by the CQC Consultant in an on-site geotechnical laboratory established for OSDF construction. It is anticipated that the compaction moisture content of the Category 1 material will be within  $\pm 3$  percentage points of the material's optimum moisture content. Specific requirements for compaction moisture content will be established by the Construction Manager during construction. These requirements will take into account the workability of the material, the required shear strength to obtain adequate levels of OSDF stability, moisture contents needed to achieve dust and other fugitive dust control, and material traffic ability.

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## 8.0 SPECIAL PLACEMENT REQUIREMENTS

### 8.1 Introduction

This IMP Plan requires special procedures for the placement of the non-soil-like materials (Categories 2 through 5). The non-soil-like materials consist primarily of impacted materials from the Solid Waste Landfill, the Lime Sludge Ponds, and impacted debris resulting from demolition of structures within the FEMP former production area. The impacted debris consists primarily of building superstructure (*i.e.*, steel, masonry, transite, and other finish components), concrete floor slabs, and building substructure (*i.e.*, concrete footings, pads, and other components).

### 8.2 Location Recording and Surveying

The Contractor shall identify the locations of placement of each horizon of Category 2 through 5 impacted material as it is placed in the OSDF. For each horizon the Contractor shall establish the horizontal location within 100 ft gridlines and the vertical location by lift. The Contractor shall survey the impacted material in accordance with the Technical Specifications. Where appropriate, sketches of placement of Category 2 through 5 materials should be provided by the Contractor to show the general orientation and layout of individual and special items.

The Contractor shall maintain the grid markers around the perimeter of the cell(s) receiving impacted material. The grid markers shall be visible from the working face. These grid markers are to be placed to a 1 ft horizontal tolerance.

### 8.3 Category 2 Material (*En Masse* Placement)

#### 8.3.1 Placement Procedures

Materials conforming to the Category 2 (*en masse* placement) definition shall be placed in the OSDF in loose lifts not exceeding 21 in.  $\pm 3$  in. in thickness. The  $\pm 3$  in. tolerance is to allow for the occasional piece of rebar, structural steel, or other material that may protrude from the material placed and material that cannot be readily removed or replaced within the 21 in. limit. Prior to placement of a lift of Category 2 material, the placement grid shall be designated such that the grid can be isolated horizontally on all sides with a minimum of 10 ft of Category 1 material. Category 2 material shall then be placed within the designated placement grid to a loose thickness of not more than 21 in.  $\pm 3$  in. Initial compaction shall be accomplished as the material is spread by tracking with a bulldozer of a minimum total weight of 50,000 lbs producing a ground pressure of at least 10 psi or with a landfill compactor (e.g., Caterpillar 826, or approved equal). After spreading and initial compaction, Category 1 material (of a granular nature when available) shall be spread over the Category 2 material to bring the layer thickness to approximately 24 in. Prior to placement of a second lift of Category 2 material, Category 1 material shall be constructed at the perimeter of Category 2 material to the

height of the Category 2 material and to a width of approximately 10 ft. The Category 1 material shall be placed in 12 to 15 inch thick loose lifts as described in Section 7.4 of this IMP Plan.

As Category 2 material is expected to be less compressible than the majority of the materials contained in the OSDF, the material should be spread laterally prior to placing the material vertically above other Category 2 material. However, as it is also expected to be more permeable than other OSDF material, Category 2 material shall not be spread laterally more than 100 ft. In all cases, Category 2 material is to be surrounded in the horizontal directions by at least 10 ft of less permeable Category 1 material. This will reduce the potential for significant lateral migration of leachate. Not more than one lift of Category 2 material shall be placed on top of another lift of Category 2 material without at least the required minimum 4 ft thickness of the intervening horizon of Category 1 material.

The Contractor shall mix Category 1 material as much as practicable with the Category 2 material during excavation and placement activities. The objective of this mixing is to fill voids within the Category 2 material, increase the density of the material placed in the OSDF, and aid in the homogenizing of building rubble, demolition debris, and soils.

### 8.3.2 Compaction Procedures

After each lift of Category 2 material is placed, the material shall be compacted by a minimum four passes of a self-propelled, static pad/blade-foot landfill compactor (*e.g.*, Caterpillar 826, or approved equal). Category 1 material for the 10-ft wide berms surrounding the Category 2 material shall be compacted to at least 90 percent of the standard Proctor maximum dry density determined as described in Section 7.4.2 of this IMP Plan. It is anticipated that the soil compaction moisture content will be within  $\pm 3$  percentage points of the material's optimum moisture content. Specific requirements for compaction moisture content will be established by the Construction Manager during construction. These requirements will take into account the workability of the Category 1 material, the required shear strength to obtain adequate levels of OSDF stability, moisture contents needed to achieve dust and other fugitive dust control, and material trafficability. After compacting the Category 1 material over the Category 2 material, the Category 1 material shall be proofrolled. Soft spots indicated by tire ruts more than 3 in. in depth or visible deflection under the moving proofrolling equipment shall be stabilized through additional passes of the compactor. The proofrolling equipment shall have a minimum gross vehicle weight of 20 tons and exert a ground pressure of at least 65 psi. The proofrolling passes shall be overlapped such that one set of tires on each pass runs between the two sets of tire tracks from the previous pass. Any soft spot that cannot be stabilized with further compactive effort shall be cause for additional treatment to the satisfaction of the Construction Manager. This treatment shall consist of removal, replacement, and recompaction of the Category 1 material, and, if needed, infilling soft spots/areas in the Category 2 material with grout or other material approved by the Construction Manager.

## 8.4 Category 3 Items (Individual Items)

### 8.4.1 Placement Procedures

Items not more than 4 ft in maximum cross-sectional dimension and of regular geometry can be placed as individual members or packages in the OSDF. As much as possible, groups of individual members or packages shall be similarly and regularly sized to enable their placement in the OSDF in regular patterns. Items shall be placed at least 8 ft apart. Figure 8-1 illustrates the placement of bundles of packaged transite panels.

Items having voids with a volume larger than 1 ft<sup>3</sup> shall be filled with a quick-set grout, or flowable cohesionless material approved by the Construction Manager. If a grout is used in this manner, it shall be allowed to set for a minimum of 4 hours prior to the commencement of placement of fill around the item.

Prior to placement of the Category 3 items, the surface of the in-place Category 1 impacted material shall be prepared by rolling with a smooth-drum roller in the area of item placement. The Category 3 items or packages shall be placed on the surface in a regular pattern with an adequate spacing between individual members or packages to allow Category 1 material placement and compaction with available equipment. The space between each member or package shall be filled with Category 1 material placed in 12- to 15-in. thick loose lifts. A final 12- to 15-in. thick loose lift of Category 1 material shall be placed over each grouping of Category 3 items. The Category 1 material shall be placed in 12 to 15 in. thick loose lifts as described in Section 7.4 of this IMP Plan.

As the Category 3 materials are expected to be less compressible than the majority of the impacted materials placed in the OSDF, the Category 3 items should be placed toward the center of the cell, at least 50 ft horizontally from the bottom of the select impacted material layer in the final cover system, and not in the same horizontal elevation within 100 ft laterally of more compressible materials (*i.e.*, Category 4 materials, and sludges and double-bagged asbestos of Category 5 materials). The 100 ft laterally means a 100 ft separation distance from all directions (*i.e.*, north-south, east-west, diagonally) of placed Category 3 material. Horizons of Category 3 materials shall be separated by at least the required minimum 4 ft thickness of the intervening horizon of Category 1 material.

### 8.4.2 Compaction Procedures

Each lift of soil (Category 1 material) between and above the Category 3 items shall be compacted using equipment capable of achieving compaction to at least 85 percent with rolling average of 90 percent of the standard Proctor maximum dry density, determined as described in Section 7.4.2 of this IMP Plan. It is anticipated that the compaction moisture content for this Category 1 material will be within  $\pm 3$  percentage points of the material's optimum moisture content. Specific requirements for compaction moisture content will be established by the Construction Manager during construction. These requirements will take into account the workability of the Category 1 material, the required shear strength to obtain adequate levels of

OSDF stability, moisture contents needed to achieve dust and other fugitive dust control, and material trafficability.

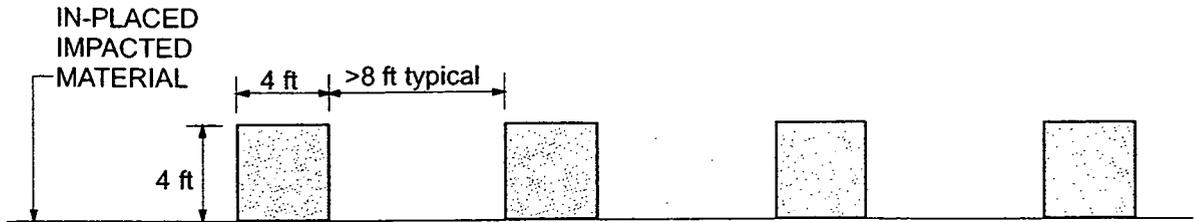
A final 12- to 15-in. thick loose lift of soil (Category 1 material) shall be placed above the Category 3 material. This final compacted lift shall be proofrolled using equipment with a minimum gross vehicle weight of 20 tons and exert a ground pressure of at least 65 psi. Soft spots indicated by tire ruts more than 3 in. in depth or visible deflection under the moving proofrolling equipment shall be stabilized through additional passes of the compactor. Any soft spot that cannot be stabilized with further compactive effort shall be cause for additional treatment to the satisfaction of the Construction Manager. This treatment shall consist of removal, replacement, and recompaction of the Category 1 material, and, if needed, infilling soft spots/areas around the Category 3 material with grout or other material approved by the Construction Manager.

## **8.5 Category 4 Materials (Highly Compressible)**

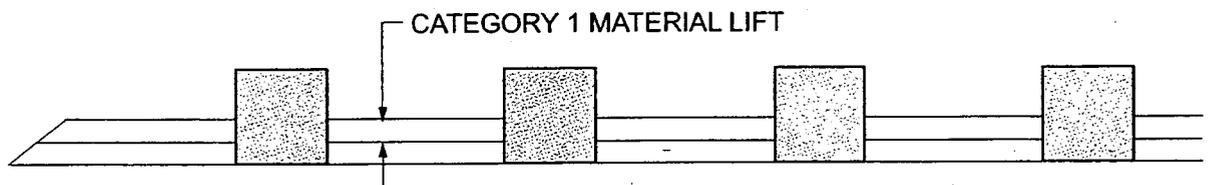
### **8.5.1 Placement Procedures**

Category 1 material berms which are a minimum of 12-in. high shall be placed around Category 4 material and placed as described in Section 7.4 of this IMP Plan. The lateral extent of each Category 4 material placement shall not exceed 100 ft. Category 4 material shall be placed adjacent to the berms to a loose thickness of approximately 18 in. Green waste shall be reduced in size, as necessary, to enable placement in the lift. Initial compaction shall be accomplished as the material is spread by tracking with a bulldozer of a minimum total weight of 50,000 lbs producing a ground pressure of at least 10 psi, or with a landfill compactor (*e.g.*, Caterpillar 826 or approved equal). Prior to placement of the succeeding lifts of Category 4 material, a minimum 12-in. thick loose lift of Category 1 material shall be placed over the Category 4 material and compacted as indicated below. Compaction of the second lift of Category 4 material shall be identical to the first lift. Not more than two lifts of Category 4 material shall be placed in a horizon. Category 4 horizons shall not be in the same vertical plane as previously placed Category 4 horizons.

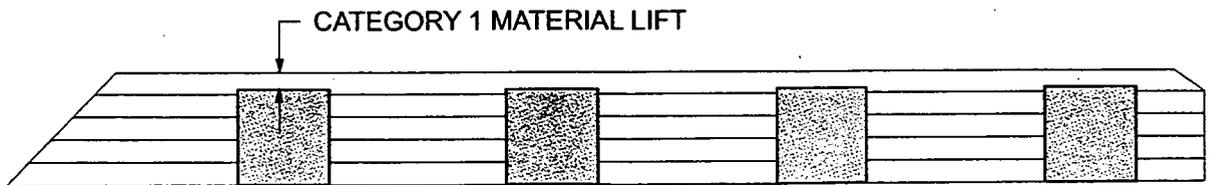
**CATEGORY 3 MATERIAL PLACEMENT SEQUENCE**



1. PLACED IN A REGULAR PATTERN



2. SPACE FILLED WITH COMPACTED CATEGORY 1 MATERIAL PLACED IN 12 TO 15 INCH THICK LOOSE LIFTS



3. FINAL LIFT OF CATEGORY 1 MATERIAL PLACED ABOVE GROUPS

NOTE: THIS FIGURE FOR ILLUSTRATION ONLY. CONSTRUCTION CONTRACTOR SHALL PLACE IMPACTED MATERIAL LAYERS TO THE LIMITS SHOWN ON CONSTRUCTION DRAWINGS



**GEO SYNTEC CONSULTANTS**

ATLANTA, GEORGIA

FIGURE NO.	8 - 1
PROJECT NO.	GQ1001-03
DOCUMENT NO.	F9620002.2
FILE NO.	FIGS.cdr

## 8.5.2 Compaction Procedures

After spreading and initial compaction, the Category 4 material shall be compacted by minimum of four passes of a self-propelled, static pad/blade-foot landfill compactor (*e.g.*, Caterpillar 826, or approved equivalent). After each sequence of Category 4 material compaction and Category 1 cover material placement, the Category 1 cover material shall be compacted as required, as described in Section 7.4 of this IMP Plan. The Category 1 cover material shall then be proof-rolled. The proofrolling equipment shall have a minimum gross vehicle weight of 20 tons and exert a ground pressure of at least 65 psi. Soft spots indicated by tire ruts more than 3 in. in depth or visible deflection under the moving proofrolling equipment shall be stabilized through additional passes of the landfill compactor. Any soft spot that cannot be stabilized with further compactive effort shall be cause for additional treatment to the satisfaction of the Construction Manager. This treatment shall consist of removal, replacement, and recompaction of the Category 1 material, and, if needed, infilling soft spots/areas in the Category 4 material with grout or other material approved by the Construction Manager.

## 8.6 Category 5 Materials (Special Handling, Placement and Compaction)

### 8.6.1 Introduction

Category 5 materials are materials that require special handling, placement and compaction procedures. These materials will be classified and designated in accordance with the approved RODs and the WAC. This section of the IMP Plan establishes procedures for disposal of impacted material that require special handling.

Materials either nominally larger than the physical criteria for the OSDF as identified in Section 4.3 (Physical Criteria) of this IMP Plan, or not reasonably anticipated by the currently identified categories in this IMP Plan, will require specialized placement plans to be developed on an as needed basis. Such plans would be developed by the OSDF project team and submitted to the regulatory agencies for review and approval prior to utilization. It is anticipated that such plans would be submitted concurrent with remedial action planning documents, which identify items for special handling, or following the discovery of unexpected materials outside the current categorizations. Once approved, these specialized placement plans either would become addenda to this IMP Plan, as indicated in Appendix C, or the appropriate section(s) of this IMP Plan would be revised accordingly.

### 8.6.2 General

Impacted materials suitable for placement in the OSDF that require special handling include:

- highly-compressible impacted materials not suitable for lateral spreading as a Category 4 material (*e.g.*, double-bagged asbestos);

- piping insulated with asbestos containing material (ACM); and
- sludges.

Placement and compaction procedures for these types of impacted materials are presented below or in Appendix C.

### 8.6.3 Highly Compressible Materials

#### *Placement*

The volume of highly compressible material, such as double-bagged asbestos, requiring OSDF disposal is very limited. The primary criterion regarding the placement of asbestos is that the material be placed in a manner protective of the health of OSDF personnel and the public. A secondary criterion is to prevent significant differential settlement of the OSDF final cover system resulting from compression of this material.

Prior to placement of any highly compressible material in the OSDF, a trench shall be dug into previously placed and compacted Category 1 material. Material excavated from this trench shall be stockpiled at least 6 ft away from the trench opening. No trenches shall be dug into layers containing Category 2 through 5 material, nor through the protective, contouring, or select impacted material layers. Trenches shall be of uniform width (between 2.0 and 3.0 ft wide) and of a uniform depth (between 3.0 and 4.0 ft deep). The final sizing of the trench shall depend on the nature and size of the material to be disposed. The trenches shall be at a minimum 6 ft apart from one another. Highly compressible material, such as double-bagged asbestos, shall be deposited in the lower half of the trench.

#### *Compaction*

An initial Category 1 material cover between 12 and 18 in. loose thickness shall be placed on top of the highly-compressible material in the trench. The initial Category 1 material cover layer shall be compacted with a minimum of four passes of a portable flat-plate or miniature roller compactor. Intermediate 6- to 12-in. thick loose Category 1 material lifts shall be placed in the trench and compacted to at least 90 percent of the standard Proctor maximum dry density determined as described in Section 7.4.2 of this IMP Plan. A final trench Category 1 material lift shall be placed and compacted to at least 90 percent of the standard Proctor maximum dry density. The surface of the compacted final lift shall be at least 2 in. above the trench shoulders. The sequencing of material placement is illustrated in Figure 8-2.

#### **8.6.4 Piping Containing ACM Insulation**

##### *Placement*

The disposal of ACM-insulated piping in the OSDF shall be performed in a manner protective of the health of OSDF personnel and the public. These materials must be segregated from other demolition debris at the source and delivered to the OSDF in a condition suitable for placement in an excavation dug into previously placed and compacted Category 1 material. The size and shape of the excavation will be based on the predominant dimension and condition of the piping. If the piping comes to the OSDF in relatively straight lengths, the pipes shall be placed in trenches similar to those required for double bagged asbestos. If the piping comes to the OSDF in random shapes, bends, or curvatures, the pipes shall be placed in a rectangular excavation sized to accommodate the pipe but not greater than 20 ft by 20 ft square and 4 ft deep. Pipe should be cut to lengths allowing placement in the 20-ft square excavation and be placed such that Category 1 material can be filled around pipes. The number of pipes placed in the 20-ft square excavation is limited to that number that can be placed such that Category 1 material in-filling around the pipes is possible. The ACM-insulated piping shall be placed in the lower half of the excavation.

##### *Compaction*

An initial Category 1 material loose lift between 12 and 18 in. thick shall be placed on top of the ACM-insulated piping in the excavation. The initial Category 1 material cover layer shall be compacted with a minimum of four passes of a portable flat-plate or miniature roller compactor or a pad-foot compactor such as the Caterpillar 815C as appropriate. Intermediate 6 to 12 in. loose Category 1 material lifts shall then be placed in the excavation and compacted to at least 90 percent of the standard Proctor maximum dry density, determined as described in Section 7.4.2 of this IMP Plan. A final excavation Category 1 material lift shall be placed and compacted to at least 90 percent of the standard Proctor maximum dry density. The surface of the compacted final lift shall be at least 2 in. above the excavation shoulders.

#### **8.6.5 Sludges**

##### *Placement*

The placement, spreading, and compaction of the sludge material from the Lime Sludge Ponds or the AWWT will depend on the water content of the sludge when delivered to the OSDF. Sludge materials from the Lime Sludge Ponds should be mixed with soils from the berms of the ponds or other soil material as much as practicable during excavation and handling or by drying until excessive moisture is removed. The objective of this activity is to decrease the moisture content of the sludges and thereby improve their handling and subsequent compaction characteristics. The Construction Manager may specify additional source(s) of materials for mixing with the sludges to achieve the required handling and placement characteristics. The following procedure assumes the sludge can be placed and compacted with conventional construction equipment, either by mixing as above in the case of the Lime Sludge Ponds, or by proper preconditioning

(dewatering or drying) in the case of the AWWT sludges. In no case shall mixing and preconditioning be performed in the OSDF active cell to achieve the criteria identified in Section 4.3 of this IMP Plan.

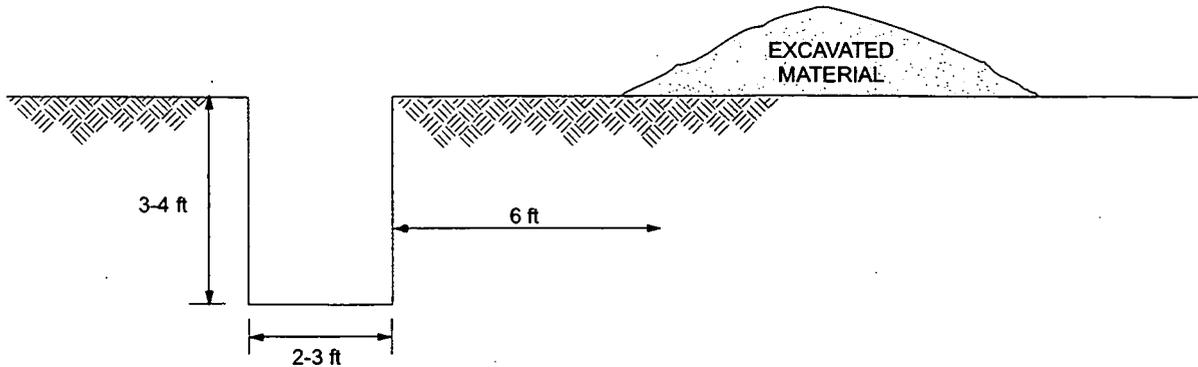
Prior to placement of the first lift of sludge material, the surface of in-place impacted material shall be prepared with Category 1 material starter berms at least 12 in. high. Sludge materials shall be placed within the starter berms to a maximum loose thickness of 12 in.

### *Compaction*

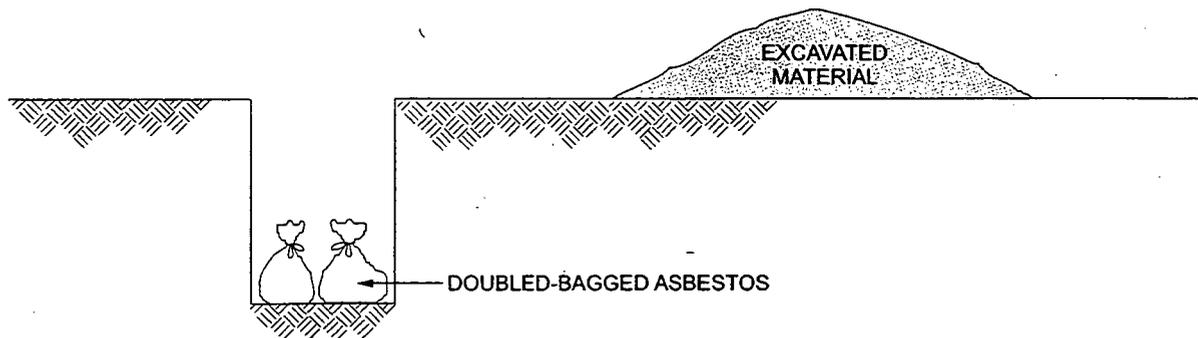
Initial compaction shall be accomplished as the material is spread. After spreading and initial compaction, the material shall be compacted by a minimum of four passes of a bulldozer of a minimum total weight of 50,000 lbs producing a ground pressure of at least 10 psi. Prior to placement of the second and succeeding lifts of sludge materials, a 12-in. to 15-in. thick lift of Category 1 material shall be placed above the sludge lift and compacted to at least 85 percent of the standard Proctor maximum dry density. After placement of the Category 1 material lift, another starter berm shall be constructed as with the first lift of sludge material. Compaction of all succeeding lifts of sludge materials shall be identical to the first lift. Not more than two lifts of sludge material shall be placed in a horizon without at least the minimum 4 ft required thickness of intervening horizon of Category 1 material.

After each sequence of sludge and covering Category 1 material placement, the cover Category 1 material shall be proofrolled. The proofrolling equipment shall have a minimum gross vehicle weight of 20 tons and exert a ground pressure of at least 65 psi. Soft spots indicated by tire ruts more than 3 in. in depth or visible deflection under the moving proofrolling equipment shall be stabilized through additional passes of the compactor. Any soft spot that cannot be stabilized with further compactive effort shall be cause for additional treatment to the satisfaction of the Construction Manager. This treatment shall consist of removal, replacement, and recompaction of the Category 1 material, and, if needed, infilling soft spots/areas in the Category 5 material with grout or other material approved by the Construction Manager.

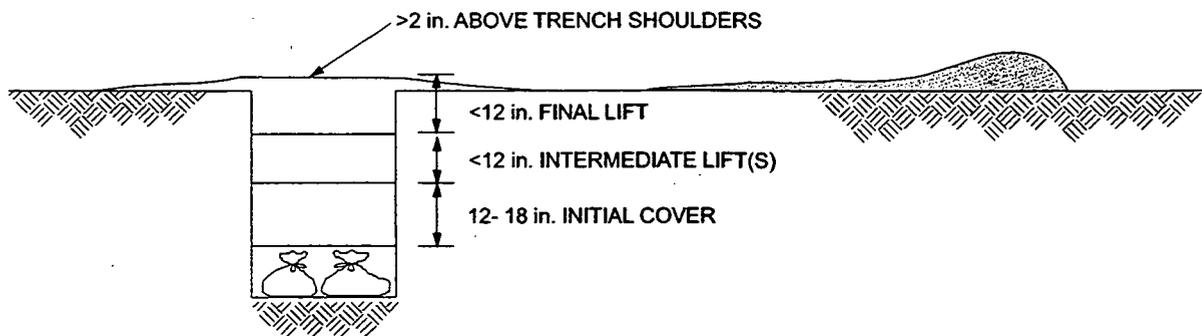
# CATEGORY 5 MATERIAL PLACEMENT SEQUENCE



1. TRENCH DUG AND EXCAVATED MATERIAL STOCKPILED



2. CATEGORY 5 MATERIAL DEPOSITED IN TRENCH



3. FINAL TRENCH LIFT PLACED

NOTE: THIS FIGURE FOR ILLUSTRATION ONLY. CONSTRUCTION CONTRACTOR SHALL PLACE IMPACTED MATERIAL LAYERS TO THE LIMITS SHOWN ON CONSTRUCTION DRAWINGS



FIGURE NO.	8 - 2
PROJECT NO.	GQ1001-03
DOCUMENT NO.	F9620002.2
FILE NO.	FIGS.cdr

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## 9.0 IMPACTED RUNOFF AND FUGITIVE DUST CONTROL

### 9.1 General

This section of the IMP Plan provides the requirements for impacted runoff and fugitive dust control within the OSDF battery limit as it relates to impacted material placement. Within the OSDF battery limit, impacted material placement activities shall be confined to within the OSDF cell lined area. Activities related to the collection, handling, staging, loading, and transportation of impacted materials outside the OSDF battery limit are addressed as part of other work plans prepared as a part of the integrated FEMP remediation.

### 9.2 Runoff Control

#### 9.2.1 OSDF Cell

Impacted runoff will be generated whenever precipitation comes in contact with impacted materials. Impacted runoff generated within the OSDF cell shall be managed as stated in Section 6.10 of this plan and in general conformance with the requirements of the *OSDF SWMEC Plan*. Impacted runoff shall be conveyed using temporary surface-water management and erosion control structures to the impacted-runoff catchment areas. An impacted runoff catchment area contains storage to handle the drainage area from two active cells. Specifically, if three cells are active, two impacted runoff catchment areas will be open. As previously described in this plan, layers of impacted material shall be placed from north to south and east to west within each cell. As these layers are placed, the impacted-runoff catchment area shall be preserved until a more southerly and adjacent cell is made active.

#### 9.2.2 Impacted Material Haul Road

Impacted runoff from an impacted material haul road west of the cells shall be contained within the boundaries of the road and shall be routed to the storm water drainage system of the FEMP former production area. Because of topography, flow from some small areas in the immediate vicinity of the OSDF equipment wash facility may be directed to the OSDF equipment wash facility; however, these areas will not contribute significant runoff.

### 9.3 Fugitive Dust Control

#### 9.3.1 General

Fugitive dust may result from impacted material handling and hauling activities. Material handling covers such activities as excavation, dumping, spreading, compacting, and short-term storage. These activities may generate fugitive emissions in the form of particulate matter released to the air (*i.e.*, dust). These activities will comply with the BAT determination for remedial construction activities on the FEMP site that was developed to control fugitive dust (see Appendix B). The appropriate records shall be kept by

the Contractor when visible emissions observations are performed in accordance with Appendix A of 40 CFR Part 60, and the FEMP procedure for fugitive dust control requirements.

The Contractor shall also control fugitive dust while hauling impacted materials to the OSDF. A no visible emissions policy is enforced for activity within the battery limit of the OSDF. If visible emissions are observed, the Construction Manager will direct the Contractor to provide a corrective action plan.

As appropriate, the Contractor shall use one or more of the following for the control of fugitive dust from the OSDF:

- water sprays;
- crusting agents;
- operational controls; and
- wind screens.

Each of the above controls is briefly discussed in the following subsections.

### **9.3.2 Water Sprays**

The Contractor shall use water distributors and or spray trucks to control fugitive dust emissions in active OSDF cells and along impacted-material haul roads within the battery limit. The frequency of water application should be weather dependent and be adjusted based on the appearance of visible dust as described in the BAT determination for remedial construction activities on the FEMP site.

### **9.3.3 Crusting Agents**

The Contractor shall consider the use of crusting agents or other suitable dust suppression chemicals whenever water is not effective. Crusting agents may be used on inactive portions of the impacted material placement area. The Contractor shall demonstrate to the Construction Manager the compatibility of any crusting agent or other suitable dust suppression chemical with components of the OSDF liner system prior to use.

### **9.3.4 Operational Controls**

The Contractor may use operational controls to limit fugitive dust. Limiting placement of impacted material to days when the wind is calm, and limiting the speed of hauling equipment, are examples of operational controls. The Contractor shall work closely with the Construction Manager in the development

and implementation of other beneficial operational controls to be implemented both on a daily and overall basis.

### **9.3.5 Wind Screens**

The OSDF will be elevated above surrounding lands during its operational life. Increased winds at the higher elevation may cause additional fugitive dust during periods of operation at the higher elevations. Silt fence on impacted material slopes installed for the control of surface erosion caused by precipitation may provide a measure of protection from winds. The Contractor shall consider the use of additional wind screens when other methods of fugitive dust control prove ineffective.

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## 10.0 REQUIRED DOCUMENTATION

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### 10.1 General

This section of the IMP Plan contains information on the documentation required for each hauling unit load of impacted materials to be placed in the OSDF.

### 10.2 Manifesting System

No impacted material will be accepted at the OSDF without an accompanying impacted material transportation "manifest". The purpose of the "manifest" is to provide a tracking mechanism for impacted material from the remediation project of origin to placement in the OSDF.

Information required to be included on the "manifest" include:

- project number and name;
- date and time of origination (*e.g.*, loading for debris, excavation for other materials);
- source Material Tracking Location (MTL);
- material type, profile number, and estimated volume of material;
- signature by originating remediation project representative that the material meets the criteria in Section 4.0 of this IMP Plan;
- the OSDF cell, grid, and lift identifier for Categories 1 through 5 material;
- date and time of receipt;
- WAO and CQC Consultant signature, as described in Section 6.3 of this IMP Plan; and
- In addition to the above "manifest" items, any special notes or safety concerns shall be included with the "manifest". Health and Safety information that could result in personnel exposure from unknown materials will be noted on the manifest documentation or included on a WAO special concerns form which will be attached to the manifest.

### **10.3 Impacted Materials Tracking**

To aid in tracking impacted material, each impacted material transportation "manifest" will have a unique serial number and up to five carbon copies. One copy of each manifest shall be given to the CQC Consultant daily. Other copies will be distributed in accordance with the site requirements and Contract Documents.

### **10.4 Records Procedures**

Fluor Fernald, Inc. will be responsible for establishing the procedures and requirements for collection, storage, maintenance, and disposition of all OSDF records. Records shall be protected from damage or deterioration by being placed in lockable, fire-proof filing cabinets and by duplication and/or microfilming. Records shall be filed in accordance with the subject file index and shall be retained for 30 years after closure of the OSDF. Required records shall include, but not be limited to, field logbooks, other data collection forms, equipment calibration records, cost data, drawings, impacted material transportation "manifests", maintenance records, and associated reports.

Original data collected in the field shall be considered a permanent record. This includes field logbooks, other data forms, and photographs. These documents shall be authenticated by the signature and date of the originator. Errors shall be corrected by crossing a single line through the error and entering the correct information. Corrections will be initialed and dated by the person making the correction.

## 11.0 SEASONAL COVER

### 11.1 Description of System

At the end of each construction season and in any area where impacted material will not be placed for at least 45 days, a seasonal cover will be required over any area that has not received final cover. The seasonal cover will consist of natural or Category 1 impacted soil which covers the Category 2 through 5 impacted materials; and is stabilized by suitable surface protection, crusting agents, or geosynthetic erosion control surface matting.

### 11.2 Seasonal Cover Inspection and Monitoring Activities

The seasonal cover shall be inspected and monitored by the Contractor in accordance with the schedule and activity requirements presented in Table 11-1. The purposes of the inspection and monitoring activities are to: (i) ensure the seasonal cover prevents excessive fugitive dust and slope erosion; (ii) provide adequate and efficient management of impacted runoff within a cell; and (iii) provide adequate protection of liner system components from freeze/thaw and mechanical damage.

Inspections of the seasonal cover shall consist of a visual survey of the seasonally-covered area. The visual inspection shall be conducted by either traversing the seasonally-covered areas on a 100 ft grid pattern or by using binoculars to inspect areas where surface crusting agents have been applied. Suspect areas shall be delineated on a plan of the site. The inspections shall result in evaluation of the seasonal cover for excessive erosion or gulying. Should such conditions be observed, the Contractor shall implement activities to reduce such erosion or gulying, including regrading the eroded area, compacting exposed soil surfaces, rerouting runoff from the area to promote sheet flow, applying additional surface crusting agent, or installing geosynthetic erosion-control surface matting.

The seasonal cover inspections shall also include observation of the area within the active OSDF cell being used for impacted runoff catchment. The runoff from the seasonal cover will be collected in the leachate collection system (LCS) or managed as impacted stormwater. The inspection shall confirm that runoff into the impacted runoff catchment area can infiltrate in an unimpeded manner into the cell LCS. Should the depth of sedimentation exceed 6 in. in any portion of this area, the sediment should be excavated and transported to an area of the cell outside of the impacted runoff catchment area. Any excavation of sediment within the cell shall be performed with extreme care so as not to damage the underlying liner systems. Should the granular protective layer or LCS geotextile filter in the impacted runoff catchment area of the cell become clogged and impede stormwater percolation into the LCS, the Construction Manager will instruct the Contractor to replace the granular material, and possibly the geotextile filter as well.

Repairs to a cell impacted runoff catchment area shall not be made unless it is part of a plan approved by the Construction Manager. Any repair activity involving any component of the liner systems or final cover systems shall be in full conformance with the Technical Specification for that component.

**11.3 Recordkeeping**

The Contractor shall maintain written records of monitoring, inspections, and repairs in accordance with recordkeeping and reporting requirements of Section 10.4 of this IMP Plan.

TABLE 11-1  
SEASONAL COVER  
INSPECTION AND MONITORING ACTIVITIES

Component	Inspections	Condition	Maintenance
	Seasonal-Closure Period		
Seasonal Cover	Bi-weekly	<ul style="list-style-type: none"> <li>unacceptable surface or slope erosion</li> <li>unacceptable fugitive emissions</li> </ul>	<ul style="list-style-type: none"> <li>regrade material surfaces; reroute runoff; recompact soil surface, apply crusting agents or geosynthetic erosion control matting</li> <li>apply surface crusting agent or geosynthetic erosion control matting; install wind screen fencing</li> </ul>
Impacted-Runoff Catchment Area (in cell)	Bi-weekly	excessive sediment deposited on top of catchment area	remove sediment and deposit outside of catchment area
		lack of timely percolation of runoff into the LCS	replace clogged protective layer granular material with new clean material; replace clogged geotextile filter layer
Protection of Liner System	Bi-weekly	system must be protected against frost and mechanical damage by at least 2 ft Category 1 material above the protective layer	add suitable soil cover over anchor trench, intercell berm, or temporary liner system termination as required

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**12.0 REFERENCES**

GeoSyntec Consultants, "*Construction Quality Assurance (CQA) Plan, On-Site Disposal Facility, Revision 1B*", Fernald Environmental Management Project, DOE Fernald Area Office, Fernald, OH, 2000a.

GeoSyntec Consultants, "*Design Criteria Package (DCP), On-Site Disposal Facility, Revision 1B*"; Fernald Environmental Management Project, DOE Fernald Area Office, Fernald, OH, U.S. Department of Energy (DOE), "*Final Record of Decision for Remedial Actions at Operable Unit 2*", Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1995a.

U.S. Department of Energy (DOE), "*Final Remedial Design Work Plan for Remedial Actions at Operable Unit 2*", Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1995b.

U.S. Department of Energy (DOE), "*Final Remedial Investigation Report for Operable Unit 2*", Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1995c.

U.S. Department of Energy (DOE), "*Final Record of Decision for Remedial Actions at Operable Unit 5*", Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1996a.

U.S. Department of Energy (DOE), "*Operable Unit 3 Record of Decision for Final Remedial Action*", Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1996b.

U.S. Department of Energy (DOE), "*Permitting Plan and Substantive Requirements for the On-Site Disposal Facility*", Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1997a.

U.S. Department of Energy (DOE), "*Systems Plan, On-Site Disposal Facility*", Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1997b.

U.S. Department of Energy (DOE), "*Waste Acceptance Criteria Attainment Plan for the On-Site Disposal Facility*", Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1997c.

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**APPENDIX A**

**IMPACTED MATERIALS PLACEMENT  
QUALITY ASSURANCE PLAN**

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## A.1 INTRODUCTION

### A.1.1 Overview

This IMP Quality Assurance (QA) Plan describes the activities which will be undertaken throughout the construction, placement, and closure of the OSDF to confirm the acceptance, filling, and compaction of the impacted materials in the OSDF are in compliance with the requirements established in the *IMP Plan*, *Technical Specifications* and *CQA Plan*. This plan contains requirements and methods specifically applicable to impacted materials after they are brought into the OSDF battery limit.

### A.1.2 Plan Scope

This IMP QA Plan establishes the quality control (QC) requirements and documentation practices to be used to monitor and test impacted materials, which are transported, placed, and compacted by the Contractor within the OSDF battery limits. The scope of this plan includes:

- WAO duties related to impacted materials within the OSDF battery limit;
- CQC Consultant duties related to impacted materials placement and compaction; and
- monitoring, testing, and documentation procedures to be used in confirming impacted material placement and testing are in accordance with the requirements of the *IMP Plan*.

### A.1.3 Plan Organization

The remainder of this plan is organized as follows:

- the job descriptions, qualifications, and required training of personnel involved in IMP QA are presented in Section A.2;
- specific monitoring procedures are presented in Section A.3;
- specific compaction testing requirements for each impacted material category are presented in Section A.4; and
- requirements for as-placed plans are presented in Section A.5.

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## A.2 IMP QA PERSONNEL

### A.2.1 Staffing Requirements

Monitoring and testing of the placement and compaction of impacted materials in the OSDF will be the responsibility of the CQC Consultant. The following personnel will have responsibilities related to the impacted materials placement QC activities at the OSDF:

- CQC Certifying Engineer;
- CQC Site Manager; and
- CQC Field Monitors.

### A.2.2 CQC Certifying Engineer

#### A.2.2.1 Job Description

The CQC Certifying Engineer will be in overall charge of the QC activities related to impacted material placement. In addition to the duties described in the *CQA Plan*, the CQC Certifying Engineer will also be responsible for monitoring and testing of the impacted materials placement and compaction in the OSDF.

#### A.2.2.2 Required Job Qualifications

The required qualifications of the CQC Certifying Engineer are contained in the *CQA Plan*.

### A.2.3 CQC Site Manager

#### A.2.3.1 Job Description

The CQC Site Manager will be in direct day-to-day charge of the QC monitoring conducted at the OSDF during impacted materials placement. In addition to the duties described in the *CQA Plan*, the CQC Site Manager will also be responsible for:

- monitoring impacted materials suitability for placement in the OSDF;
- monitoring the compaction of the impacted materials in the OSDF;
- supervising the compaction testing of impacted materials in the OSDF;
- assigning CQC Field Monitors;

- forwarding required documentation to the CQC Certifying Engineer; and
- assuring that CQC Field Monitors attend regular health and safety meetings as required in site safe work plan.

#### **A.2.3.2 Required Job Qualifications**

The qualifications of the CQC Site Manager are contained in the *CQA Plan*.

#### **A.2.4 CQC Field Monitors**

##### **A.2.4.1 Job Description**

CQC Field Monitors will perform placement monitoring and compaction testing of impacted materials in the OSDF in accordance with this IMP QA Plan. Placement monitoring and compaction testing will include documentation that the Contractor is performing impacted materials placement and compaction in accordance with the procedures specified in the *IMP Plan*. Monitors shall also classify, as necessary, the impacted materials for the purposes of assigning a compaction method to the impacted materials.

##### **A.2.4.2 Required Job Qualifications**

The qualifications of the CQC Field Monitors are contained in the CQA Plan.

#### **A.2.5 Training**

Training requirements for personnel employed at the FEMP are contained in the Fernald Site Wide Training Plan - PL-3032 [FERMCO, 1995]. Personnel engaged in impacted materials QC activities at the OSDF shall be trained in accordance with this plan.

Each CQC Consultant employee will have OSHA 40-Hour Hazardous Waste Workers' Health and Safety Training (HAZWOPER) conducted in accordance with 29 CFR 1910.120. Each employee will also take an 8-hour Hazardous Waste Workers' Health and Safety Training refresher course each year, and no more than 1 year from the date of completion of the 40-hour HAZWOPER training. The CQC Site Manager will receive 8-hour HAZWOPER Supervisory training.

Each new employee will receive 3 days of on-the-job training as required by 29 CFR 1910.120. On-the-job training will include, at a minimum, a discussion of site specific health and safety features, a walk-through of the areas in which the new employees will be working with a discussion of possible hazards in the area, a discussion of job duties and potential hazards associated with the duties and a discussion regarding appropriate personal protective equipment (PPE) including minimum requirements for work clothing in accordance with the site specific health and safety plan.

### A.3 IMPACTED MATERIALS MONITORING

#### A.3.1 Required Documentation

Upon entering the OSDF battery limits, WAO will check that the impacted materials are accompanied by a "manifest" and that the hauling unit has been properly identified as to the impacted material category. Impacted material categories are defined in Section 5.2 of the *IMP Plan*. If no material category has been entered onto the manifest, the WAO OSDF representative will contact the WAO excavation or debris source representative to verify the category. The WAO OSDF representative will complete and review the manifest prior to releasing the hauling unit to the placement area. If the category cannot be identified, the hauling unit will be returned to its point of origin. WAO will verify that the "manifest" contains all information relating to the impacted material origin as specified by Section 10.2 of the *IMP Plan*. WAO will complete the "manifest" by recording any pertinent notes, comments, or observations about the load. WAO will finally affix a signature to the "manifest" verifying that the load has been delivered in accordance with the *IMP Plan*.

#### A.3.2 Visual Inspection

The CQC Consultant will perform a visual review of the impacted materials after dumping to confirm that the contents match the visual description entered on the "manifest" as communicated by WAO.

#### A.3.3 Monitoring for Moisture Content

Impacted materials accepted at the OSDF will be at a moisture content suitable for placement and compaction in accordance with the *IMP Plan*. If the CQC Consultant determines that impacted materials are too wet, the Contractor will dry the material to a condition allowing placement and compaction in accordance with the *IMP Plan*.

#### A.3.4 Demolition Debris Monitoring

##### *General*

The CQC Consultant will monitor demolition debris delivered to the OSDF. Additional information regarding waste classification and special handling of specific types of demolition debris is presented in the following sections.

##### *Asbestos*

Trucks carrying double-bagged regulated asbestos containing material must display asbestos warning signs. The Contractor shall comply with regulations relating to the handling and transportation of regulated asbestos containing material.

### *Broken Concrete*

Most concrete demolition debris will fall into Category 2 (*en masse* placement). Loads of concrete containing concrete pieces that cannot be spread into 21 in.  $\pm 3$  in. loose lifts will be classified as Category 5 materials.

### *Steel or Transite Sidings*

Steel or transite sidings that arrive at the OSDF in neatly packaged stacks not greater than 4 ft high will be classified as Category 3 items (individual placement). Loose truck loads of miscellaneous demolition debris containing steel sidings that can be spread in lifts not higher than 21 in.  $\pm 3$  in. will be classified as Category 2 materials (*en masse* placement).

### *Steel Beams*

Steel beams which can be spread or placed into a lift no higher than 21 in.  $\pm 3$  in. will be classified as Category 2 materials (*en masse* placement).

### *Wood*

Loads of demolition debris consisting primarily of wood that can be spread in lifts no higher than 18 in. will be classified as Category 4 materials (highly compressible).

### *Miscellaneous Demolition Debris*

Loads of miscellaneous demolition debris (doors, plumbing, wiring, wood *etc.*) that can be spread in lifts no higher than 21 in.  $\pm 3$  in. will be classified as Category 2 materials (*en masse* placement). Miscellaneous demolition debris that can be placed individually such that the highest part of the debris is not more than 4 ft above the ground surface will be classified as Category 3 items (individual items).

### *Tanks*

Tanks that cannot be placed such that the void space can be filled and Category 1 material placed and compacted around them shall not be placed in the OSDF. Cylinders that have not been processed to remove pressurized material and processed to eliminate future potential for pressurization will not be accepted at the OSDF. A visual inspection of cylinders shall be performed prior to placement in the OSDF. Cylinders that have either the cylinder cap or valve attached shall be removed and returned to the point of generation. Cylinders with nominal diameter of 12 in. or greater will be split in half. Tanks acceptable for placement in the OSDF and which are less than 5 ft in diameter and 4 ft high will be classified as Category 3 items (individual items).

*Pipes*

Steel pipes which can be spread or placed into a lift no higher than 21 in.  $\pm$ 3 in. will be classified as Category 2 materials (*en masse* placement). Process piping with a nominal diameter of 12 in. or greater will be split in half before disposal. Piping used as surface water drainage conduit (e.g., corrugated metal pipe, concrete pipe, vitrified clay pipe) and non-processing piping will be crushed or split in half in length to reduce void space; maximum size will be 10 ft in length and 18 in. thick.

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#### A.4 IMPACTED MATERIAL PLACEMENT AND COMPACTION

##### A.4.1 Category 1 Materials (Soils and Soil-Like Materials)

###### *General Monitoring Requirements*

Monitoring the placement, and compaction, and testing of impacted soil and soil-like materials includes the following:

- monitoring materials to confirm sizing criteria and content meet criteria specified in Section 5.2 of the IMP Plan;
- testing to determine the compaction characteristics of the impacted soil materials during processing, placement, and compaction;
- monitoring the thickness of lifts as loosely placed and as compacted; and
- monitoring the action of the compaction and heavy hauling equipment on the construction surface (e.g., sheepfoot penetration, pumping, cracking, etc.).

###### *Placement and Compaction Quality Control*

The standard Proctor test (ASTM D 698) shall be used for the determination of moisture/density relationships of the Category 1 material to be disposed in the OSDF. The standard Proctor compaction tests will be performed in the on-site geotechnical laboratory established per the *CQA Plan*. The standard Proctor compaction testing will be performed with each change in material type.

The dry density and moisture content of Category 1 materials shall be measured at a minimum frequency of once per 10,000 ft<sup>2</sup> or once per 100 ft by 100 ft grid element per lift; measurement of dry density and moisture content are to be in accordance with ASTM D 2922 and D 3017 (nuclear methods). To establish correlations of moisture and density with the nuclear methods, the sand cone test method (ASTM D 1556, Density and Unit Weight of Soil in Place by the Sand-Cone) or the Drive Cylinder Method (ASTM D 2937, Density of Soil in Place by the Drive-Cylinder Method) shall be used once per 25 nuclear density tests when Category 1 materials are placed. This correlation will also be used to evaluate the effect impacted materials may have on the nuclear gauge.

Compaction testing for Category 1 materials will be documented in accordance with procedures established in the *CQA Plan*.

### *Rework*

At locations where the field testing indicates densities below the requirements of the *IMP Plan*, the failing area shall be reworked.

### *Lines and Grades*

Surveying of lines and grades shall be conducted by the Contractor on a periodic basis during the placement and compaction of the impacted materials as specified in the Technical Specifications. The CQC Consultant will monitor the surveying to confirm that slopes are properly constructed to promote proper drainage and confirm that required separation distances are maintained. Any deviation from the *IMP Plan* procedures will be reported to the Construction Manager for corrective action.

#### **A.4.2 Category 2 Materials (*En Masse* Placement)**

##### *Placement Quality Control*

The CQC Consultant will monitor and document that the placement of Category 2 materials is in accordance with the *IMP Plan*.

Monitoring of placement by the CQC Consultant will include verification that:

- loose lift thickness is no more than 21 in.  $\pm$ 3 in. ;
- Category 1 materials are worked into the lift as much as practical;
- horizontal extent of a lift is no more than 100 ft and each lift is surrounded with 10 ft of Category 1 material; and
- horizons are limited to two lifts and separated vertically by at least the minimum 4 ft required thickness of the intervening horizon of Category 1 material.

##### *Compaction Quality Control*

The CQC Consultant will monitor and document that the Category 2 materials have received the compaction effort specified by the *IMP Plan*. Category 1 materials used to surround the Category 2 material will be tested in accordance with Section A.4.1 of this IMP QA Plan, but at a frequency as follows:

- for side berms, once per 250 ft length but not less than twice per lift; and

- for cover soil over Category 2 material, no testing is required aside from monitoring proofrolling of the final surface.

Compaction testing of Category 1 materials surrounding the Category 2 material will be documented in accordance with procedures established in the *CQA Plan*.

#### *Rework*

At locations where the field testing indicates densities below the requirements of the *IMP Plan*, the failing area shall be reworked as specified in Section 8.3.2 of the *IMP Plan*.

#### **A.4.3 Category 3 Items (Individual Items)**

##### *Placement Quality Control*

The CQC Consultant will monitor and document that the placement procedures presented in Section 8.4 of the *IMP Plan* are followed by the Contractor in the placement of Category 3 items. Monitors will observe and document that the maximum lift thicknesses of Category 1 materials placed around the individually placed items are in accordance with the *IMP Plan*.

##### *Compaction Quality Control*

The CQC Consultant will monitor and document that the Category 1 materials used in the placement of Category 3 items have received the compaction effort specified by the *IMP Plan*. Category 1 materials used in the placement of Category 3 materials shall be tested in accordance with Section A.4.1 of this *IMP QA Plan*, but at a frequency as follows:

- for soil cover lifts, once per each soil cover lift; and
- for side berms, once per 250 ft length but not less than twice per grid element.

Compaction testing of Category 1 materials used in the placement of Category 3 items will be documented in accordance with procedures established in the *CQA Plan*.

#### *Rework*

At locations where the field testing indicates densities below the requirements of the *IMP Plan*, the failing area shall be reworked.

#### **A.4.4 Category 4 Materials (Highly Compressible)**

##### *Placement Quality Control*

The CQC Consultant will monitor and document that the placement procedures presented in Section 8.5 of the *IMP Plan* are followed by the Contractor in the placement of Category 4 materials. Monitors will observe and document that maximum loose lift thicknesses are in accordance with the *IMP Plan*.

##### *Compaction Quality Control*

The CQC Consultant will monitor and document that the Category 4 materials, and the Category 1 materials used in the placement of Category 4 materials, have received the compaction effort specified by the *IMP Plan*. Category 1 materials used in the placement of Category 4 materials will be tested in accordance with Section A.4.1 of this IMP QA Plan, but at a frequency as follows:

- for side berms, once per 250 ft length but not less than twice per grid element; and
- for cover 12- to 15-in. thick loose lift, once per each soil cover lift.

Compaction testing for Category 1 materials will be documented in accordance with procedures established in the *CQA Plan*.

##### *Rework*

At locations where the field testing indicates densities below the requirements of the *IMP Plan*, the failing area shall be reworked.

#### **A.4.5 Category 5 Materials (Special Handling, Placement and Compaction)**

##### *Placement Quality Control*

The CQC Consultant will monitor and document that the placement procedures, trench/excavation dimensions or berm heights, maximum loose lift thicknesses, and compacted height of final soil lifts are in accordance with the *IMP Plan* (or its appropriate addenda presented in Appendix C).

### *Compaction Quality Control*

#### *Highly Compressible Materials and Piping Containing Asbestos Insulation*

The CQC Consultant will monitor and document that the Category 1 materials used in the placement of these Category 5 materials (*IMP Plan* Sections 8.6.3 and 8.6.4, respectively) have received the compaction effort specified by the *IMP Plan*. Category 1 materials used in the placement of these Category 5 materials shall be tested in accordance with Section A.4.1, but at a frequency as follows:

- for initial soil cover lifts in trenches or excavations, no testing is necessary or desired aside from observing compaction passes; and
- for subsequent soil cover lifts in trenches or excavation, once per each soil cover lift in each trench or excavation.

Compaction testing of Category 1 materials used in the placement of these Category 5 materials will be documented in accordance with procedures established in the *CQA Plan*.

#### *Sludges*

The CQC Consultant will monitor and document that the Category 1 materials used in the placement of these Category 5 materials, and these Category 5 materials themselves, have received the compaction effort specified by the *IMP Plan*.

Category 1 materials used in the placement of sludges shall be tested in accordance with Section A.4.1 of this *IMP QA Plan*, but at a frequency as follows:

- for side berms, once per 250 ft but not less than a minimum of two per grid element; and
- for soil cover, once per each soil cover lift in each placement grid.

Compaction testing of these Category 5 materials, and Category 1 materials used in the placement of these Category 5 materials, will be documented in accordance with procedures established in the *CQA Plan*.

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**A.5 AS-PLACED RECORDS**

The CQC Consultant will prepare daily placement sketches showing impacted material category, lift numbers, and grid designation. Daily sketches will be provided to Fluor Fernald, Inc. The CQC Consultant will keep track of placement locations by grid, lift, and category of material. The CQC Consultant shall coordinate with Fluor Fernald, Inc. on placement location issues.

Daily placement sketches prepared by the CQC Consultant and survey data provided by the Contractor will be used by Fluor Fernald, Inc. to develop an as-placed plan view for each lift, which shows each grid by cell. The as-placed plan will include total in-place cubic yards (icy) per lift, impacted material category, and date placed. Fluor Fernald, Inc. will develop cell cross sections from the as-placed plans showing impacted material category by lift.

The Contractor shall coordinate impacted material placement survey activities in accordance with the Technical Specifications. The Contractor shall provide survey information to the Construction Manager in a timely manner. The Contractor shall also keep track of placement locations by grid, lift, Category of material and submit surveyed volumes by category to the Construction Manager.

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**APPENDIX B**

**BEST AVAILABLE TECHNOLOGY DETERMINATION FOR  
REMEDATION CONSTRUCTION ACTIVITIES ON THE  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

**BEST AVAILABLE TECHNOLOGY DETERMINATION FOR REMEDIATION CONSTRUCTION ACTIVITIES  
ON THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

Category	Remediation Activities/Areas Included	Standard or Site-Specific Limit	Dust Controls/Work Practices*
<p>Paved roadways and paved parking areas</p>	<p>Activities:  <ul style="list-style-type: none"> <li>Hauling materials and equipment</li> <li>Vehicle and equipment traffic</li> </ul> <p>Areas:                      All predetermined areas designed and improved specifically for vehicle traffic. Improvements include the application of materials such as asphalt or concrete that forms a firm level surface for travel.</p> </p>	<p>Limit:                      There shall be no visible particulate emissions from any paved roadway or paved parking area except for a period of time not to exceed one minute during any sixty-minute observation period.</p>	<ul style="list-style-type: none"> <li>Apply dust suppression agents.</li> <li>Minimize the amount of unnecessary traffic on paved roadways used for hauling materials and vehicle/equipment traffic.</li> <li>Limit speed to 20 mph or less during operation of equipment or vehicles.</li> <li>Apply appropriate dust suppression agents such as water or surfactants to materials being transported by truck load beds to ensure the transported materials will not become airborne; cover truck load beds when transported materials are still likely to become airborne.</li> <li>Wheel wash prior to entering paved roadways or paved parking areas.</li> <li>Wet sweep or otherwise remove any clods, clumps, tracks, or visible deposits of soil or mud from paved roadways or paved parking areas, applying appropriate dust control measures to suppress the generation of visible dust that may result from the sweeping or removal process.</li> <li>Repair or resurface paved roadways/parking areas as needed.</li> </ul>
<p>Unpaved roadways, unpaved parking areas, and wind erosion from storage piles</p>	<p>Activities:  <ul style="list-style-type: none"> <li>Hauling materials and equipment</li> <li>Vehicle and equipment traffic</li> </ul> <p>Areas:                      All predetermined areas designed and improved specifically for vehicle traffic. Improvements include the application of gravel, shredded shingles, cinders, compaction, etc. to the delineated areas.</p> </p>	<p>Limit:                      There shall be no visible particulate emissions from any unpaved roadway, unpaved parking area, or wind erosion from a storage pile except for a period of time not to exceed three minutes during any sixty-minute observation period.</p>	<ul style="list-style-type: none"> <li>Apply dust suppression agents.</li> <li>Minimize the amount of unnecessary traffic on unpaved roadways or unpaved parking areas.</li> <li>Limit speed to 10 mph during operation of equipment or vehicles.</li> <li>Apply dust suppression agents such as surfactants or crusting agents to storage piles or cover with tarpaulin, plastic, etc., if practical; for extended periods of planned inactivity, vegetate as a last resort if protective cover or periodic application of crusting agent proves ineffective.</li> <li>Apply appropriate dust suppression agents such as water or surfactants to materials being transported by truck load beds to ensure the transported materials will not become airborne; cover truck load beds when transported materials are still likely to become airborne.</li> <li>Wheel wash prior to entering unpaved roadways or unpaved parking areas.</li> <li>Remove, as practical, any clods, clumps, tracks, or visible deposits of soil or mud from unpaved roadways or unpaved parking areas.</li> <li>Repair or resurface roadways/parking areas as needed or use an alternative road surface as a last resort.</li> </ul>

**BEST AVAILABLE TECHNOLOGY DETERMINATION FOR REMEDIATION CONSTRUCTION ACTIVITIES  
 ON THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

Category	Remediation Activities/Areas Included	Standard or Site-Specific Limit	Dust Controls/Work Practices*
Project field activities and material handling/vehicle traffic on storage piles	<p>Activities:</p> <ul style="list-style-type: none"> <li>• Excavation</li> <li>• Trenching</li> <li>• Loading/Unloading</li> <li>• Transportation to defined roadway (paved or unpaved)</li> <li>• Load-in/Load-out on storage piles</li> <li>• Material placement in Onsite Disposal Cell</li> <li>• Vehicle traffic on storage piles</li> </ul> <p>Areas:</p> <ul style="list-style-type: none"> <li>• Working faces</li> <li>• Transition areas between working faces and defined roadways (paved or unpaved)</li> <li>• Onsite Disposal Cell</li> <li>• Storage Piles</li> </ul>	<p>Standard:          Visible particulate emissions from project field activities/areas shall not exceed twenty percent (20%) opacity as a three-minute average. (OAC 3745-17-07 (B)(1))</p>	<p>Dust Controls/Work Practices*</p> <ul style="list-style-type: none"> <li>• Apply dust suppression agents.</li> <li>• Minimize the amount of unnecessary traffic in and around field activities.</li> <li>• Limit speed to 10 mph or less during operation of equipment or vehicles.</li> <li>• Reduce rate of excavation.</li> <li>• Minimize height of drop during loading and unloading.</li> <li>• Change method of excavation &amp; transport (E.G., from front end loader dumping into a truck to self-propelled pan).</li> <li>• Apply dust suppression agents such as surfactants or crusting agents to storage piles.</li> <li>• Apply appropriate dust suppression agents such as water or surfactants to materials being transported by truck load beds to ensure the transported materials will not become airborne; cover truck load beds when transported materials are still likely to become airborne.</li> </ul>

\* to be applied progressively as environmental conditions dictate.

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**APPENDIX C**

**ADDENDA TO THE  
IMPACTED MATERIALS PLACEMENT PLAN**

## PLACEMENT RESTRICTIONS FOR SPECIALIZED PLACEMENT PLANS

PLACEMENT RESTRICTIONS	ADDENDUM 1 (Bagged Impacted Material)	ADDENDUM 2 (Thorium and Non-Bagged Impacted Material)	ADDENDUM 3 (Alternate CAT 2 Placement)
TRENCHES SHALL NOT BE EXCAVATED IN PREVIOUSLY PLACED CATEGORY 2 THROUGH 5 IMPACTED MATERIAL, PROTECTIVE, CONTOURING, OR SELECT IMPACTED MATERIAL LAYERS.	X	X	X
IMPACTED MATERIAL SHALL NOT BE PLACED DIRECTLY ON PREVIOUSLY PLACED CATEGORY 2 THROUGH 5 IMPACTED MATERIAL, PROTECTIVE LAYER, OR SELECT IMPACTED MATERIAL LAYERS.	X	X	X
PLACEMENT GRID SHALL NOT BE LOCATED WITHIN 100 FT Laterally Adjacent to a Category 3 Grid in the same Horizon	X	X	
GRIDS WITH TRANSITE DEBRIS OR THORIUM DEBRIS PLACED BY THE GRID METHOD SHALL NOT BE Laterally Adjacent to Each Other within the same Horizon.		X	
GRIDS WITH TRANSITE DEBRIS OR THORIUM DEBRIS PLACED BY THE TRENCHING METHOD SHALL NOT BE Laterally Adjacent to Each Other within the same Horizon.		X	
GRIDS WITH TRANSITE DEBRIS OR THORIUM DEBRIS PLACED BY THE GRID METHOD AND GRIDS WITH TRANSITE DEBRIS OR THORIUM DEBRIS PLACED BY THE TRENCHING METHOD SHALL NOT BE Adjacent to Each Other in the same Horizon.		X	
IMPACTED MATERIAL SHALL BE PLACED ABOVE AN Intervening Horizon of Category 1 Impacted Material		X	X
IMPACTED MATERIAL SHALL NOT BE PLACED WITHIN 6 FEET UNDER THE SELECT IMPACTED MATERIAL FOR THE FINAL COVER SYSTEM		X	X
PLACEMENT OF IMPACTED MATERIAL PER THIS ADDENDUM IS LIMITED TO ONE LIFT PER GRID FOR THE LIFE OF THE CELL		X	

"X" INDICATES THAT PLACEMENT RESTRICTION IS APPLICABLE TO ADDENDUM NOTED.

**Addendum No. 1  
To  
IMPACTED MATERIALS PLACEMENT PLAN  
ON-SITE DISPOSAL FACILITY**

**Specialized Placement Plan  
for Bagged Impacted Material**

**20100-PL-007  
Revision 1  
March 2000**

**United States Department of Energy**

**Fernald Environmental Management Project  
Fernald, Ohio**

*Prepared by*

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*Under*

**Fluor Fernald  
Subcontract 95PS005028**

**On-Site Disposal Facility (OSDF)****Addendum 1 - OSDF Impacted Material Placement Plan  
Rev.1, Date: January 20, 1999****Specialized Placement Plan for Bagged Impacted Material**

According to Section 8, Article 8.6.1 of the Impacted Material Placement (IMP) Plan, Revision 0, dated January 1998, a specialized placement plan is to be developed for "materials either nominally larger than the physical criteria for the OSDF..." or "not reasonably anticipated by currently identified categories...". The following specialized placement plan provides the placement and compaction requirements for the bagged impacted materials which will not fit in the trenching system described for Category 5 impacted material placement as discussed in Section 8, Article 8.6.3 of the IMP plan.

***Placement***

Bagged impacted materials, including thorium contaminated soils and debris, requiring placement in the OSDF is limited. The primary criterion for the placement of bagged impacted materials is that the materials are placed in a manner protective of the health and safety of OSDF personnel and the public. A secondary criterion is to minimize differential settlement of the OSDF cover system.

Prior to commencement of placement activities, the contractor shall identify an appropriate grid(s) for the placement of the bagged impacted material. The placement grid(s) shall be approved by the Construction Manager. The approved grid(s) shall have a 3 ft (0.9m) to 4 ft (1.2m) depth of previously placed Category 1 material and shall comply with the following placement procedures.

A trench for bagged material placement in the approved grid(s) location shall be excavated, as shown in attached Figure 1. The bottom of the trench shall have minimum of 6 in (150mm) of Category 1 material above a previously placed Category 1 through 5 material. The trench shall not be excavated in previously placed protective, contouring, or select

impacted material layers. The width of the trench shall be approximately the width of the transporting container for the bagged impacted material plus 2 ft (0.6m). The width of the trench is anticipated to be approximately 8 ft (2.4m) to 12 ft (3.6m). Category 1 impacted material excavated from the trench shall be stored at least 6 ft (1.8m) away from the trench opening. The length of the trench shall vary depending on the quantity of bagged impacted material to be placed in the OSDF. The depth of bagged impacted material in the trench shall be approximately 24 in (600mm). The maximum distance between the bag(s) placed in the trench and trench walls and between the bags shall be 2 ft (0.6m). The placement of bagged impacted material shall be performed in accordance with Fernald Environmental Management Project (FEMP) radiological safety procedures, as well as the contractor's Safe Work Plan, to minimize worker exposure.

### *Compaction*

Compaction shall not be performed directly on the bagged impacted material. Contact with the bagged material shall be minimized by personnel and equipment. After placement of the bagged impacted material in the trench, void spaces between the bags and between the bags and trench walls shall be filled with Category 1 material. The Category 1 material filled in void spaces shall not be compacted. An initial lift of 15 in (376mm)  $\pm$  3 in (76mm) thick Category 1 material shall be placed over the bagged impacted material. The top of the initial lift shall be compacted with a minimum of four passes of a portable flat-plate, self-propelled double drum roller compactor, or a smooth drum vibratory roller and shall not require compaction testing. Additional 12 in (300mm)  $\pm$  3 in (76mm) thick Category 1 lifts shall be placed above the initial lift. Total thickness of Category 1 material placed above the bagged impacted material, including the initial lift, shall be a minimum 3 ft (0.9m) as shown on attached Figure 1. The Category 1 lifts above the initial lift shall be compacted by a CAT 826 compactor, CAT 815 compactor, or equivalent, to meet at least 90 percent of the standard Proctor dry density. The compaction shall be tested in accordance with the IMP Plan.

**Addendum No. 2  
To  
IMPACTED MATERIALS PLACEMENT PLAN  
ON-SITE DISPOSAL FACILITY**

**Specialized Placement Plan  
for Thorium and Non-Bagged Impacted Material**

**20100-PL-007**

**Revision 1**

**March 2000**

**United States Department of Energy**

**Fernald Environmental Management Project  
Fernald, Ohio**

*Prepared by*

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*Under*

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Subcontract 95PS005028**

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**Addendum No. 2**  
**To**  
**Impacted Material Placement Plan**  
**On-Site Disposal Facility**  
**Specialized Placement Plan for Thorium and Non-bagged Impacted Material**

In accordance with Section 8, Article 8.6.1 of the Impacted Material Placement (IMP) Plan, Revision 0, dated January 1998 for the On-Site Disposal Facility (OSDF), a specialized placement plan is required to be prepared for "materials either nominally larger than the physical criteria for the OSDF..." or "not reasonably anticipated by currently identified categories...". This specialized placement plan provides requirements and two options for placement of Category 2, Category 3, Category 4, and Category 5 thorium and non-bagged impacted material. This impacted material cannot be placed as described in Section 8, Article 8.6.3 of the IMP Plan or as described for bagged material in Addendum No 1, "Specialized Placement Plan for Bagged Impacted Material" because of more restrictive radiological requirements for thorium and more restrictive placement requirements for non-bagged asbestos.

**PLACEMENT REQUIREMENTS**

Placement of Category 2, Category 3, Category 4 and Category 5 thorium and non-bagged impacted material shall be performed in accordance with Fernald Environmental Management Project (FEMP) radiological safety procedures, the IMP Plan, including fugitive dust control and storm water runoff control, and the Contractor's approved Safe Work Plan. The Contractor's Safe Work Plan shall be revised to include requirements for placement of thorium and non-bagged impacted material as described in this Addendum No. 2. In addition to the requirements described in the above said documents, thorium and non-bagged impacted material shall be placed in a manner protective of the health and safety of OSDF personnel and the public, utilizing the As Low As Reasonably Achievable (ALARA) approach and shall meet the OSDF performance criteria stated in the Design Criteria Package for the OSDF.

**PLACEMENT OPTIONS**

Thorium and non-bagged impacted material (e.g. thorium contaminated debris, broken

transite panels, and soil containing friable asbestos) is expected to be generated as buildings are demolished. Additionally, some non-bagged impacted material may be generated in small quantities as other remediation activities are performed. To provide flexibility, two options are specified herein for placement of Category 2, Category 3, Category 4 and Category 5 thorium and non-bagged impacted material. These options are specified to minimize potential radiological exposure to personnel and equipment, limit dust generation, control storm water runoff, and place thorium and non-bagged impacted material in a safe manner. The two placement options are:

- Option 1 - Placement by Grid Method
- Option 2 - Placement by Trenching Method

Selection of the placement option will be made by the Construction Manager based on the quantity of thorium and non-bagged impacted material that is available for placement and availability of a required grid.

#### **Option 1 - Placement by Grid Method**

Non-bagged impacted material shall be placed by grid method when an estimated quantity of debris for placement is equal to or more than that required to fill half a grid (approximately 220 bcy or more) or when a previously placed minimum 3 ft (0.9 m) thick Category 1 grid is not available for placement by Option 2 trenching method. Bagged thorium impacted debris shall be placed by Option 2 only.

A minimum of two (2) working days prior to commencement of non-bagged impacted material placement by grid method, the Construction Manager will select and approve a grid(s). The approved selected grid(s) shall meet the following requirements:

- Grid shall not be located within 100 ft (30m) laterally adjacent to a Category 3 grid in the same horizon
- Grids with non-bagged impacted material placed by the Grid Method shall not be laterally adjacent to each other within the same horizon.
- Grid with non-bagged impacted material placed by the Grid Method and grid with thorium and non-bagged impacted material or bagged thorium impacted material placed by the Trenching Method shall not be adjacent to each other in the same horizon.
- Non-bagged impacted material shall be placed above an intervening horizon of Category

1 impacted material.

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- Non-bagged impacted material shall not be placed directly on previously placed Category 2 through 5 impacted material, protective layer, or select impacted material layer.
- Non-bagged impacted material shall not be placed within 6 ft (1.8 m) under the select impacted material for the final cover system.
- Only one (1) lift of non-bagged impacted material shall be placed in each grid.

Non-bagged impacted material placement in grid(s) shall be in accordance with the following requirements and general procedures and as shown on Figures 1, 2 and 3.

General procedures include:

- Preparation of the grid
- Debris placement
- Initial and additional lifts of Category 1 material

Requirements for each procedure are as follows:

Preparation of the Grid: After a grid is selected and approved, perimeter berms shall be constructed on three sides of the grid, as shown on Figure 1. These berms shall be constructed from Category 1 material; they shall be 24 in (600 mm) high and have a minimum top width of 10 ft (3 m). The berms shall be placed and compacted in 12 inch (300 mm) to 15 inch (375 mm) loose lifts in accordance with the IMP Plan. An additional berm shall be constructed (with the same requirements of the perimeter berms) in the middle of the grid to provide access for a trackhoe (or other equipment) to spread and compact the material. Until non-bagged impacted material placement in the grid is complete, the fourth side shall be left open for truck entrance and exit to and from the grid. The fourth side of the perimeter berm shall be constructed after completion of non-bagged impacted material as shown in Figures 2, and 3. The berms shall be compacted to meet at least 90 percent of the standard Proctor maximum dry density as described in the IMP Plan (Section 7.4.2). Compaction shall be tested in accordance with the IMP Plan. The surface of the Category 1 material on which the non-bagged impacted material will be placed shall be graded at an approximately 1% slope downward away from the truck entrance and exit side of the grid. A temporary diversion berm (approx. 18 inches [450

mm] high), as needed, shall be constructed approximately 30 ft (9 m) in front of the grid entrance to limit runoff from entering the grid. The grid shall be oriented so that the open side of the grid (fourth perimeter berm) is at the up gradient side of the grid. The required radiological controls for the placement area will be established prior to commencement of non-bagged impacted material placement.

**Debris Placement:** After the grid has been prepared, trucks transporting non-bagged impacted material shall dump material at the down gradient end of the grid. Non-bagged impacted material shall be spread and tamped by the bucket of a trackhoe to achieve a maximum loose lift thickness of 18 inches (450 mm). The trackhoe shall be of sufficient size and reach and be situated in such a way that only the bucket shall contact the non-bagged impacted material. Compaction, other than tamping from a trackhoe bucket shall not be performed directly on the non-bagged impacted material. In accordance with the ALARA concept, equipment operators and other personnel shall avoid contact with thorium or asbestos impacted material. Also, trucks delivering thorium impacted debris shall not drive on material deposited by the trucks or previously placed thorium impacted debris to minimize the potential for thorium contamination on the outside of the vehicle. A radiological technician or trained asbestos personnel, as appropriate, will monitor the trucks at the exit to the grid as shown on Figure 1. Fugitive dust and storm water runoff controls shall be in accordance with the IMP Plan. Water trucks and/or water hoses shall be available at the location of placement activities. The top of non-bagged impacted material shall be surveyed for location and elevation and information shall be submitted to the Construction Manager.

**Initial and Additional Lifts of Category 1 Material:** As the material placement progresses, an initial 15 inches (375 mm), minimum, 18 in (450 mm) maximum loose lift of Category 1 material (soil and soil-like material) shall then be placed on top of the non-bagged impacted material by the end of each working day. No non-bagged impacted material shall remain uncovered with Category 1 material by the end of the workday. The entire grid shall be covered with an initial lift by the end of five (5) working days. The initial lift shall be compacted with a minimum of four one-way passes of a self-propelled double drum roller compactor, a smooth drum vibratory roller or other compaction equipment approved by the Construction Manager. No compaction testing will be performed on the initial lift above the non-bagged impacted material. As shown in Figures 2 and 3, the fourth side of the perimeter berm will be constructed after non-bagged impacted material placement is completed. After the fourth side of the perimeter berm has been placed and initial lift is

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placed over the non-bagged impacted material, the temporary diversion berm to control storm water runoff, as needed, shall be removed. An additional 12 inches (300 mm)  $\pm$  3 inches (75 mm) loose lift(s) of Category 1 material shall be placed above the initial lift. Total compacted thickness of Category 1 material placed above the non-bagged impacted material, including the initial lift, shall be at least as thick as the intervening horizon described in the IMP Plan. See attached Figure 3. The Category 1 lift(s) above the initial lift shall be compacted to meet at least 90 percent of the standard Proctor maximum dry density. Appropriate compaction equipment, including the Cat-826 landfill compactor or approved equivalent, shall be used on lifts above the initial lift to meet the specified compaction requirements. Compaction of the additional lift(s) shall be tested in accordance with the IMP Plan.

After compacting the final lift of Category 1 material over the non-bagged impacted material the Category 1 material shall be proof-rolled. Soft spots indicated by tire ruts more than 3 inches (76 mm) in depth or visible deflection under the moving proof rolling equipment shall be stabilized through additional passes of the compactor. The proof rolling equipment shall have a minimum gross vehicle weight of 20 tons (180kN) and exert a ground pressure of at least 65 psi (450 kPa). Any soft spot that cannot be stabilized with further compactive effort shall be cause for additional treatment to the satisfaction of the Construction Manager.

#### **Option 2 – Placement by Trenching Method**

Bagged thorium or non-bagged impacted material shall be placed by trenching method when the material estimated quantity of debris will be less than the quantity required to fill a half grid (less than approximately 220 bcy) and a previously placed minimum 3 ft (0.9 m) thick Category 1 grid is available for placement of the bagged thorium or non-bagged impacted material as shown in Figure 4.

A minimum of two (2) working days prior to commencement of impacted material placement by the trenching method, the Construction Manager will select and approve a grid previously placed with a minimum 3 ft (0.9 m) thick Category 1 layer overlying an intervening horizon of Category 1 material. The trench for placement of bagged thorium or non-bagged impacted material by this method shall meet the following requirements:

- Grid shall not be located within 100 ft (30 m) laterally adjacent to a Category 3 grid in

the same horizon.

- Grids with bagged thorium or non-bagged impacted material trenches shall not be laterally adjacent to each other within the same horizon.
- Grid with non-bagged impacted material placed by the Grid Method and grid with bagged thorium or non-bagged impacted material placed by the Trenching Method shall not be adjacent to each other in the same horizon.
- A trench for bagged thorium or non-bagged impacted material shall not be excavated in previously placed Category 2 through 5 impacted material, protective layer, or select impacted material layer.
- A trench for bagged thorium or non-bagged impacted material shall not be excavated within 6 ft (1.8 m) under the select impacted material for the final cover system
- Only one (1) lift of bagged thorium or non-bagged impacted material shall be placed in each grid.
- Minimum thickness of Category 1 material under bagged thorium or non-bagged impacted material trench excavation shall be the thickness of the intervening horizon of Category 1 impacted material as described in the IMP Plan.

Bagged thorium or non-bagged impacted material placement in a trench shall be in accordance with the following requirements and general procedures and as shown on Figure 4.

General procedures include:

- Trench Excavation
- Debris Placement
- Initial and Additional Lifts of Category 1 Material

Requirements for each procedure are as follows:

**Trench Excavation:** After a grid(s) is selected and approved, a trench (or trenches) shall be excavated as shown on Figure 4. Each trench shall be a minimum of 3 ft (0.9 m) deep and a maximum of 4 ft (1.2 m) deep and between 8 ft (2.4 m) and 12 ft (3.6 m) wide. A minimum 6 ft (1.8 m) distance shall be maintained between top of the side slopes of the adjacent trench. One end of the trench shall be graded to a minimum 5H:1V ramp (subject to approval by FDF Safety Engineer) for truck access into the trench. The trench bottom

shall be graded at an approximately 1% slope downward away from the truck access ramp. The maximum trench length shall be approximately 70 ft (21 m) and shall be limited by the maximum length that can be excavated in one grid and still provide adequate access to enter and exit the trench. The Category 1 material excavated from the trench shall be stockpiled a minimum of 6 ft (1.8 m) from the top of the side slopes of the trench and shall be used later for initial and additional lifts over the bagged thorium or non-bagged impacted material. The necessary radiological controls or trained asbestos personnel, as appropriate, will be established prior to commencement of bagged thorium or non-bagged impacted material placement.

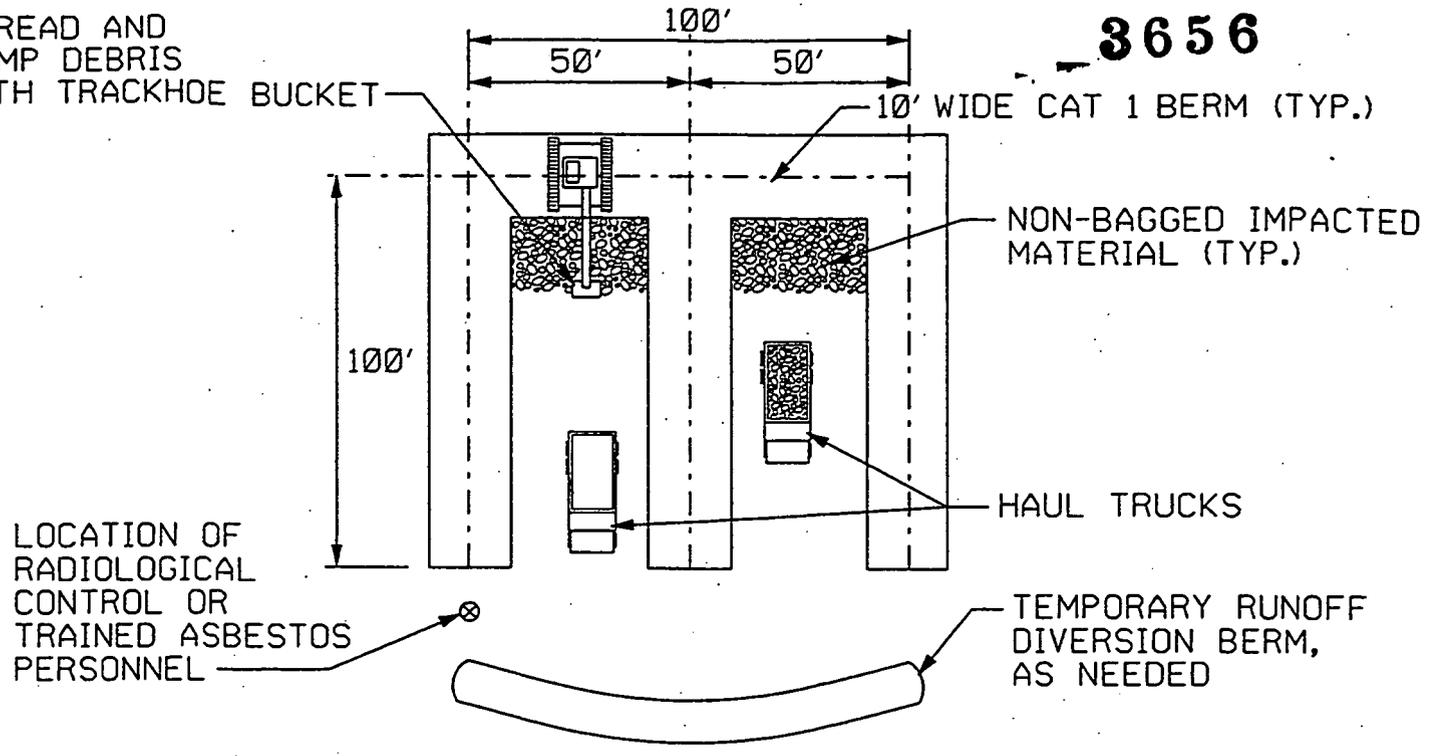
**Debris Placement:** After the trench is excavated, trucks transporting bagged thorium or non-bagged impacted material shall back down the ramp and begin dumping material at the furthest end of the trench. Bagged thorium or non-bagged impacted material shall be spread and tamped by the bucket of a trackhoe to achieve a maximum loose lift thickness of 18 inches (450 mm). The trackhoe shall be situated in such a way that only the bucket shall contact the bagged thorium or non-bagged impacted material. Compaction, other than tamping from a trackhoe bucket shall not be performed directly on the bagged thorium or non-bagged impacted material. Equipment operators and other personnel shall avoid contact with thorium or asbestos impacted material in accordance with the ALARA concept. Trucks delivering thorium impacted debris shall not drive on material deposited by the trucks or previously placed thorium impacted material to minimize the potential for thorium contamination on the outside of the vehicle. A radiological technician or trained asbestos personnel, as appropriate, will monitor the trucks at the exit to the trench as shown on Figure 4. Fugitive dust and storm water runoff controls shall be in accordance with the IMP Plan. Water trucks and/or water hoses will be available at the location of placement activities. The bottom of the trench and the top of the bagged thorium or non-bagged impacted material shall be surveyed for location and elevation and information shall be submitted to the Construction Manager.

**Initial and Additional Lifts of Category 1 Material:** After bagged thorium or non-bagged impacted material is placed in the trench and compacted, it shall be covered with an initial 15 inches (375 mm) minimum, 18 in (450 mm) maximum loose lift of Category 1 material by the end of each working day. The initial lift shall be compacted with a minimum of four one-way passes of a self-propelled double drum roller compactor, a smooth drum vibratory roller or other compaction equipment approved by the Construction Manager. No compaction testing will be performed on the initial lift above bagged thorium or non-bagged

impacted material. An additional 12 inches (300 mm)  $\pm$  3 inches (75 mm) loose lift(s) of Category 1 material shall be placed above the initial lift. Total compacted thickness of Category 1 material placed above the bagged thorium or non-bagged impacted material, including the initial lift, shall be a minimum 15 inches (375 mm) as shown on attached Figure 4. The Category 1 lift(s) above the initial lift shall be compacted to meet at least 90 percent of the standard Proctor maximum dry density. Appropriate compaction equipment, shall be used on lifts above the initial lift to meet the specified compaction requirements. Compaction of the additional lift(s) shall be tested in accordance with the IMP Plan.

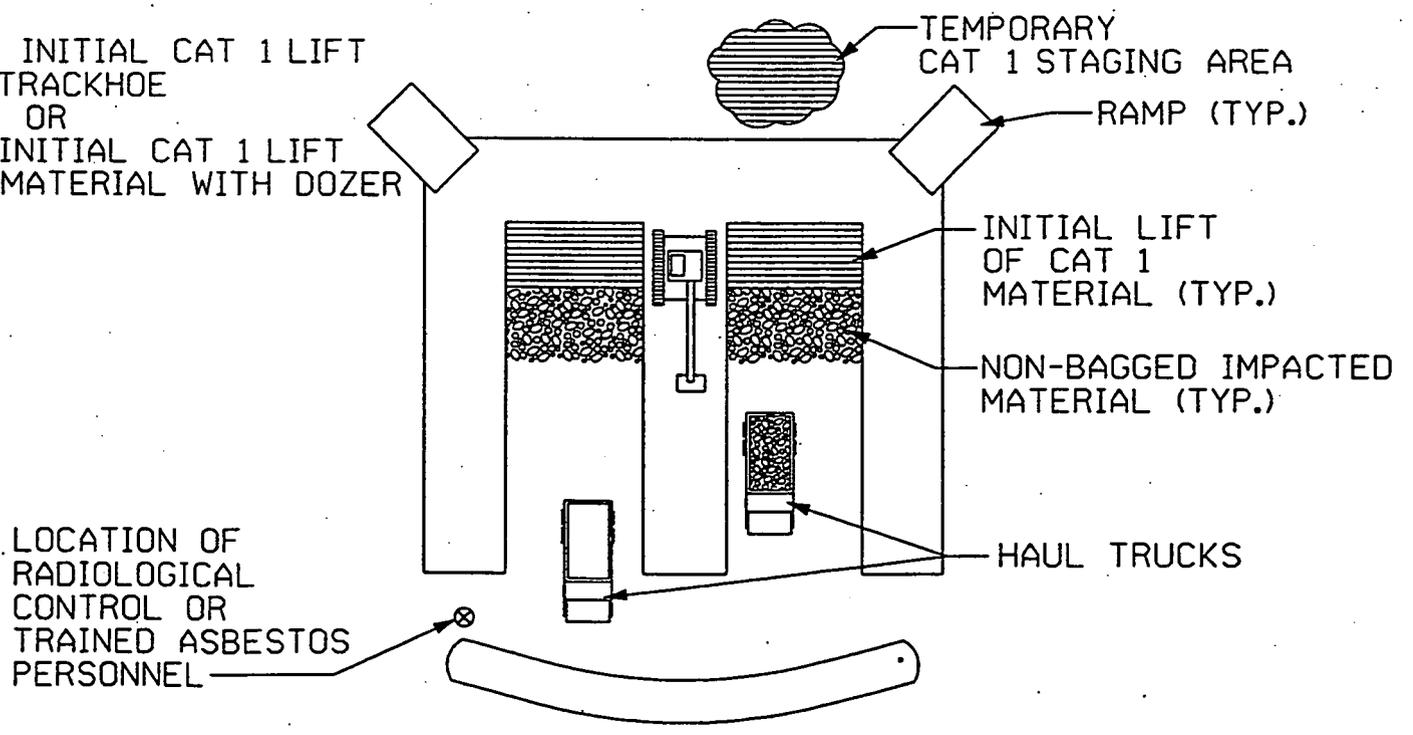
After compacting the final lift of Category 1 material over the bagged thorium or non-bagged impacted material, the Category 1 material shall be proof-rolled. Soft spots indicated by tire ruts more than 3 inches (76 mm) in depth or visible deflection under the moving proof rolling equipment shall be stabilized through additional passes of the compactor. The proof rolling equipment shall have a minimum gross vehicle weight of 20 tons (180 kN) and exert a ground pressure of at least 65 psi (450 kPa). Any soft spot that cannot be stabilized with further compactive effort shall be cause for additional treatment to the satisfaction of the Construction Manager. As shown on Figure 4, the trench will subsequently be covered with an intervening horizon of Category 1 material.

SPREAD AND TAMP DEBRIS WITH TRACKHOE BUCKET



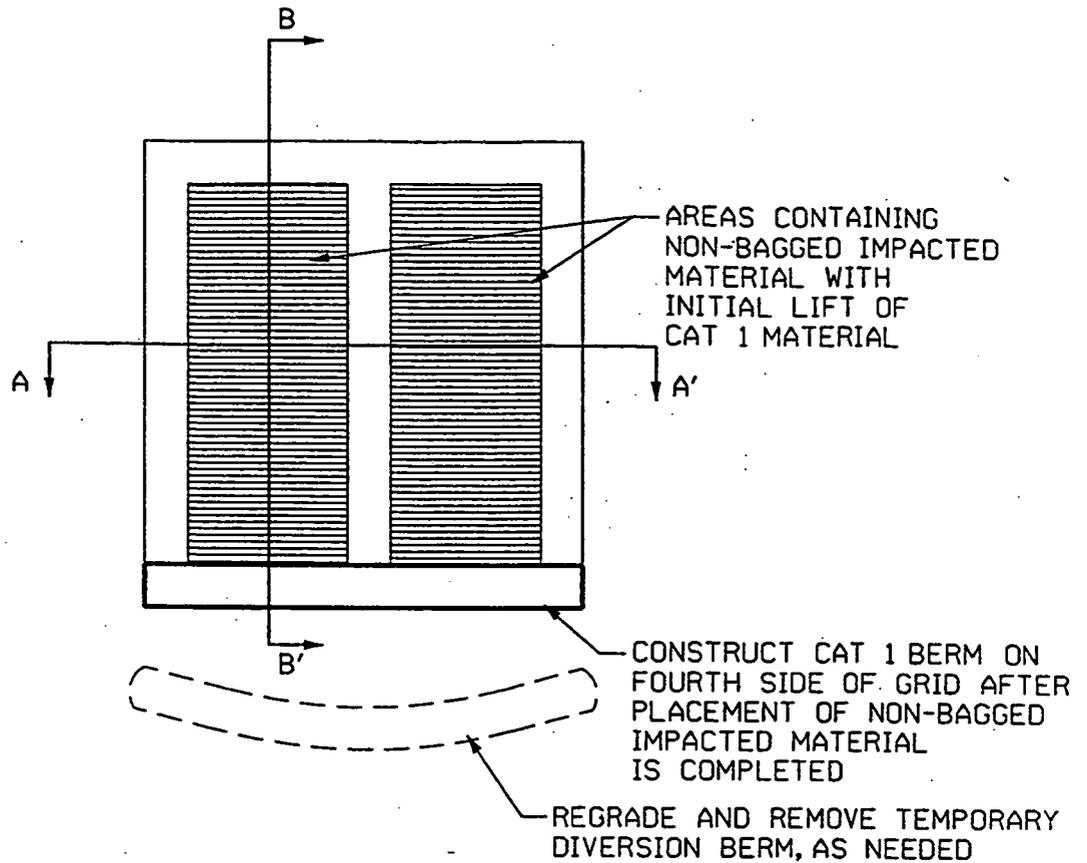
PLACING NON-BAGGED IMPACTED MATERIAL IN GRID  
NTS

PLACE INITIAL CAT 1 LIFT WITH TRACKHOE OR  
OR  
FINISH INITIAL CAT 1 LIFT ONTO MATERIAL WITH DOZER



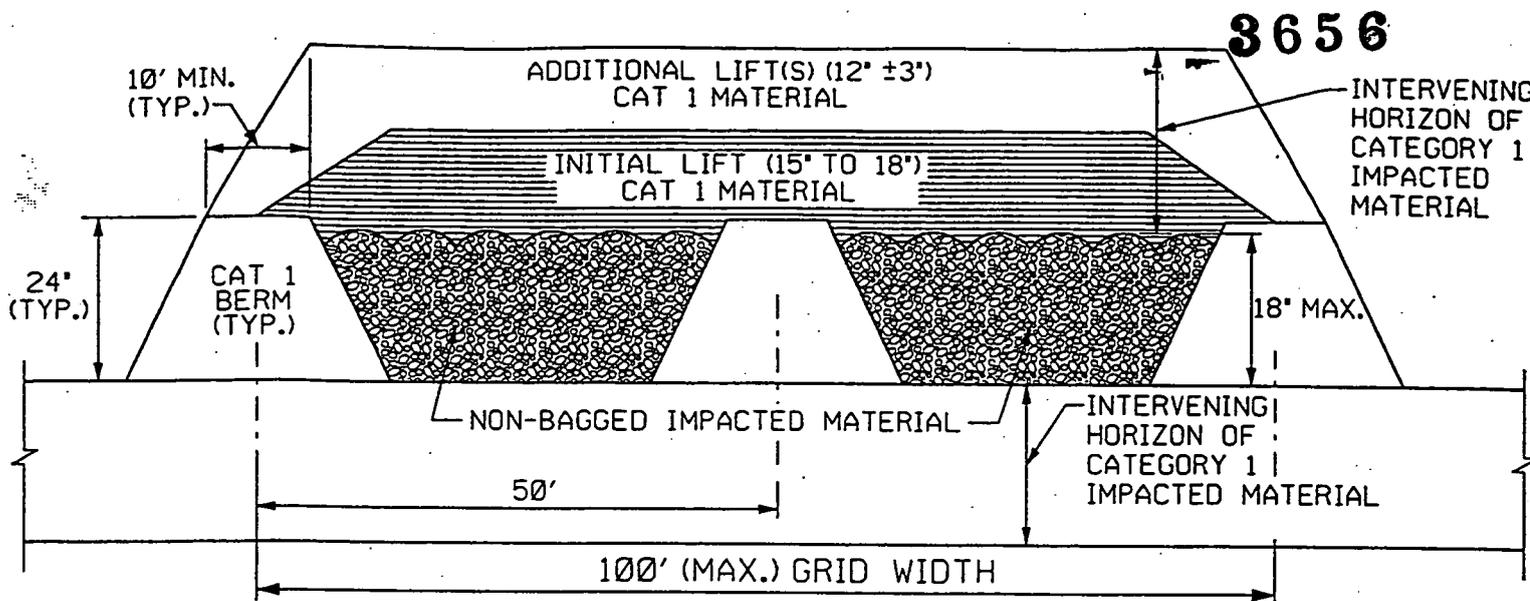
COVERING NON-BAGGED IMPACTED MATERIAL  
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FIGURE 1  
RADIUM AND NON-BAGGED IMPACTED MATERIAL PLACEMENT  
OPTION 1 - GRID METHOD  
PLAN VIEW  
SHEET 1 OF 3



COMPLETION OF NON-BAGGED IMPACTED MATERIAL GRID  
NTS

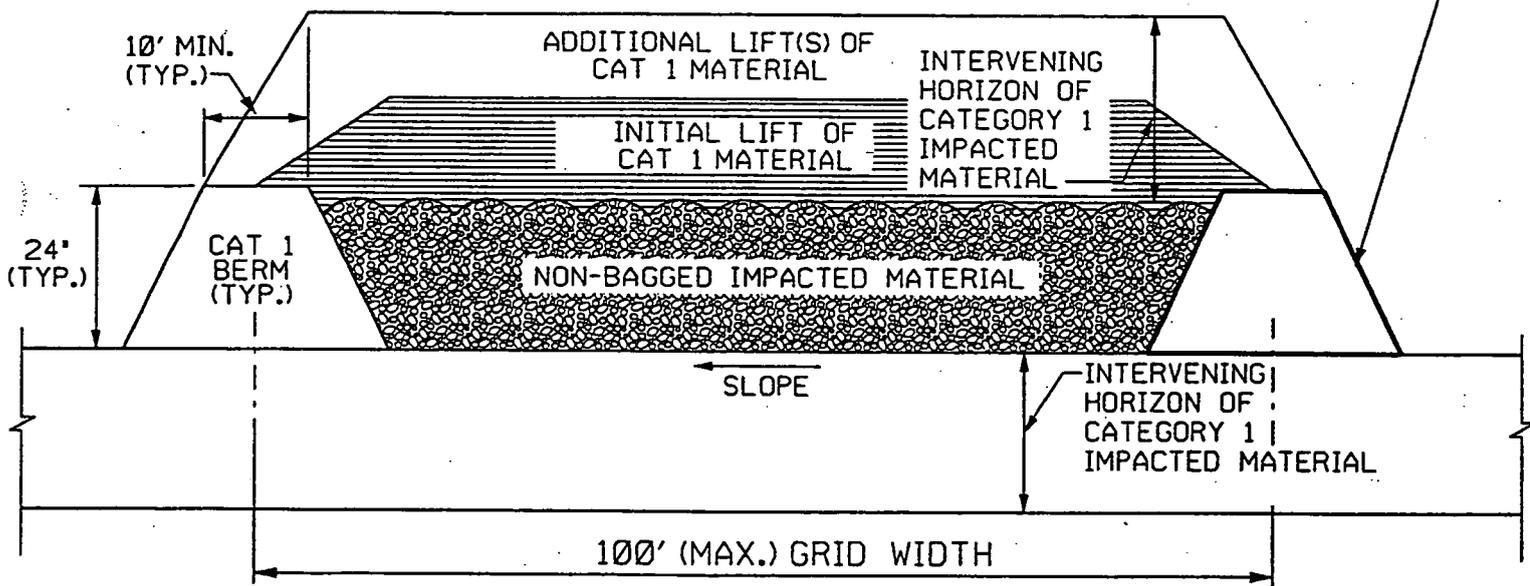
NOTES: SEE FIGURE 3 (SHEET 3 OF 3) FOR AA' AND BB' CROSS SECTIONS.



SECTION A-A'

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CONSTRUCT CAT 1 BERM ON FOURTH SIDE OF GRID AFTER PLACEMENT OF NON-BAGGED IMPACTED MATERIAL IS COMPLETED



NOTE: FOR PLAN VIEW SEE FIGURE 2 (SHEET 2 OF 3)

SECTION B-B'

NTS

FIGURE 3  
 INTERVENING HORIZON AND NON-BAGGED IMPACTED MATERIAL PLACEMENT  
 OPTION 1 - GRID METHOD  
 CROSS SECTIONS  
 SHEET 3 OF 3

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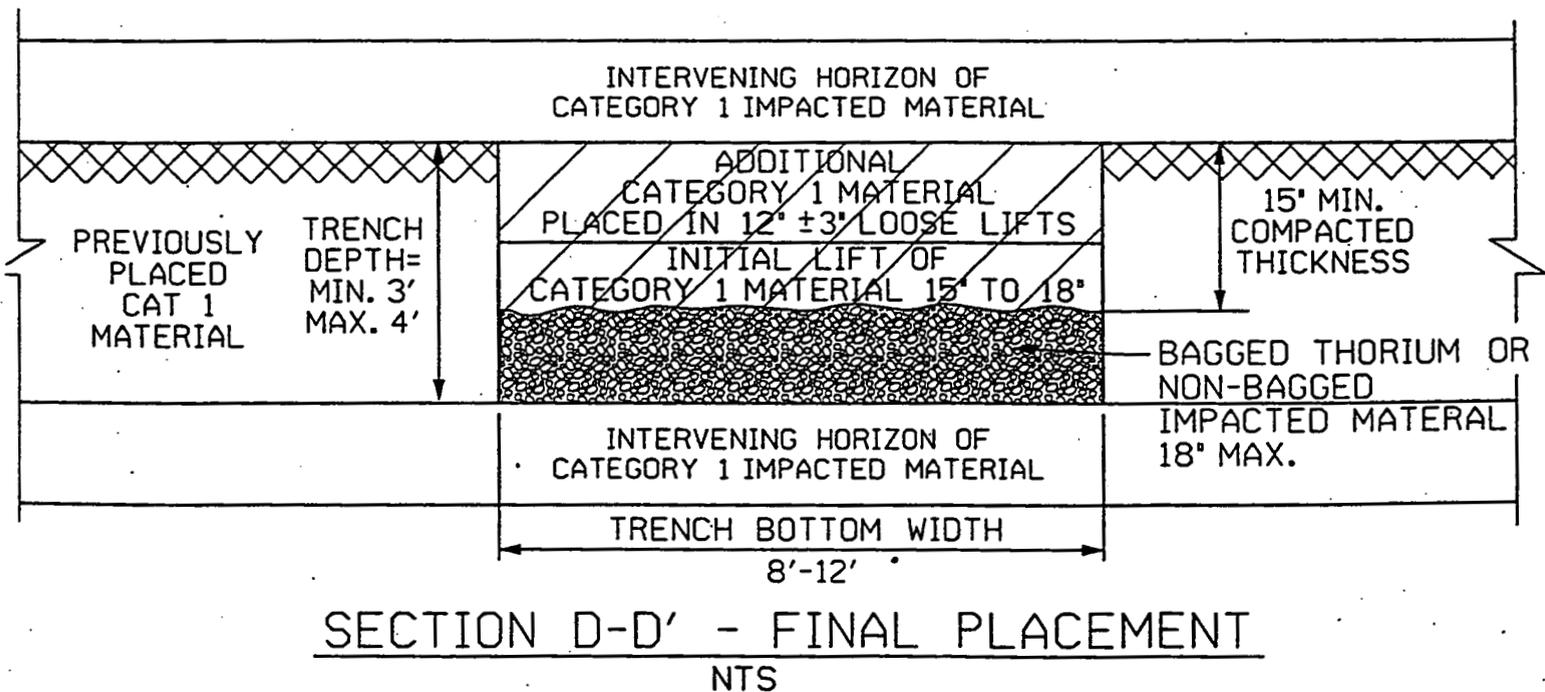
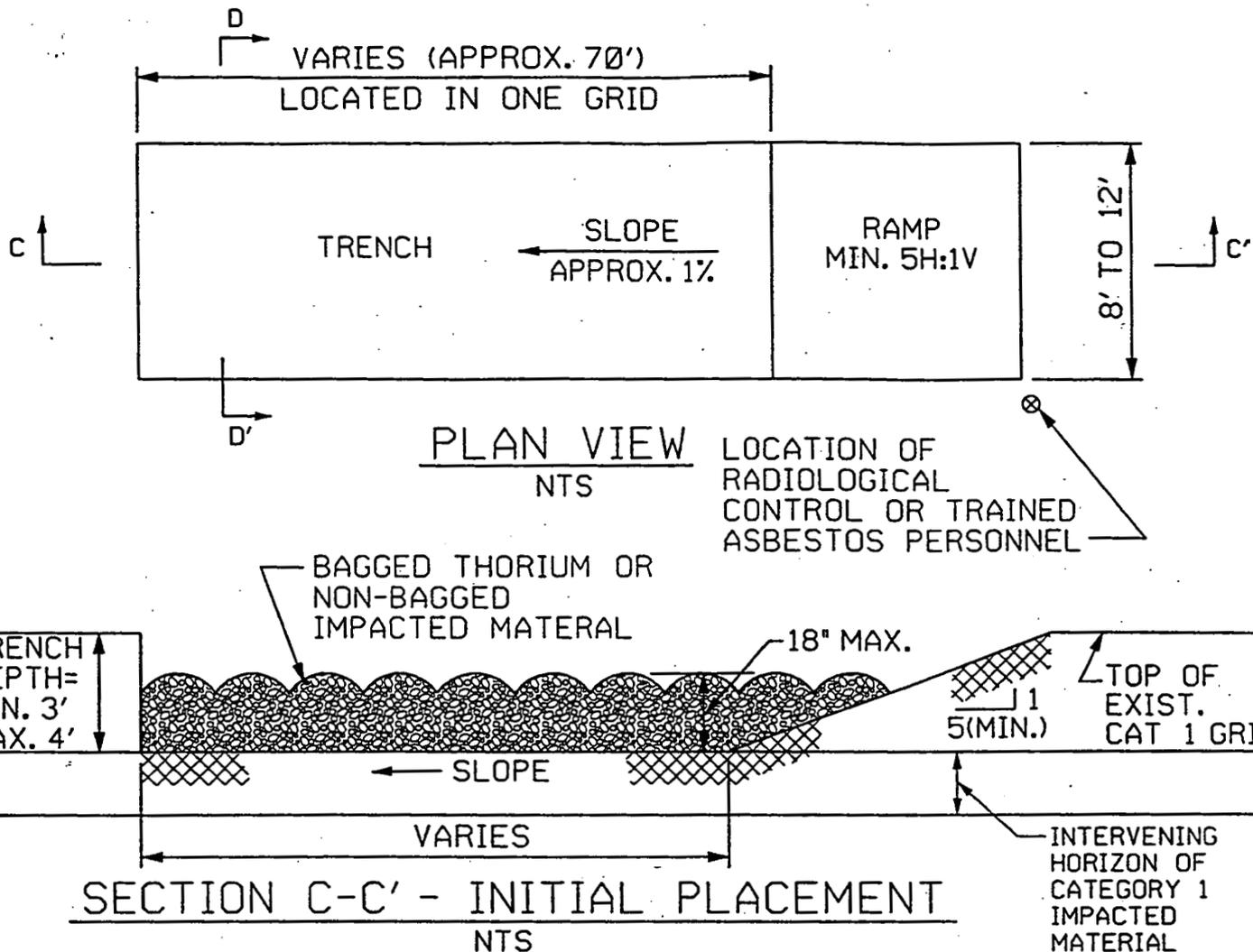


FIGURE 4  
THORIUM AND NON-BAGGED IMPACTED MATERIAL PLACEMENT  
OPTION 2 - TRENCHING METHOD 000110  
SHEET 1 OF 1

**Addendum No. 3  
To  
IMPACTED MATERIALS PLACEMENT PLAN  
ON-SITE DISPOSAL FACILITY**

**Alternative Trenching Method for Placement  
of Category 2 Impacted Material**

**20100-PL-007**

**Revision 1  
MARCH 2000**

**United States Department of Energy  
Fernald Environmental Management Project  
Fernald, Ohio**

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*Under*

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Subcontract 95PS005028**

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**Addendum No. 3**  
**To**  
**Impacted Material Placement Plan**  
**On-Site Disposal Facility**  
**Alternative Trenching Method for Placement of Category 2 Impacted Material**

In accordance with Section 8, Article 8.3 of the Impacted Materials Placement (IMP) Plan, Revision 0, dated January 1998 for the On-Site Disposal Facility (OSDF) describes the placement and compaction procedures for Category 2 impacted material. As described in Section 5, Article 5.2 of the IMP Plan, Category 2 impacted materials are materials that can be transported, placed, spread and compacted *en masse*. Examples of Category 2 impacted material include: broken-up concrete foundations, impacted soil mixed with broken-up concrete, general building rubble and debris of irregularly shaped metals or other components of the superstructure or substructure with a maximum length of 10 ft (3 m) and a maximum thickness of 18 in (450 mm).

This specialized placement plan provides an alternative trenching method and related requirements for placement of Category 2 impacted material. This alternative trenching method shall be used for non-routine placement of Category 2 impacted material when:

- Types of Category 2 impacted material require lateral confinement for spreading and placement activities (e.g., structural steel, pipes), or
- Types of Category 2 material require special handling (such as large structural members that meet the Category 2 materials size criteria).

**PLACEMENT REQUIREMENTS**

Placement of Category 2 impacted material using the alternative trenching method shall be performed in accordance with Fernald Environmental Management Project (FEMP) radiological safety procedures, the IMP Plan, including fugitive dust control and storm water runoff control, and the Contractor's approved Safe Work Plan. The Contractor's Safe Work Plan shall be revised to include requirements for the Alternative Trenching

**Method.** In addition to the requirements described in the above said documents, Category 2 impacted material shall be placed in a manner protective of the health and safety of OSDF personnel and the public, utilizing the As Low As Reasonably Achievable (ALARA) approach and shall meet the OSDF performance criteria stated in the Design Criteria Package for the OSDF.

A minimum of two (2) working days prior to commencement of Category 2 impacted material placement by the alternative trenching method, the Construction Manager will select and approve a previously placed minimum 3 ft (0.9 m) thick Category 1 grid overlying an intervening horizon of Category 1 material. The trench for placement of Category 2 material by this method shall meet the following requirements:

- A trench shall not be excavated in previously placed Category 2 through 5 impacted material, protective layer, or select impacted material layer.
- A trench shall not be excavated within 6 ft (1.8 m) under the select material for the final cover system.
- Minimum thickness of Category 1 material under trench excavation shall be as thick as the intervening horizon of Category 1 impacted material as described in the IMP Plan.

Category 2 material placement in a trench shall be in accordance with the requirements and general procedures presented herein and as shown on Figure 1.

General procedures include:

- Trench Excavation
- Category 2 Material Placement
- Lift(s) of Category 1 Material

Requirements for each procedure are as follows:

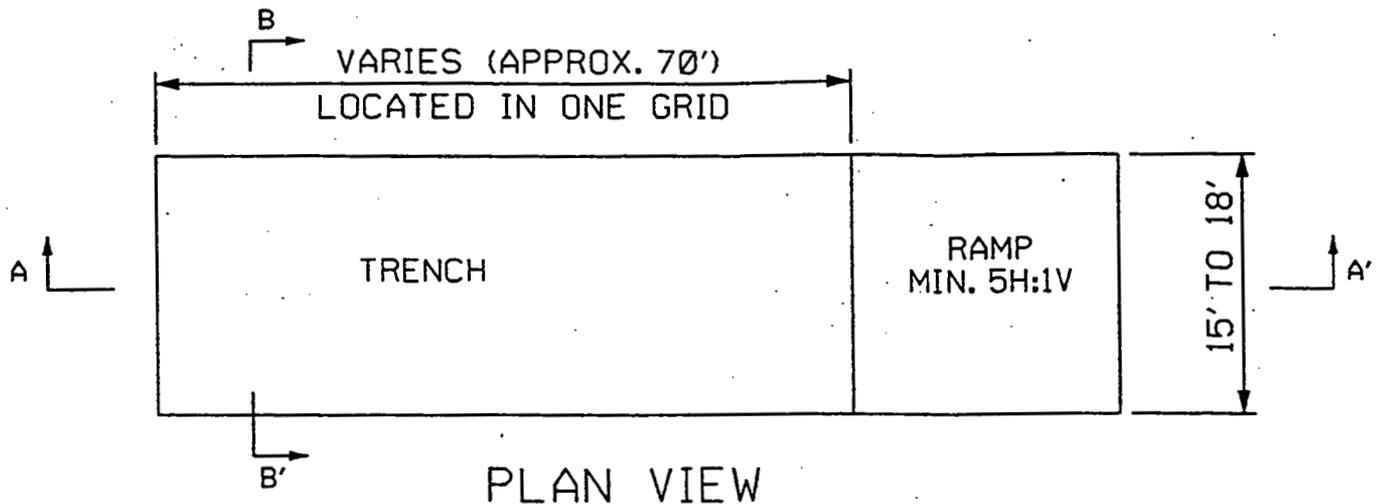
**Trench Excavation:** After a grid(s) is selected and approved, a trench (or trenches) shall be excavated as shown on Figure 1. Each trench shall be a minimum of 3 ft (0.9 m) deep and a maximum of 4 ft (1.2 m) deep, and between 15 ft (4.6 m) and 18 ft (5.5 m) wide. A minimum 6 ft (1.8 m) distance shall be maintained between top of the side slopes of the adjacent trenches. One end of the trench shall be graded to a minimum 5H:1V (subject to approval by FDF Safety Engineer) ramp for truck access into the trench. The maximum trench length shall be approximately 70 ft (21 m) and shall be limited by the maximum

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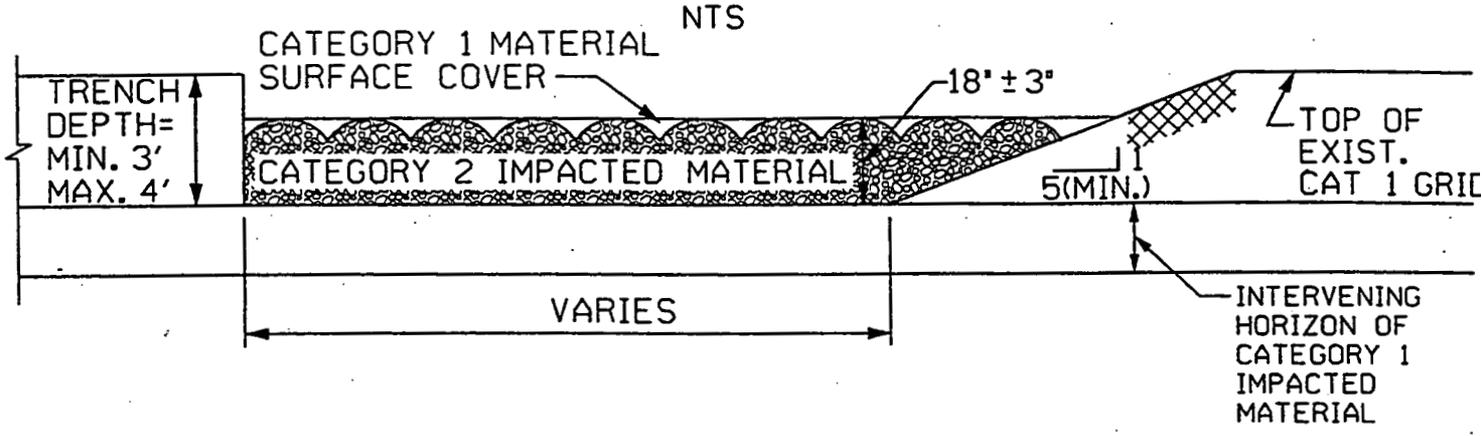
length that can be excavated in one grid and still provide adequate access to enter and exit the trench. The Category 1 material excavated from the trench shall be stockpiled a minimum of 6 ft (1.8 m) from the top of the side slopes of the trench and shall be used later for lift(s) of Category 1 material over the Category 2 impacted material.

Category 2 Material Placement: After the trench is excavated, trucks transporting Category 2 impacted material shall back down the ramp and begin dumping material at the furthest end of the trench. Category 2 material shall be spread by construction equipment, such as a trackhoe or dozer, to achieve a maximum loose lift thickness of 18 in. (450 mm)  $\pm$  3 in. (75 mm). Contractor shall spread and mix Category 1 material as much as practicable with Category 2 material during placement in the trench. The objective of this mixing is to fill voids within the Category 2 material, increase the density, and aid in homogenizing the debris. Initial compaction shall be accomplished using a Cat 826 landfill compactor or equivalent within the trench. Fugitive dust and storm water runoff controls shall be in accordance with the IMP Plan. Water trucks and/or water hoses will be available at the location of placement activities.

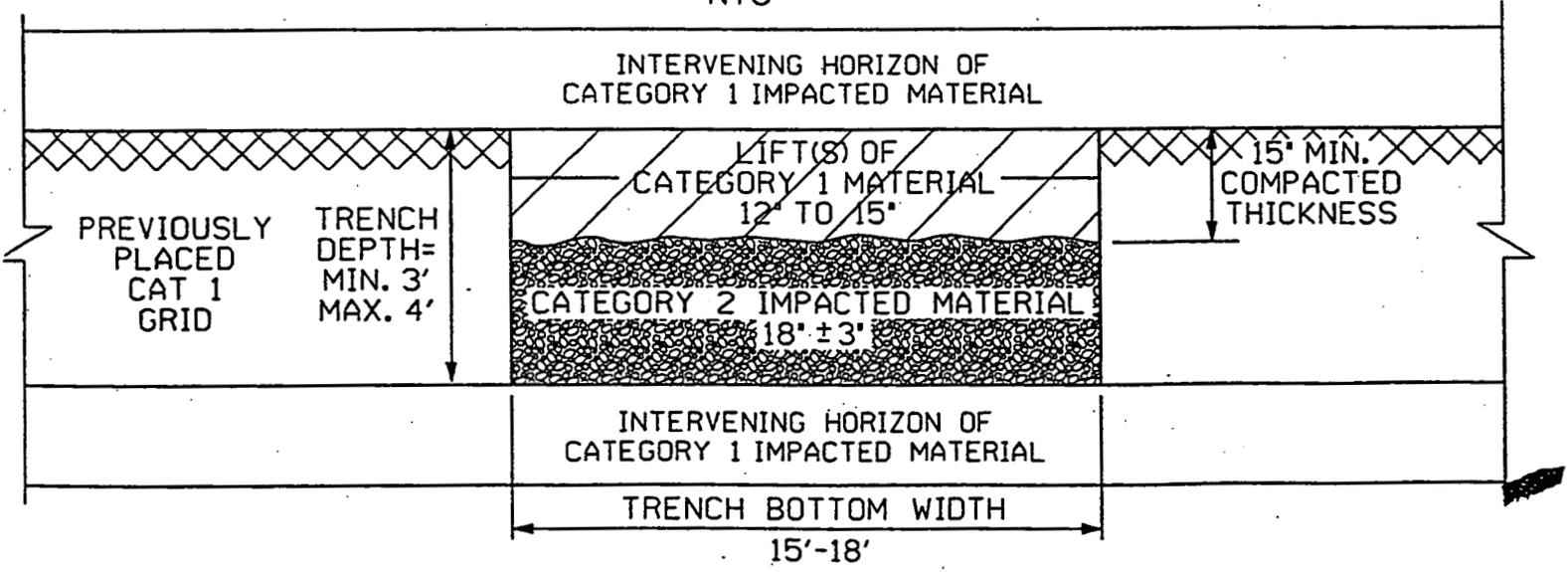
Lift(s) of Category 1 Material: The compacted Category 2 impacted material shall be covered with a 12 in. (300 mm) to 15 in. (375 mm) loose lift of Category 1 material. The lift shall be compacted with a minimum of four one-way passes of a self-propelled double drum roller compactor, a smooth drum vibratory roller or other compaction equipment approved by the Construction Manager. Additional 12 in. (300 mm) to 15 in. (375 mm) loose lift(s) of Category 1 material shall be placed, if necessary, to the top of trench elevation. Total compacted thickness of Category 1 material placed above the Category 2 impacted material, shall be a minimum of 15 in. (375 mm) as shown on attached Figure 1. The lift(s) of Category 1 material shall be compacted to at least 90 percent of the standard Proctor maximum dry density. Compaction shall be tested in accordance with the IMP Plan. As shown on Figure 1, the trench will subsequently be covered with an intervening horizon of Category 1 material.



PLAN VIEW



SECTION A-A' - CATEGORY 2 MATERIAL PLACEMENT  
NTS



SECTION B-B' - PLACEMENT OF CATEGORY 1 LIFT(S)  
NTS

FIGURE 1  
CATEGORY 2 IMPACTED MATERIAL PLACEMENT  
ALTERNATIVE TRENCHING METHOD  
SHEET 1 OF 1

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