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RFS-ERDF-002.5

Environmental Restoration Disposal Facility

Waste Disposal Operations

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Waste Materials Management Plan

Work Performed for Bechtel Hanford Inc. Under Subcontract 0600X-SC-G0006

Duratek

Record of Revisions

Revision/PCN No.	Date Entered	Entered By (Handwritten Signature)

List of Effective Pages

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1.0 Purpose and Scope

1.1 Purpose

The purpose of the Waste Materials Management Plan is to establish the plan for waste fill sequencing, waste material placement, waste material compaction, operations layer placement and compaction and compaction verification testing requirements to support operations of the Hanford Environmental Restoration Disposal Facility (ERDF).

1.2 Scope

The requirements of this plan apply to waste to be disposed of at the ERDF. Waste received onsite will only be placed after verifying that the waste meets the criteria contained within the Waste Acceptance Plan for the ERDF. Waste placement operations will comply with the requirements outlined in Section 3.5.2 of the Performance Specification for ERDF Waste Disposal Services (0600X-SP-G0005). This plan implements the requirement of the Specification.

The scope of this plan will include the following areas:

- Waste Filling Sequence
- Waste Placement/Compaction
- Stabilization/Void Fill/Subsidence Control
- Compaction Testing
- Dust Control

2.0 Filling Sequence

This section presents a filling sequence for the filling of Cells 1 through 4 of the ERDF. The cells will be filled using two levels (35' and 70') (10.68 and 21.35 meters). All dimensions referred to in this plan are approximate and subject to minimal variation.

2.1 General Sequence

A graphical representation of the filling sequence is presented in Appendix A. The two-lift sequence is completed in 12 stages.

2.1.1 Landfill Lift Elevations - The filling sequence for the new landfill cells will start at the bottom and move through two lifts toward the landfill top. Two lifts will be performed at the 35' and 70' (10.68 and 21.35 meters) levels.

2.1.2 First Lift (35') (10.68 meters) - The first lift will be started just north of the crest between Cell 1 and Cell 2. The width of the lift will be 100' to 125' (30.5 to 38.2 meters) to the east. The lift will progress north and the elevation of the lift will increase at 10% until the 35' (10.68 meters) elevation is achieved. The lift will continue to proceed north until the northern edge of Cell 1 is encountered. At this point, the lift will proceed east to the eastern edge of Cell 1. A road will be constructed, as soon as possible, along the eastern working face of Cell 1 from the 35' (10.68 meters) level to the bottom of the cell. This road will

allow access to the bottom of the landfill. After construction of the road, the existing ten percent ramp will be covered with waste and leveled at the 35' elevation. After Cell 1 is completely covered to the 35' (10.68 meters) level, the lift will progress south into Cell 2. The working face will advance south and fill the entire cell. A two-foot (0.61 meter) daily operational cover (DOC) will be placed over the first lift incrementally as the lift is completed.

2.1.3 Second Lift (70 feet) (21.35 meters) - Shortly prior to the completion of the 35-foot (10.68 meters) first lift over both Cells 1 and 2, the second lift at the 70-foot (21.35 meters) elevation will be started. The lift will be developed just as the first 35-foot (10.68 meters) lift was started, and progress to the 70-foot (21.35 meters) elevation. The lift will progress north and the elevation of the lift will increase at ten percent until the 70-foot (21.35 meters) elevation is achieved. The lift will continue to proceed north through Cell 1 until it reaches the north boundary of Cell 1. At this point, the lift will proceed south and west to the western edge of Cell 1. The lift will continue to proceed south until the southern edge of Cell 2 is encountered. A crown will be developed on the waste as it is placed to meet the five- percent slope requirements. A nominal two-foot (0.61 meter) thick DOC will be placed over the second lift incrementally as the lift is completed.

2.1.4 Material Placement in Future Cells – Cells 3 and 4 and all subsequent cells will follow a similar filling sequence as Cells 1 and 2.

3.0 Placement/Compaction

3.1 Location of Waste

During the waste placement activities a three-dimensional grid of the waste placed in the cells will be maintained to record the location where the waste was placed. The grid will consist of a grid marked off in 30-foot (9.2 meters) increments. The location of the waste will be recorded on the manifest to the nearest 30-foot (9.2 meters) grid marker. The vertical location will be recorded on the manifest as the lift number (i.e., 35-foot lift [10.68 meters] or 70-foot [21.35 meters] lift).

This grid location information will be hand entered on the specific waste manifest. This information will be entered into the automation system.

3.2 Bulk Soil Waste Material

Bulk soil waste material will be dumped from the trucks into the currently active operations area. The trucks will back onto a peninsula dumping station. This dumping station will be approximately six feet above the active operations area. Appendix B provides an example of a dumping station. Dumping stations may differ in size and layout. Water will be sprayed on the material during the dumping operation as required to mitigate any dust generation. The material will be spread in a layer thin enough to

achieve at least 90 percent of optimum density. Water can or may be added during both the spreading and compaction functions. The volume of water shall not exceed quantity required to achieve optimum moisture. The bulk soil will be compacted to at least 90 percent of the Modified Proctor (ASTM D 1557) maximum dry density.

Leachate meeting the criteria identified in the Leachate Management Plan may be used instead of water to accomplish dust suppression and compaction. Good water conservation practices will be followed so that enough water or leachate is applied to control dust or achieve compaction, while not applying more water or leachate than is required in order to minimize generation of leachate.

3.3 Daily Operational Cover Material

DOC is applied over contaminated material on horizontal and haulage ramp surfaces. DOC will be applied on an as needed basis. DOC material will be transported from the storage area to the landfill. The material will be spread on top of the 35-foot (10.68 meters) level, as required to accommodate waste filling requirements identified in the subcontract. This material will keep the waste transport vehicles on a clean surface during the dumping process. Clean water will be sprayed on the material as required during the dumping process to mitigate any dust generation. The material will be spread in layers in the required area. The material will be compacted to at least 90 percent of the optimum density. Water will be added during both the spreading and compaction functions. Only clean water will be used for compaction and dust control to prevent the spread of contamination to the shuttle trucks and other "clean" equipment. The DOC material will be compacted to at least 90 percent of the Modified Proctor (ASTM D 1557) maximum dry density.

3.4 Metal Debris and Containerized Waste Material

Metal debris and containerized waste material will be placed toward the bottom of the lifts and leveled to be only one layer thick (i.e., debris will not be stacked on debris). Flat metal plates and other flat noncompactable items may be stacked more than one layer thick. Bulk soil waste will be compacted over the top of the metal debris as specified in section 3.1, above. This method will minimize subsidence within the landfill. Metal debris and containerized waste material may be staged in the bottom of the pit or staged in boxes outside the landfill to assure proper placement as described in this section.

3.5 Soft Debris Waste Material

Soft debris waste material is waste material that consists of wood, paper, cardboard, and other biodegradable material that can cause a subsidence problem within the landfill. This soft debris material will be staged and added to lifts in quantities less than five percent by volume. The soft debris material will be uniformly distributed and placed toward the bottom of the lifts and leveled to be only one layer thick (i.e., soft debris will not be stacked on soft debris). Bulk soil waste will be compacted over the top of the soft debris as specified in section 3.1, above. No soft debris will be placed in the top 20 feet of the landfill cell. This method will minimize subsidence within the landfill. Soft debris waste material may be staged in the bottom of the pit or staged in boxes outside the landfill, prior to incorporation into the working face.

3.6 High Dose Rate Waste

High dose rate waste will be accepted at the ERDF. Specific unloading/disposal work plans will be developed to handle waste above a dose rate of 100 millirem per hour at 12-inches (0.31 meter) from the package. These plans will be maintained as controlled documents and describe the specific methods that will be employed for the unloading and disposal of the waste, and the methods to assure the dose is as low as reasonably achievable. The shielded loads will be off-loaded with a crane, or dragged off using the bulldozer/compactor. Generally, the loads will not be removed from their containers and will be covered with bulk soil immediately.

3.7 Asbestos Wastes

Asbestos waste material meeting the Waste Acceptance Criteria can cause a fiber release problem if not handled properly. The asbestos waste material will be staged and added to lifts in quantities less than five percent by volume. The asbestos waste material will be distributed into pre-staged trenches cut to a minimum depth of two feet. The trench should be created at the bottom of lifts and long enough to accommodate a single layer of the packaged asbestos waste material (i.e., asbestos waste will not be stacked on asbestos waste). Bulk soil waste of at least two feet thickness will be placed over the asbestos waste prior to being compacted over the top of the asbestos waste as specified in section 3.1, above. This method will minimize subsidence within the landfill as well as any potential asbestos fiber releases. Soft debris waste material may be staged in the bottom of the pit or staged in boxes outside the landfill, prior to incorporation into the working face.

3.8 Other Waste

Other wastes that are not specifically identified in section 3.0 of this plan will be placed in the landfill by specific unload/disposal work plans, or this plan may be modified. Should any incompatible waste forms be identified during the waste profiling process, this plan will be revised to address segregation requirements at that time.

3.9 Hazardous Debris for Macroencapsulation

The Resource Conservation and Recovery Act of 1976 (RCRA) regulations prohibit placement of land disposal restricted (LDR) waste in disposal units, prior to meeting specified treatment standards. However, treatment within non-land-based units such as tanks or containers does not constitute land disposal, even if the unit is physically located within the confines of a landfill cell, provided that the LDR treatment standards are achieved prior to undertaking actual disposal (e.g., burial within the trench). Thus, treatment by stabilization or macroencapsulation of LDR waste in Macro-Secure containers (or within other container or tank units) residing within the ERDF disposal cells is allowed.

The treatment standard for radioactive lead specifically prohibits use of a tank or container as the method for achieving macroencapsulation. However, the standard does not preclude the use of tanks or containers as treatment vessels to contain the lead while being macroencapsulated. Macro-Secure containers are allowable as the treatment

vessels. The macroencapsulation treatment standard requires that the encapsulating material shall completely surround the waste and be unbroken. As a consequence, when using the Macro-Secure container (or other vessel) as the treatment chamber, it will be necessary to ensure that the lead waste is elevated above the bottom of the vessel and that a void space is maintained along the sides to ensure that the macroencapsulating agent (e.g., concrete) is allowed to completely encapsulate the waste.

4.0 Stabilization

Stabilization is required to fill voids in waste materials that cannot be crushed by the weight of the compaction equipment (i.e., thick walled steel piping) or to reduce the size of wood waste to meet maximum wood loading requirements.

4.1 Void Fill

Void filling practices will eliminate as much void space as practical and reasonable with the ultimate intent to reduce subsidence within the landfill. If unique void space fill concerns arise, specific work plans will be developed. The optimized landfill space, bulk soil waste will be used to fill voids in waste debris and between waste materials. In rare cases, when bulk debris cannot be crushed by the weight of equipment the waste material and void spaces cannot be adequately filled with bulk soil waste (the waste material may be cut to eliminate void spaces). In other cases, grout may be used to fill the void space. During review of the waste certification documents, the void space issue will be evaluated. Metal waste may be staged in the bottom of the pit or staged in boxes outside the landfill, prior to void space filling.

4.2 Size Reduction of Soft Debris Waste

Soft debris waste will be staged and mixed in with the bulk soil waste in small quantities. The action of the bulldozer/compactor will size reduce the waste and facilitate the mixing of the bulk soil and waste material. In some cases, when large amounts of soft debris make direct mixing impractical, soft debris may be shredded, staged, and mixed with soil over time.

5.0 Compaction/Moisture Content Testing

5.1 Compaction Testing

Two methods of compaction testing will be used to measure in-place density. The two methods are ASTM D 1556, "Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method" and ASTM D 2922, "Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods." Quality Assurance for compaction testing is addressed in the RFS-ERDF-003, Quality Assurance Project Plan.

5.1.1 Sand-Cone Method - In-place density will be measured in accordance with ASTM D 1556, "Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method." This method will be used on a weekly basis to verify that information obtained from the nuclear method referenced in section 5.1.2 is correct.

5.1.2 Nuclear Method - In-place density will be measured in accordance with ASTM D 2922, "Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods." This method will be used at the frequency identified in section 5.1.3.

The density in mass per unit volume of the material under test is determined by comparing the detected rate of gamma radiation. Since the waste does contain gamma-emitting isotopes, a correction factor may be required. The manufacture will recommend correction factors based on dose rate.

5.1.3 Compaction Testing Frequency - An in-place density measurement will be performed for every 1,000 yds^3 (765 m^3) of waste placed in the trench, and at least one such test will be performed in each active placement area every operating shift.

5.1.4 Reduction of Testing Frequency - The testing frequency may be reduced as sufficient process controls are developed using actual test data obtained in the field. This frequency reduction will reduce exposure to personnel that perform the tests. These process controls will likely consist of a standard quantity of water addition, standard lift thickness, and a standard number of passes with specific equipment.

5.2 Moisture Content Testing

Moisture content will be measured according to ASTM D 3017, "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods." Quality Assurance for compaction testing is addressed in the RFS-ERDF-003, Quality Assurance Project Plan.

5.2.1 Test Method - Moisture content will be measured according to ASTM D 3017, "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods." This method will be used at the frequency identified in section 5.2.2.

The moisture content, in mass per unit volume of the material under test, is determined by comparing the detection rate of thermalized of slow neutrons with previously established calibration data. Since the waste contains insignificant quantities of neutron emitting isotopes, no correction factor is required.

5.2.2 Moisture Content Testing Frequency - A moisture content test for every 1,000 yds^3 (765 m^3) of waste placed in the trench, and at least one such test, will be performed in each active placement area every operating shift.

5.2.3 Reduction of Testing Frequency - The testing frequency may be reduced as sufficient process controls are developed using actual test data obtained in the field. This frequency reduction will reduce exposure to personnel that perform the

tests. These process controls will likely consist of a standard quantity of water addition, standard lift thickness, and a standard number of passes with specific equipment.

6.0 Dust Control

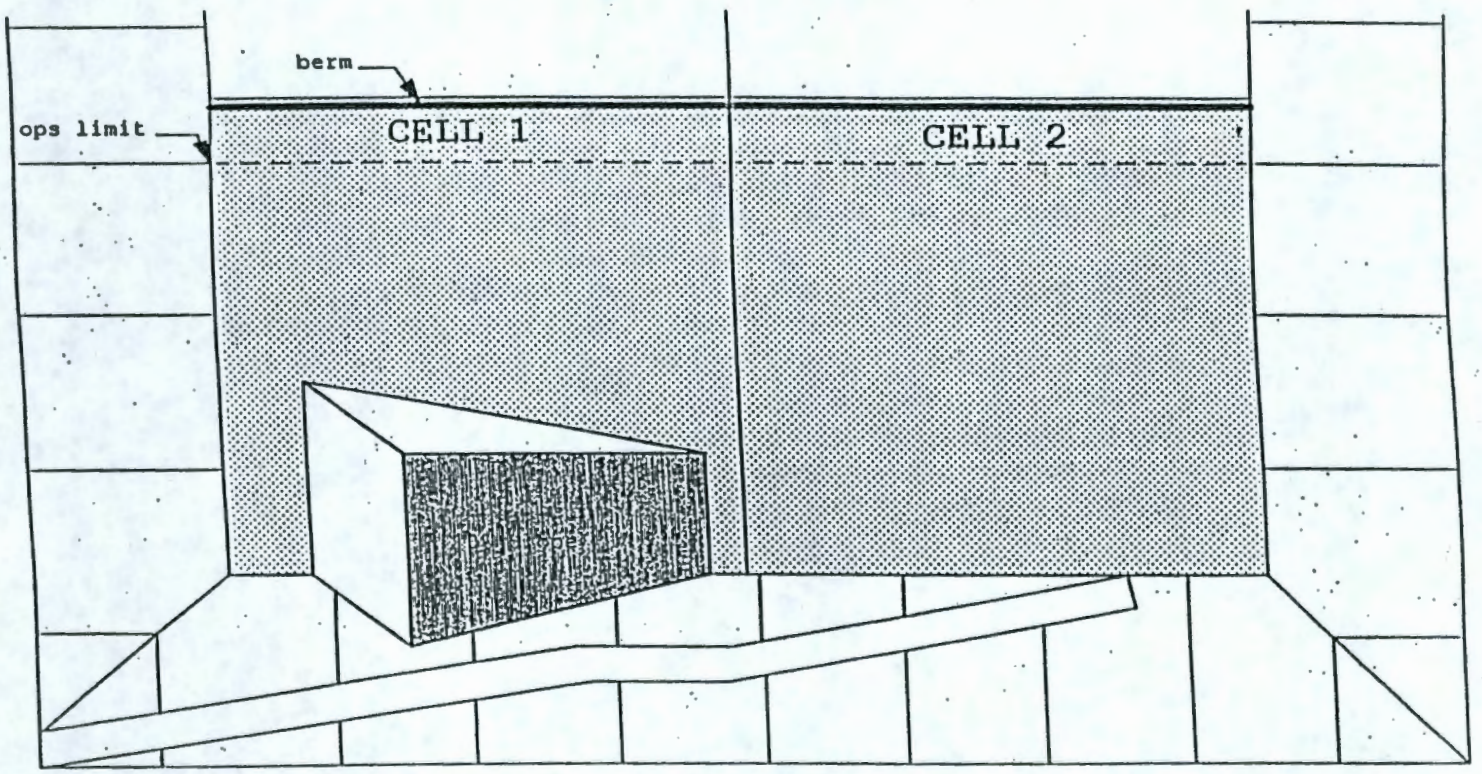
6.1 In-pit Dust Control

In-pit dust control will be accomplished by utilizing water sprays during the placement and compaction operations. Recycled leachate that meets the criteria established in the RFS-ERDF-002.6, Leachate Management Plan will also be used for this operation. Water will only be added as needed to control dust and to achieve compaction requirements. At the end of each day of operations, a fixative will be applied to the active areas of the landfill. Operational data on attaining optimum moisture content will be used to provide guidance on the volume of water required for compaction.

6.2 Facility Roadways

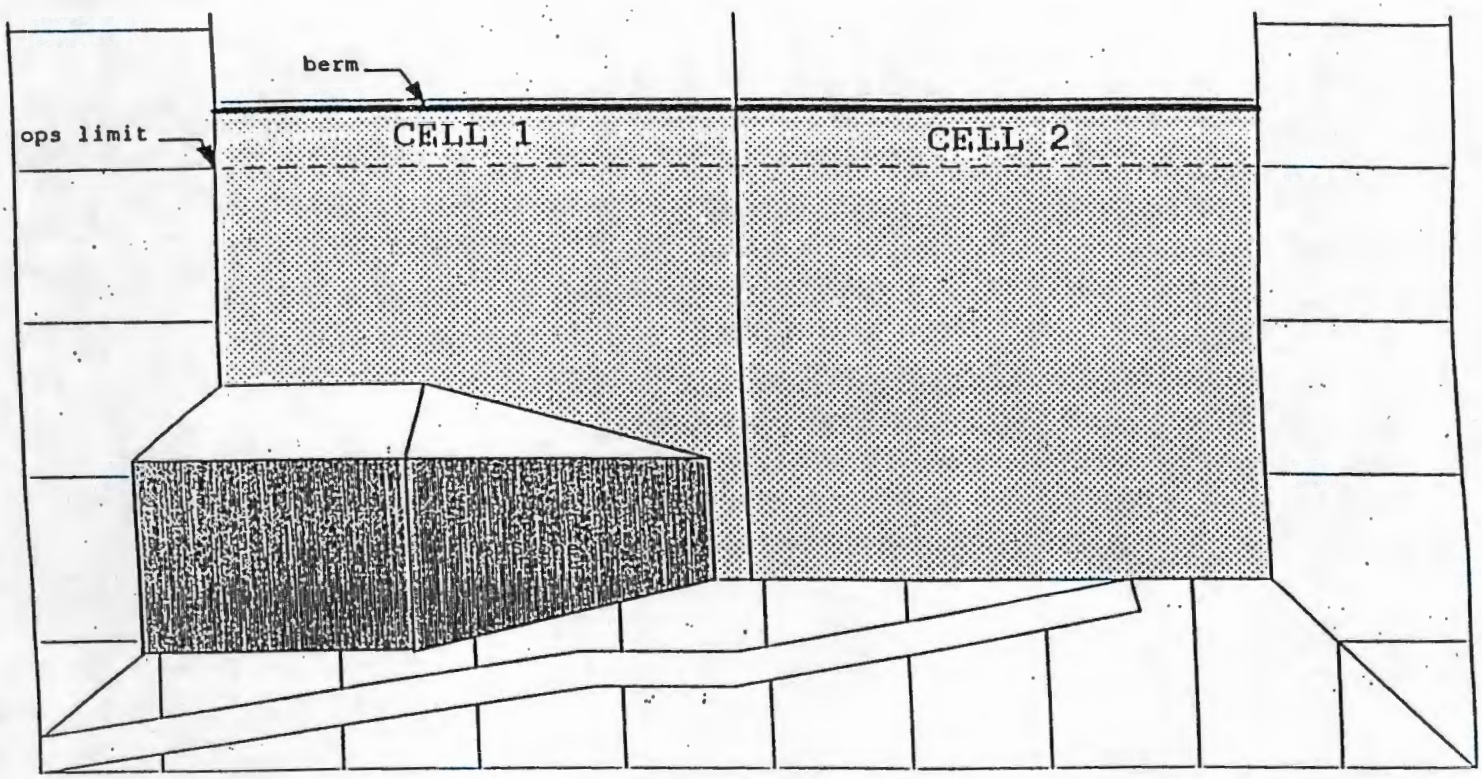
Facility roadways will be watered on an as needed basis to control dust generated from transport traffic. Other dust fixatives may be applied to the roadways. The dust fixatives must be non-hazardous per the requirement of Washington Administrative Code 173-303. Contaminated leachate will not be used to control dust on facility roadways.

APPENDIX A – FILL SEQUENCY



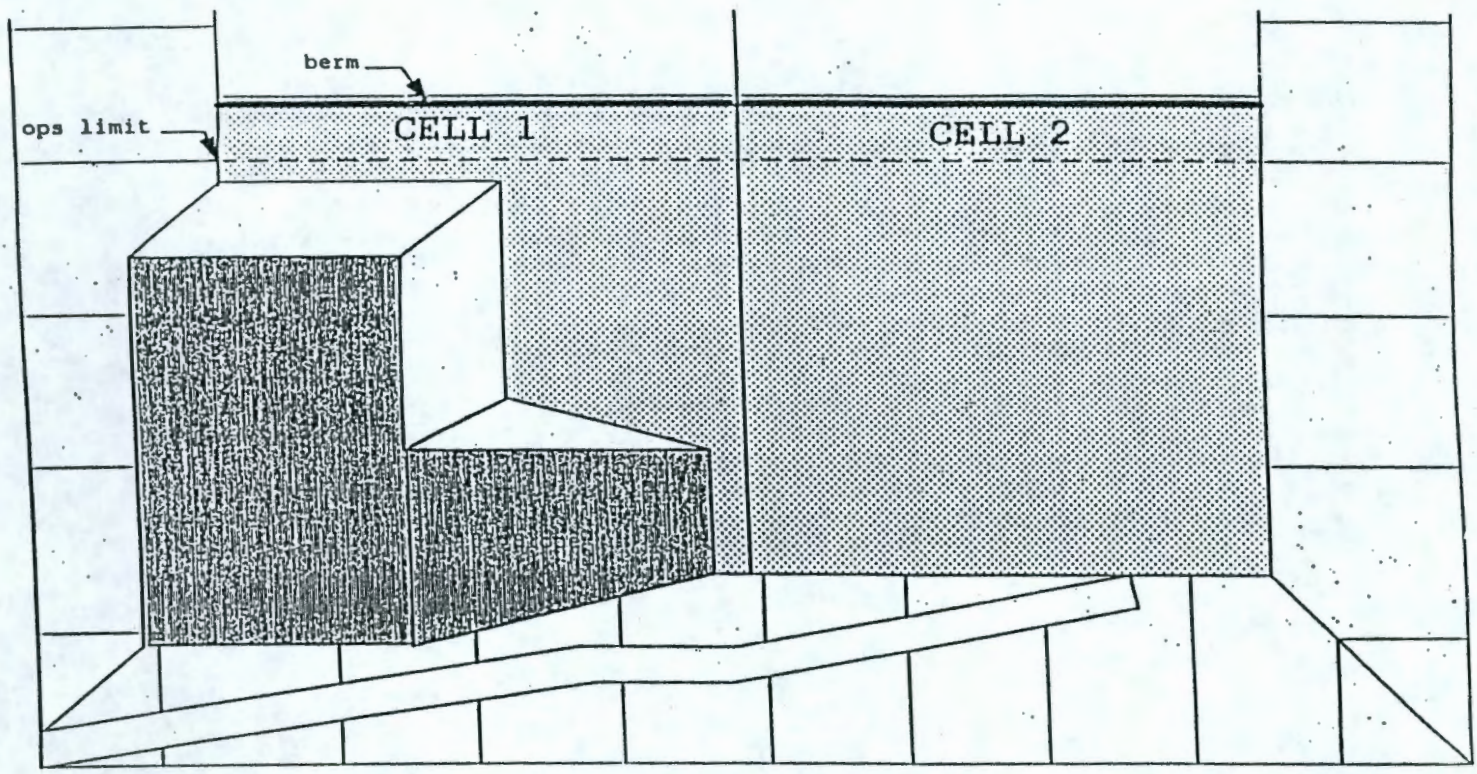
ERDF Trench Filling
Sequence Stage 1
Start of 35' elevation

Approximate
Scale 1"=150'



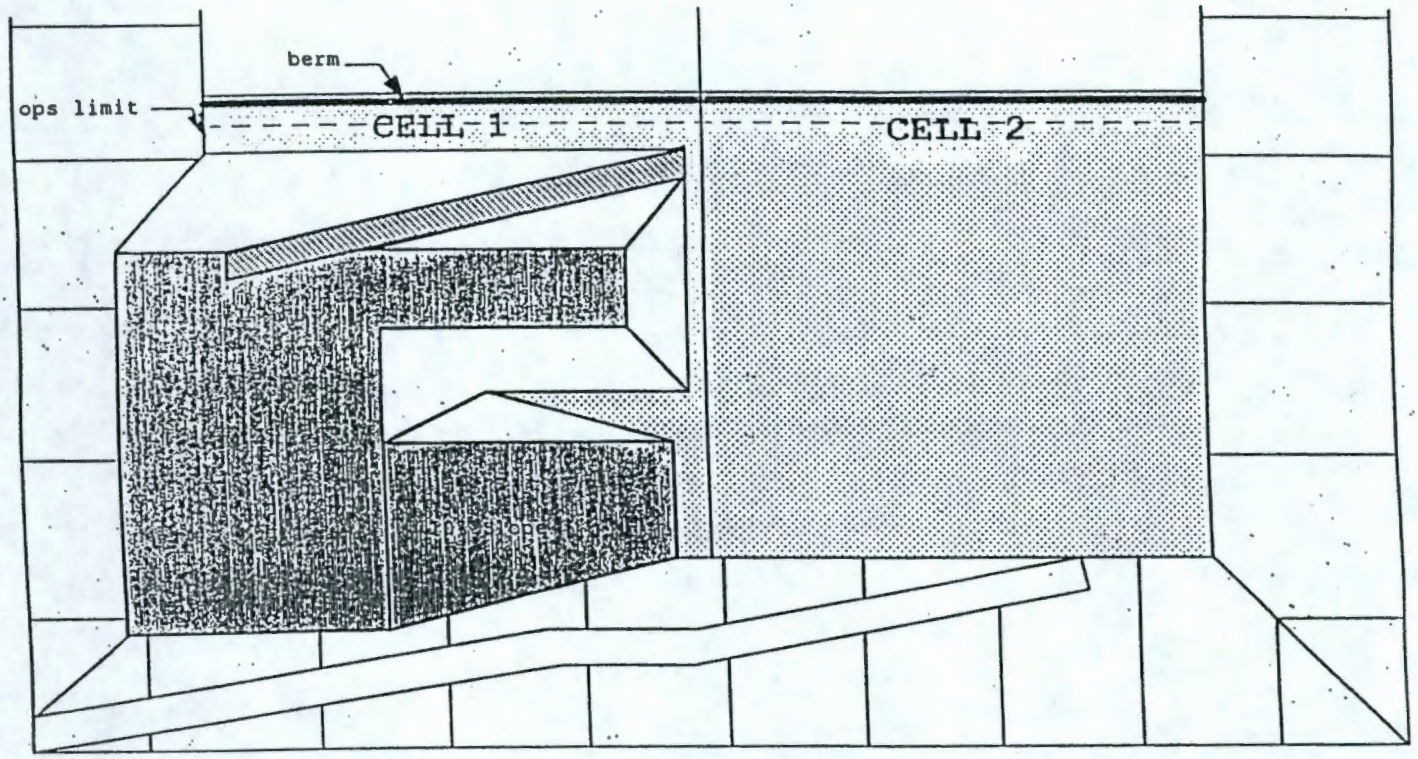
ERDF Trench Filling
Sequence Stage 2
35' elevation

Approximate
Scale 1"=150'



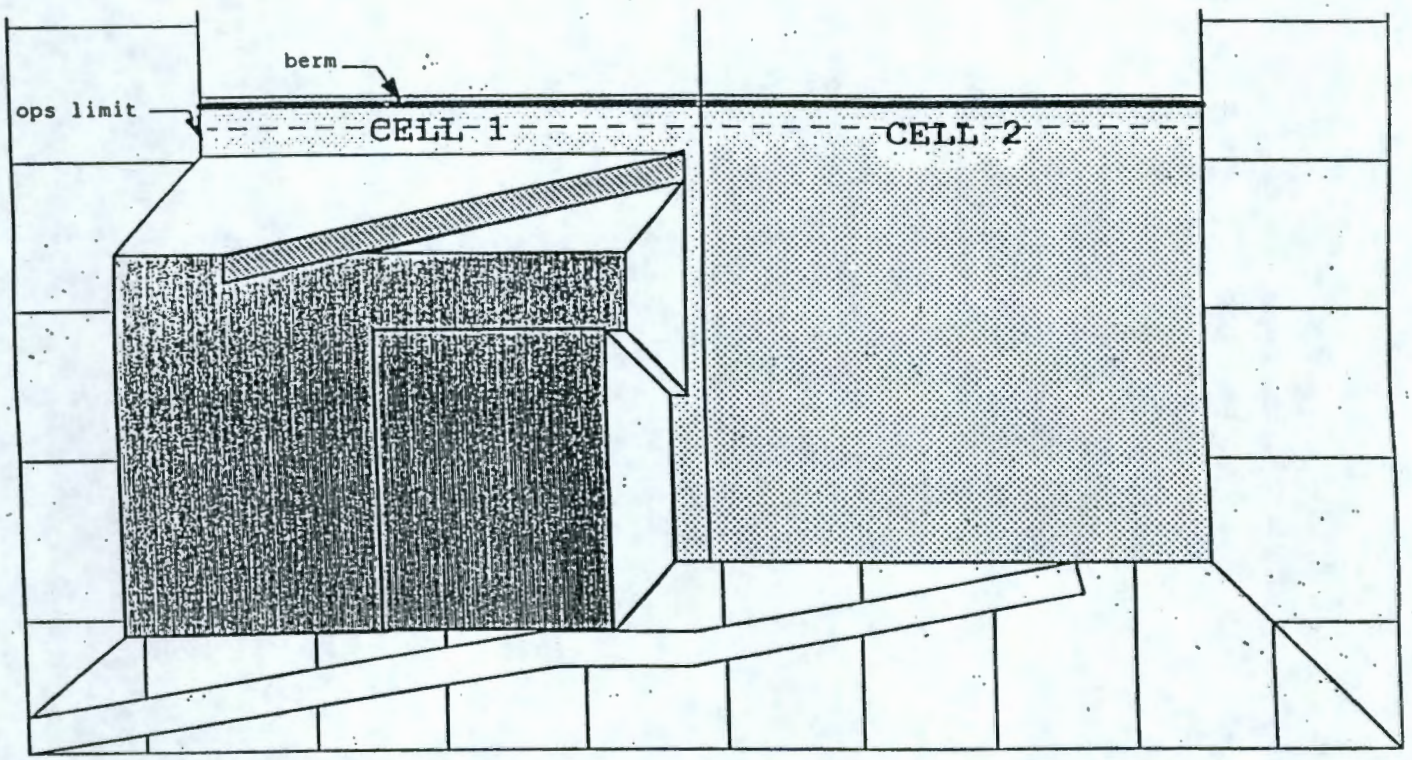
ERDF Trench Filling
Sequence Stage 3
35' elevation

Approximate
Scale 1"=150'



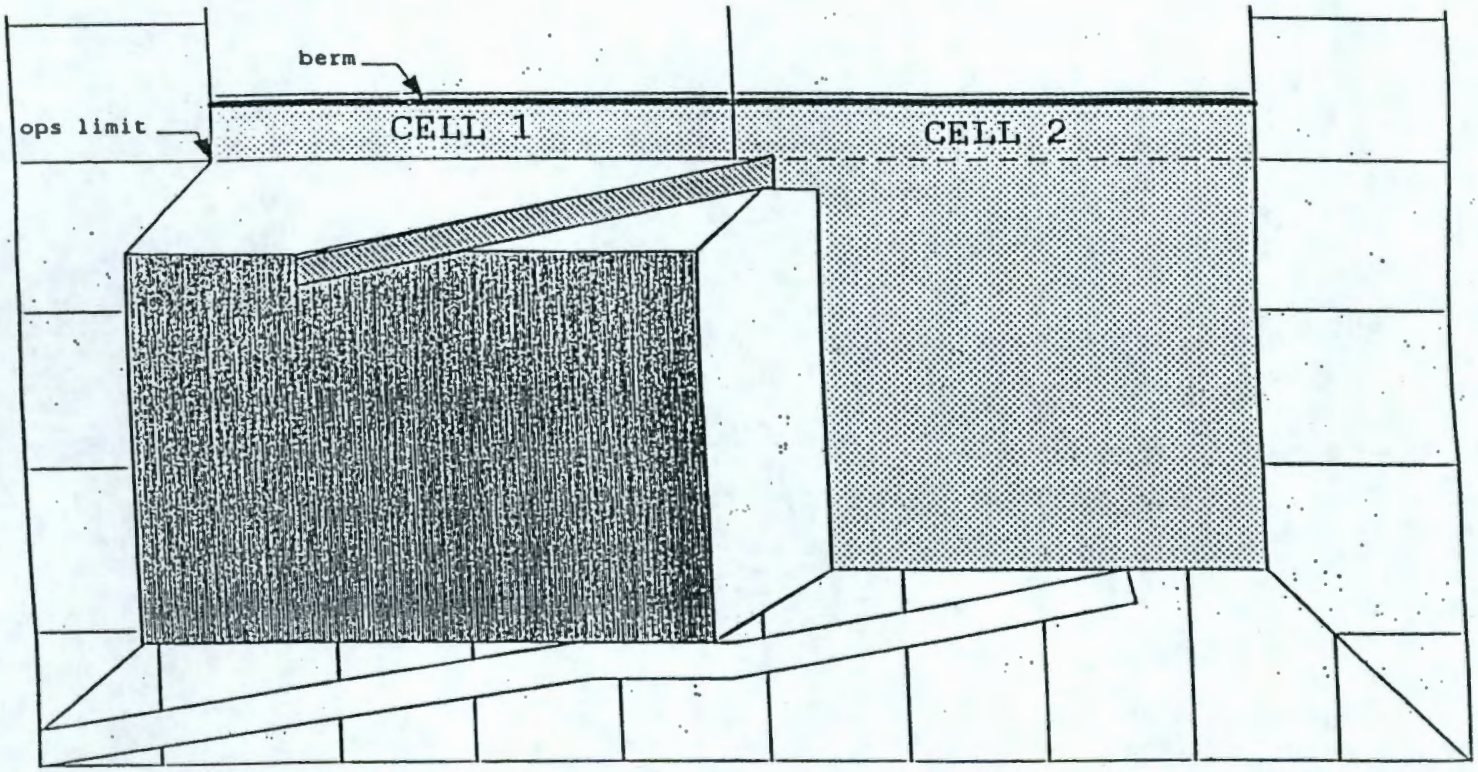
ERDF Trench Filling
Sequence Stage 4
35' elevation

Approximate
Scale 1"=150'



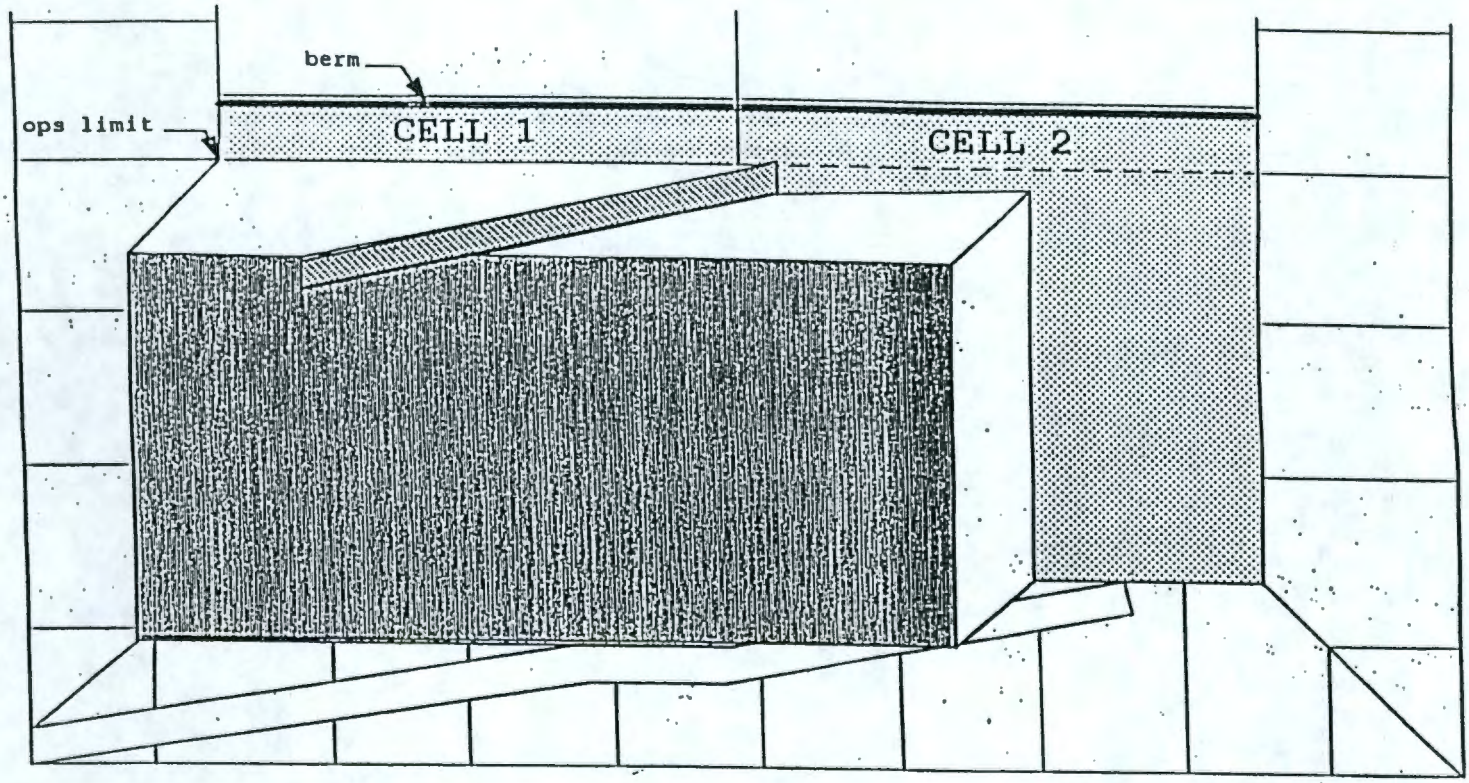
ERDF Trench Filling
Sequence Stage 5
35' elevation

Approximate
Scale 1"=150'



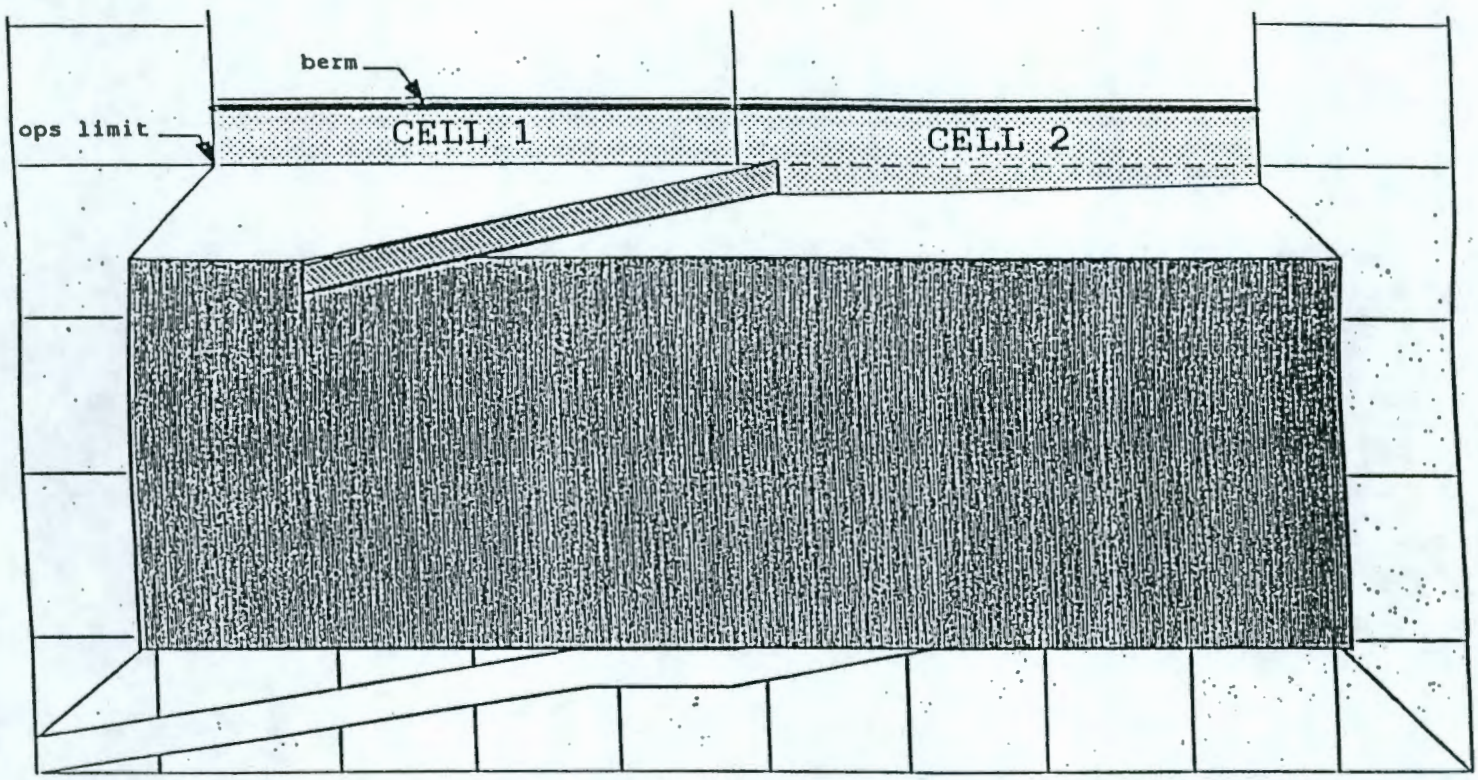
ERDF Trench Filling
Sequence Stage 6
35' elevation

Approximate
Scale 1"=150'



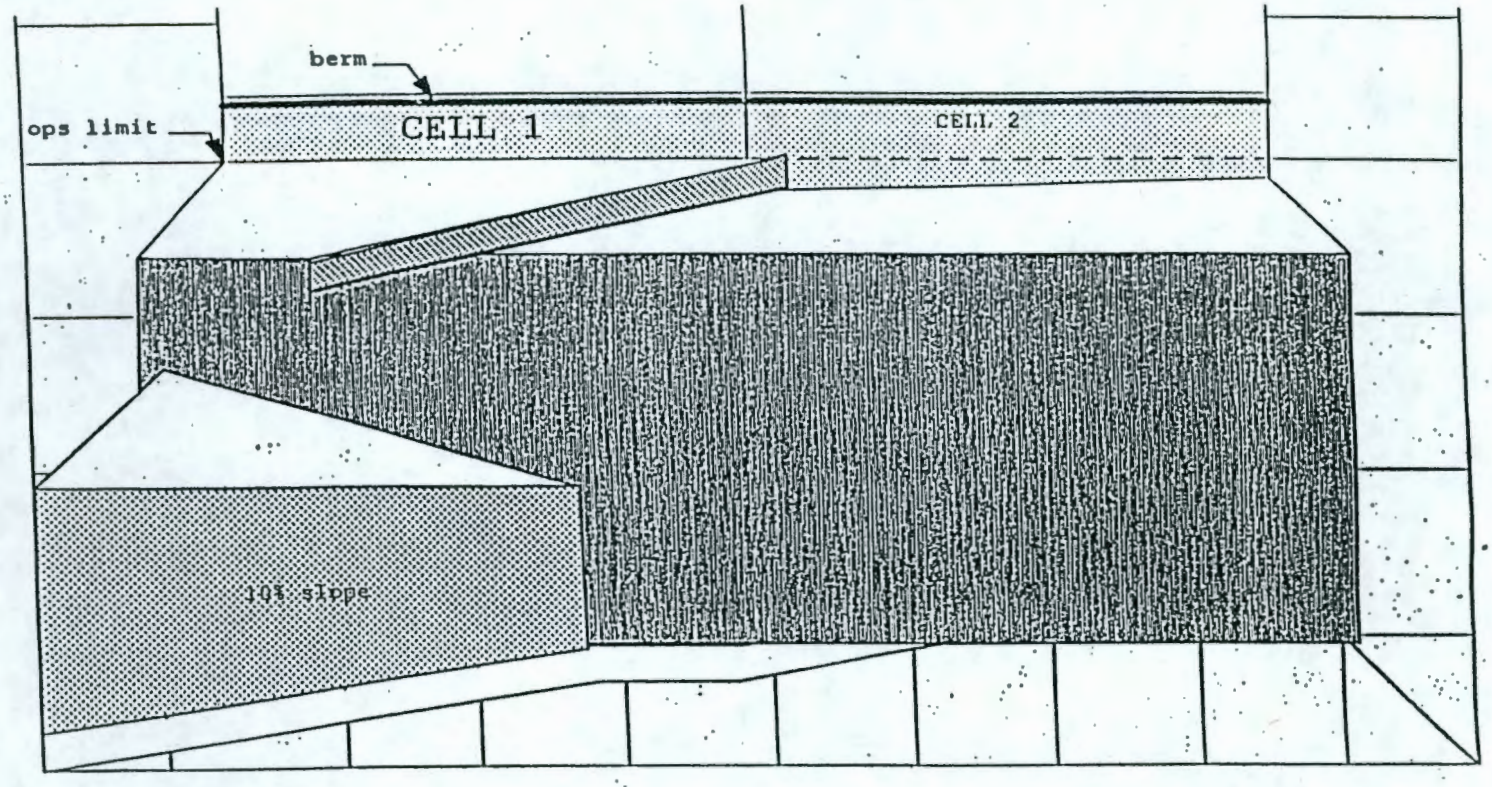
ERDF Trench Filling
Sequence Stage 7
35' elevation

Approximate
Scale 1"=150'



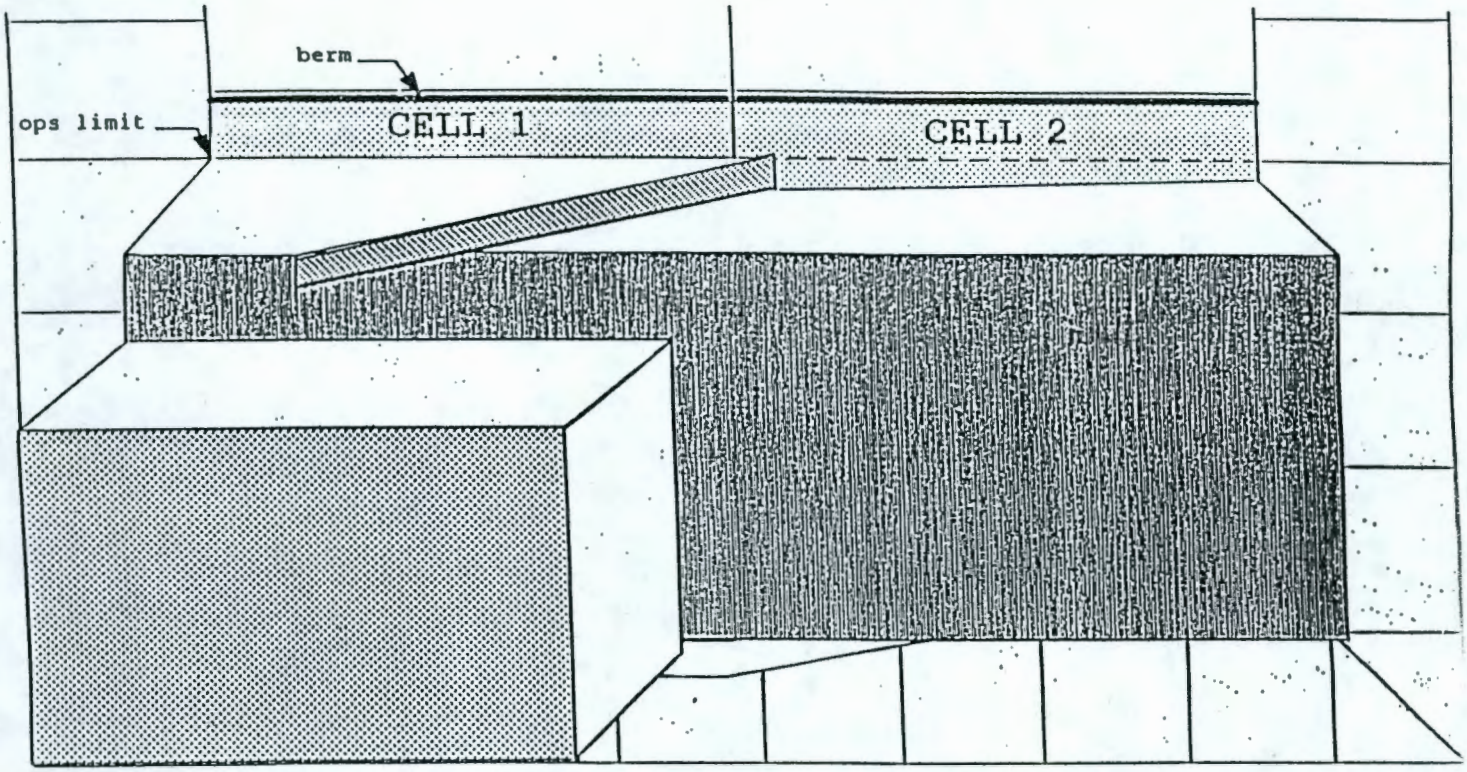
ERDF Trench Filling
Sequence Stage 8
35' elevation

Approximate
Scale 1"=150'



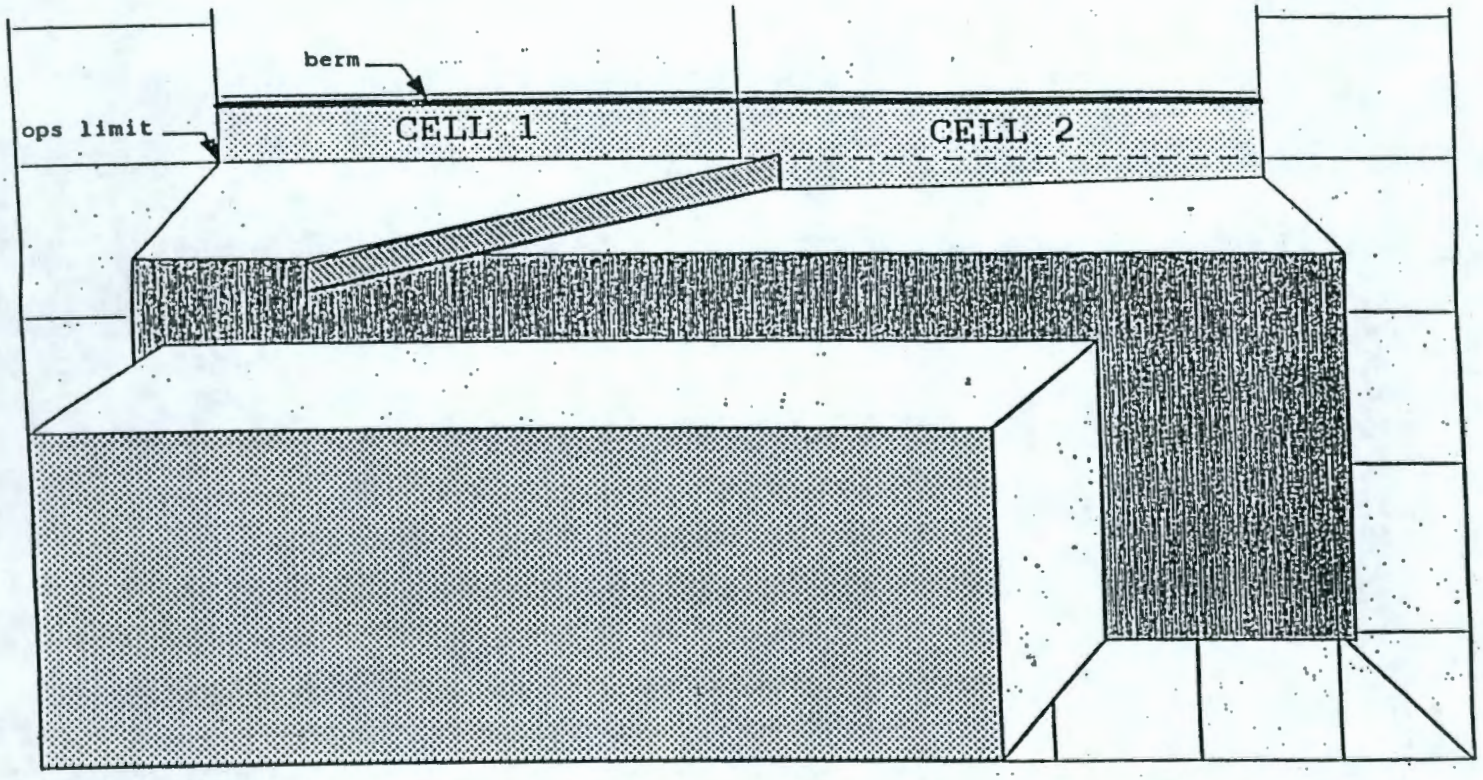
ERDF Trench Filling
Sequence Stage 9
70' elevation

Approximate Scale
1"=150'



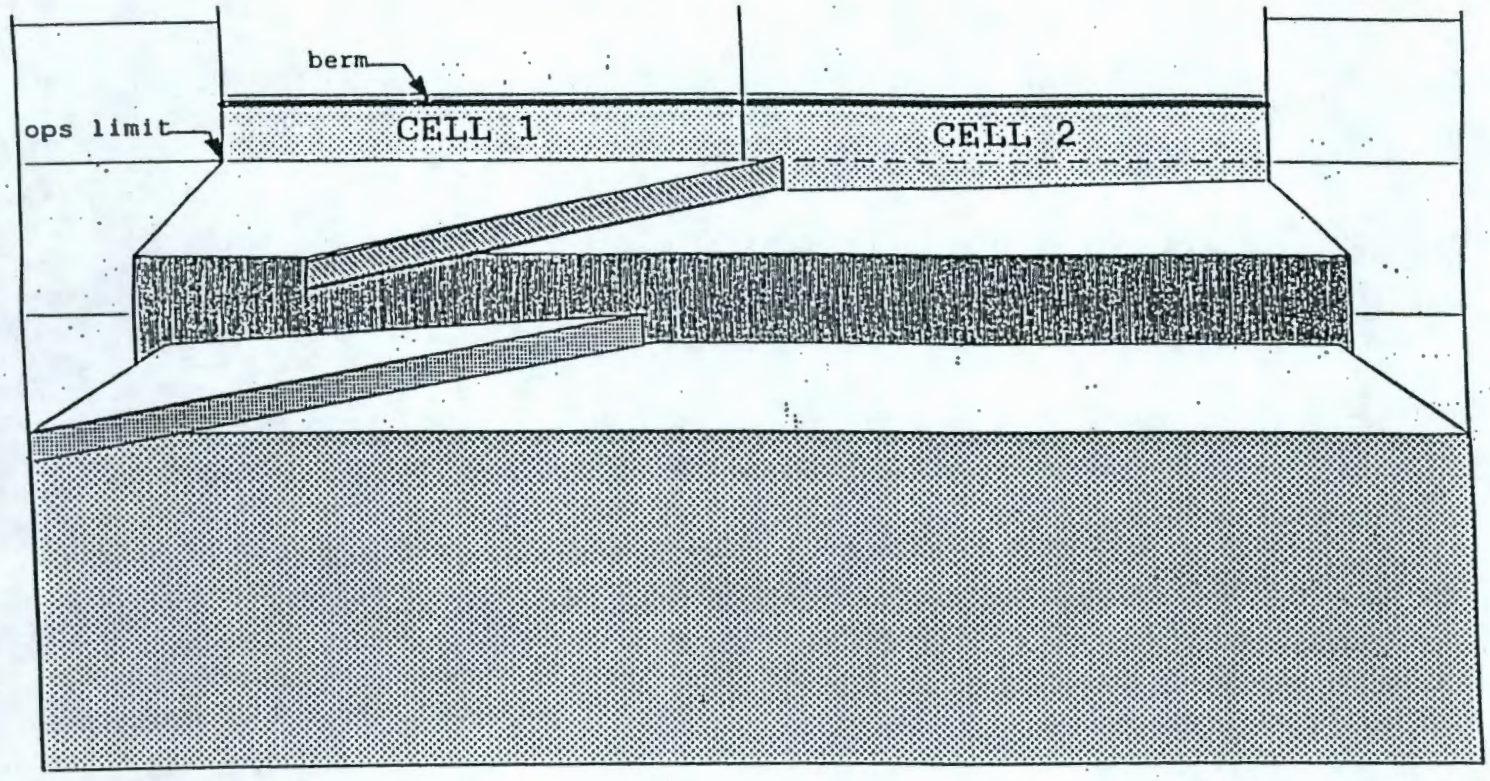
ERDF Trench Filling
Sequence Stage 10
70' elevation

Approximate
Scale 1"=150'



ERDF Trench Filling
Sequence Stage 11
70' elevation

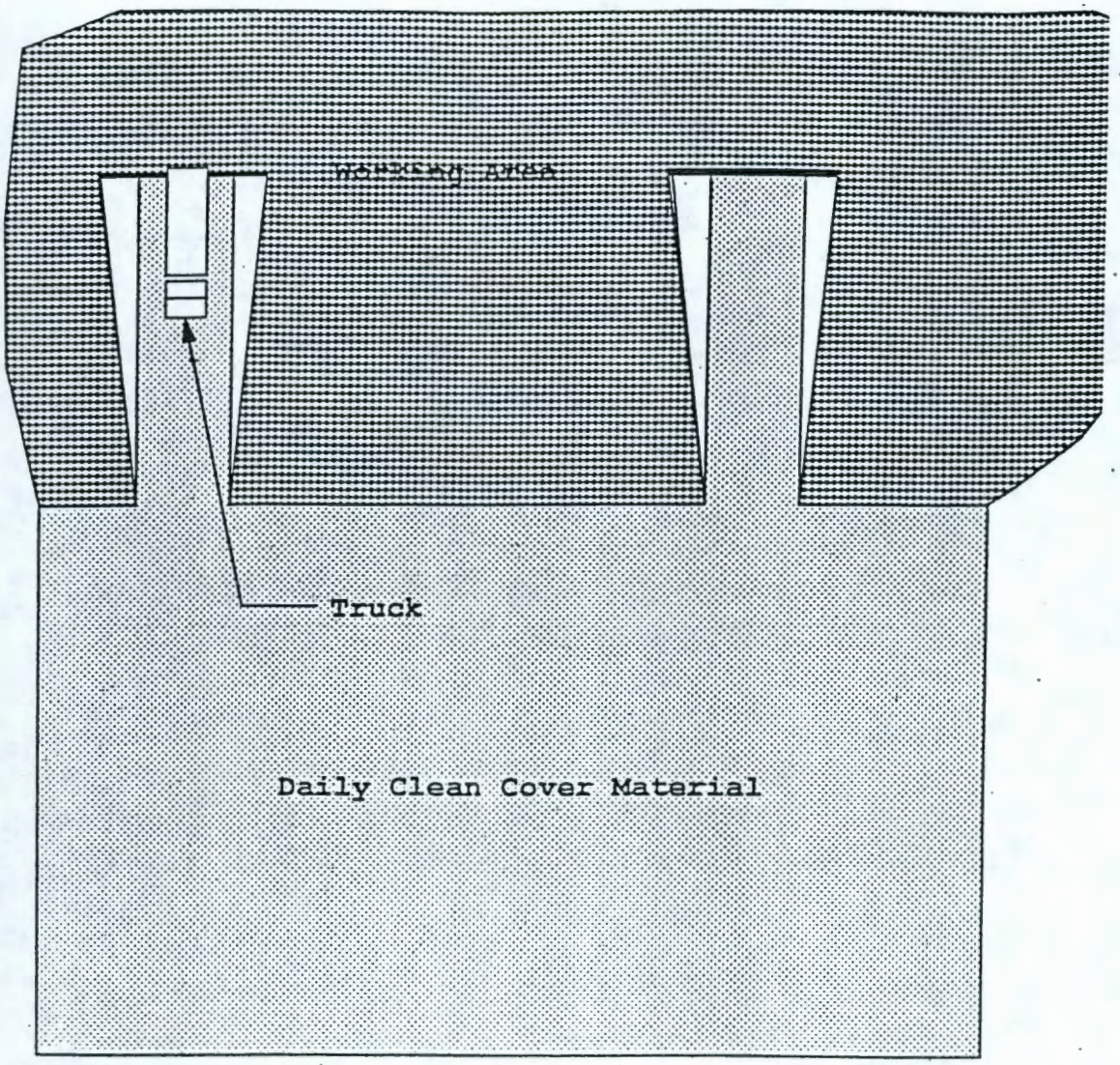
Approximate
Scale 1"=150'



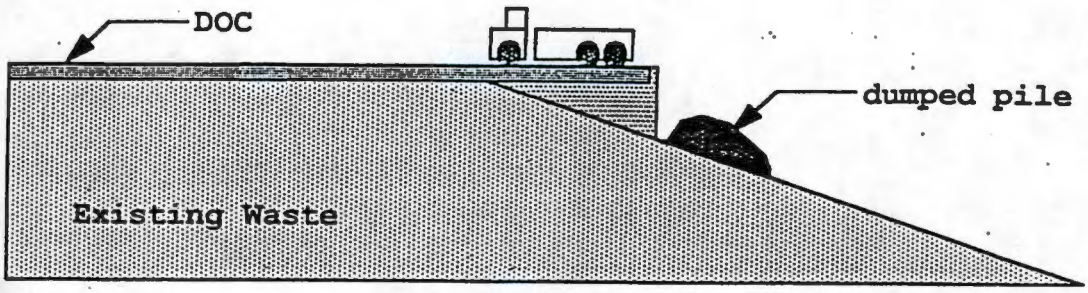
ERDF Trench Filling
Sequence Stage 12
70' elevation

Approximate Scale
1"=150'

APPENDIX B – DUMPING STATION LAYOUT



Dumping Stations Plan View (Example)



Dumping Station Side View