

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

**20100-PL-007
Revision 3, PCN 2
March 4, 2004**

United States Department of Energy

**Fernald Closure Project
Fernald, Ohio**

Prepared by

GeoSyntec Consultants
1100 Lake Hearn Drive, NE, Suite 200
Atlanta, Georgia 30342

Under

**Fluor Fernald, Inc.
Subcontract 95PS005028**

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).
0 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 (OSDF).
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 OSDF.
1	10/11/99	Issuance of Revision 1 based on page changes approved by the U.S. EPA and OEPA. Addendum 1 incorporated into Appendix C.
1 ADD 2	3/31/00	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 OSDF.
1 ADD 3C	3/31/00	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 OSDF.
1 TBL 1	3/31/00	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 20102-33 dated July 1, 1998. Addenda 2 and 3 incorporated into Appendix C.
2 PCN 1	6/01	Added liner sludge placement procedure to Section 8.6.5 based on RCI 20102-068R dated June 20, 2000.
3	7/01	Issuance of Revision 3 to incorporate 2 PCN 1.
3 PCN 1	10/1/01	Added alternate placement requirements for Category 3 materials (transite panels) to Section 8.4.
3 PCN 2	3/4/04	Appendix C, Addendum 2: Issuance of Revision 2 of Addendum 2, <i>Specialized Placement for Thorium and Non-Bagged Impacted Material</i> to include placement of bagged material as a viable option.

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

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

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Addendum No. 2
To
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On-Site Disposal Facility
Specialized Placement Plan for Thorium and Bagged or 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 15 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. This placement plan is also a viable option for bagged impacted material, including bagged asbestos.

PLACEMENT REQUIREMENTS

Placement of Category 2, Category 3, Category 4 and Category 15 thorium and bagged or non-bagged impacted material shall be performed in accordance with Fernald Closure Management Project (FCP) 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 impacted material as described in this Addendum No. 2. In addition to the requirements described in the above said documents, thorium and bagged or 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 bagged or non-bagged impacted material (e.g., thorium contaminated debris, broken transite panels, soil containing friable asbestos, and bagged asbestos) is expected

to be generated as buildings are demolished. Additionally, some bagged or 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 bagged or 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 bagged or 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 bagged or non-bagged impacted material that is available for placement and availability of a required grid.

Option 1 - Placement by Grid Method

Bagged or 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 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 bagged or non-bagged impacted material placed by the Grid Method shall not be laterally adjacent to each other within the same horizon.
- Grid with bagged or non-bagged impacted material placed by the Grid Method and grid with thorium and bagged or 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.

- Bagged or non-bagged impacted material shall be placed above an intervening horizon of Category 1 impacted material.
- Bagged or non-bagged impacted material shall not be placed directly on previously placed Category 2 through 5 impacted material, protective layer, or 2 ft. thick select impacted material layer.
- Bagged or 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.

Bagged or 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 inches (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 bagged or 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 bagged or 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 bagged or 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 upgradient side of the grid. The required radiological controls for the placement area will be established prior to commencement of bagged or non-bagged impacted material placement.

Debris Placement: After the grid has been prepared, trucks transporting bagged or non-bagged impacted material shall dump material at the downgradient 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). Bagged impacted material shall be spread out evenly. The trackhoe shall be of sufficient size and reach and be situated in such a way that only the bucket shall contact the bagged or non-bagged impacted material. Compaction, other than tamping from a trackhoe bucket shall not be performed directly on the bagged or 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 bagged 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: As the material placement progresses, an initial 15 inches (375 mm) minimum, 18 inches (450 mm) maximum loose lift of Category 1 material (soil and soil-like material) shall then be placed on top of the bagged or non-bagged impacted material by the end of each working day. No bagged or 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 bagged or non-bagged impacted material. As shown in Figures 2 and 3, the fourth side of the perimeter berm will be constructed after

bagged or non-bagged impacted material placement is completed. After the fourth side of the perimeter berm has been placed and initial lift is placed over the bagged or 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 bagged 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 (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, bagged 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, bagged 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 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, bagged or non-bagged impacted material trenches shall not be laterally adjacent to each other within the same horizon.
- Grid with bagged or non-bagged impacted material placed by the Grid Method and grid with bagged thorium, bagged 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, bagged or non-bagged impacted material shall not be excavated in previously placed Category 2 through 5 impacted material, protective layer, or 2-ft. thick select impacted material layer.
- A trench for bagged thorium, bagged 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, bagged 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, bagged 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 Fluor Fernald 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, bagged or non-bagged impacted material. The necessary radiological controls or trained asbestos personnel, as appropriate, will be established prior to commencement of bagged thorium, bagged or non-bagged impacted material placement.

Debris Placement: After the trench is excavated, trucks transporting bagged thorium, bagged or non-bagged impacted material shall back down the ramp and begin dumping material at the furthest end of the trench. Bagged thorium, bagged 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, bagged or non-bagged impacted material. Compaction, other than tamping from a trackhoe bucket shall not be performed directly on the bagged thorium, bagged 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, bagged or non-bagged impacted material shall be surveyed for location and elevation and information shall be submitted to the Construction Manager.

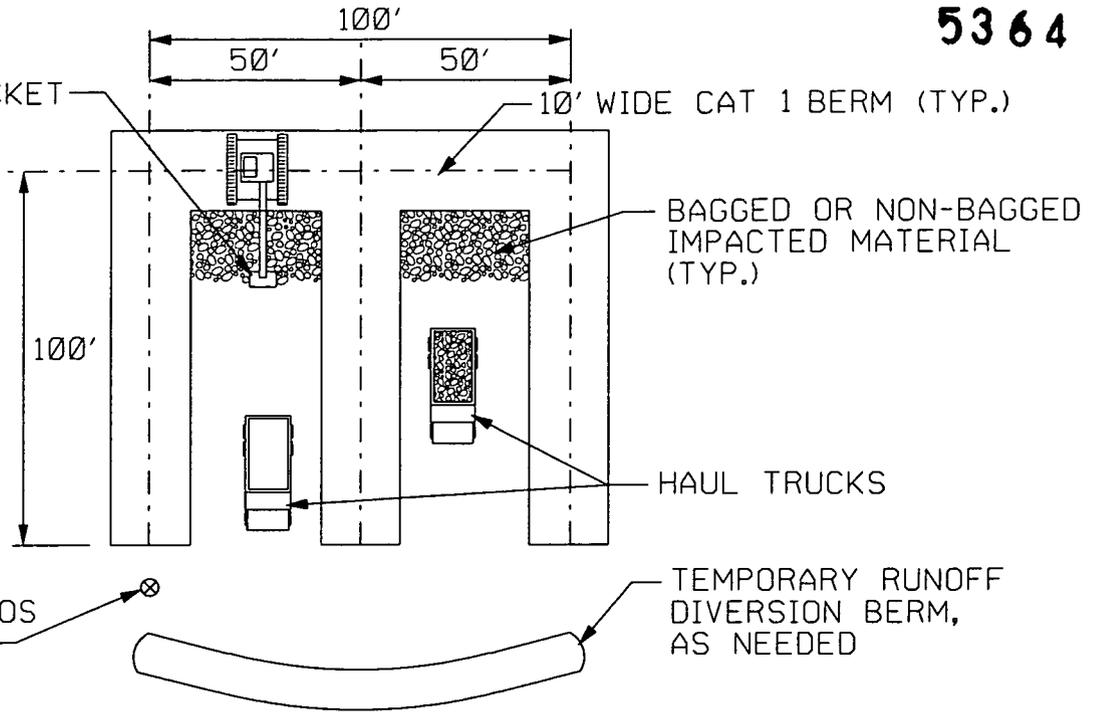
Initial and Additional Lifts of Category 1 Material: After bagged thorium, bagged or non-bagged impacted material is placed in the trench and compacted, it shall be covered with an initial 15 inches (375 mm) minimum, 18 inches (450 mm) maximum loose lift of Category 1 material by the end of each working 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, bagged 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, bagged 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, bagged 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

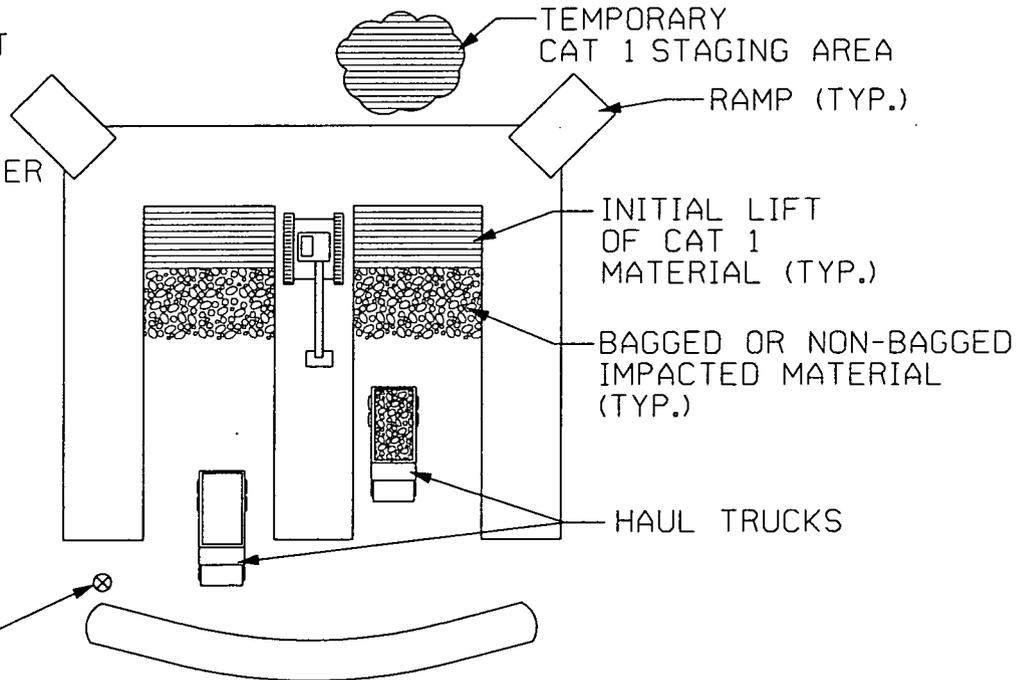
LOCATION OF RADIOLOGICAL CONTROL OR TRAINED ASBESTOS PERSONNEL



PLACING BAGGED OR NON-BAGGED IMPACTED MATERIAL IN GRID
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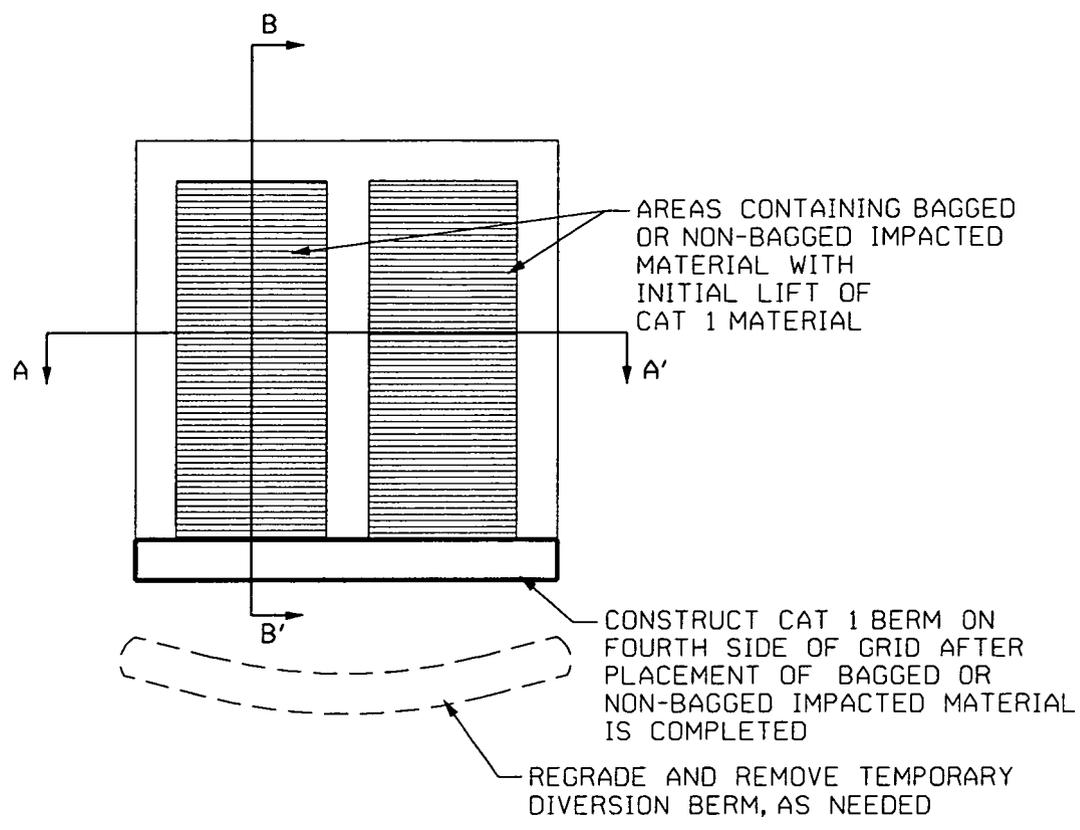
PLACE INITIAL CAT 1 LIFT WITH TRACKHOE OR PUSH INITIAL CAT 1 LIFT ONTO MATERIAL WITH DOZER

LOCATION OF RADIOLOGICAL CONTROL OR TRAINED ASBESTOS PERSONNEL



COVERING BAGGED OR NON-BAGGED IMPACTED MATERIAL
NTS

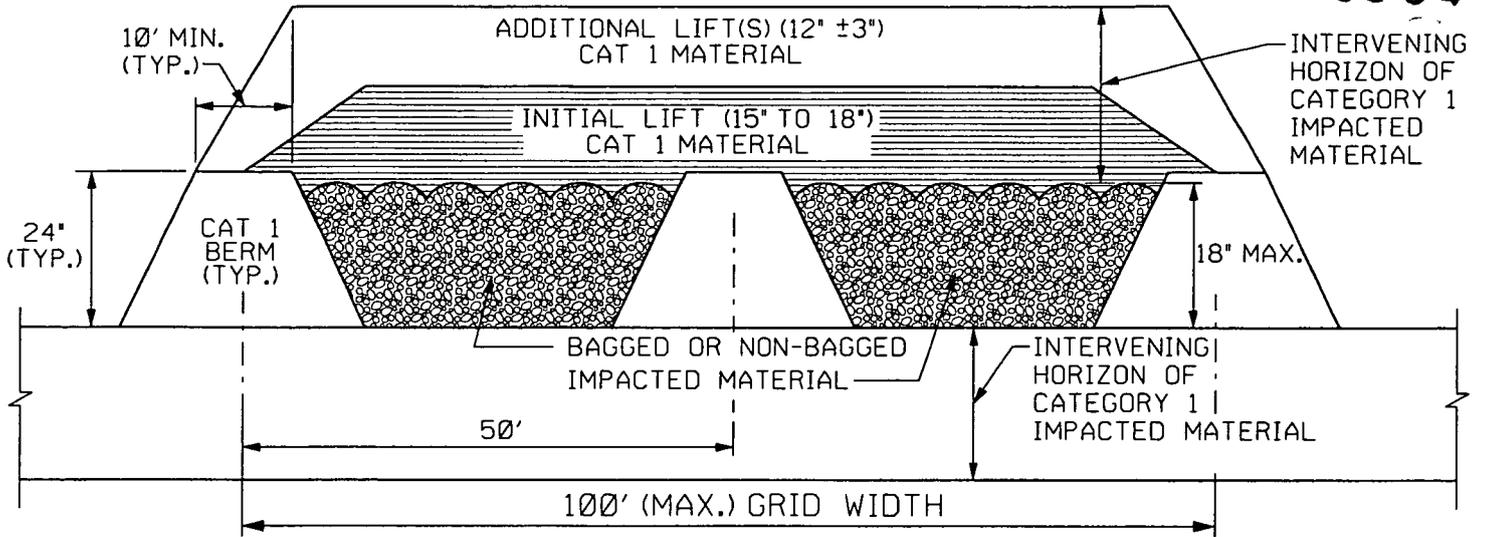
FIGURE 1
THORIUM, BAGGED OR NON-BAGGED
IMPACTED MATERIAL PLACEMENT
OPTION 1 - GRID METHOD
PLAN VIEW
SHEET 1 OF 3



COMPLETION OF BAGGED OR NON-BAGGED IMPACTED MATERIAL GRID
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NOTES: SEE FIGURE 3 (SHEET 3 OF 3) FOR AA' AND BB' CROSS SECTIONS.

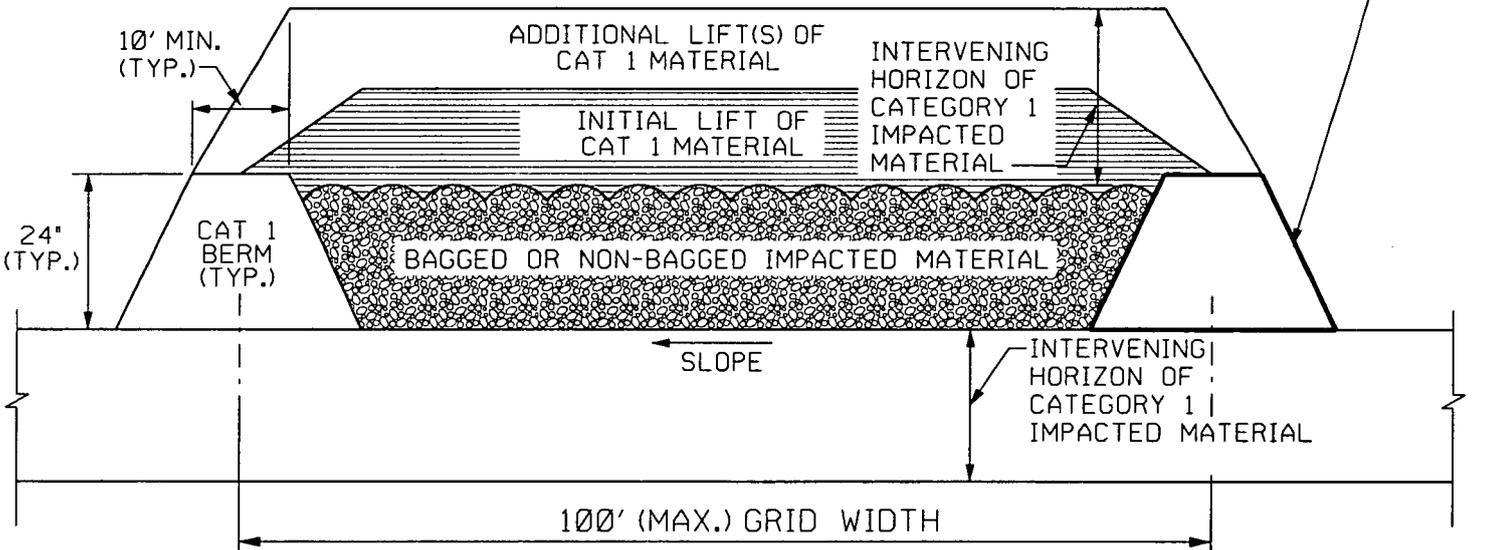
FIGURE 2
THORIUM, BAGGED OR NON-BAGGED
IMPACTED MATERIAL PLACEMENT
OPTION 1 - GRID METHOD
PLAN VIEW
SHEET 2 OF 3



SECTION A-A'

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

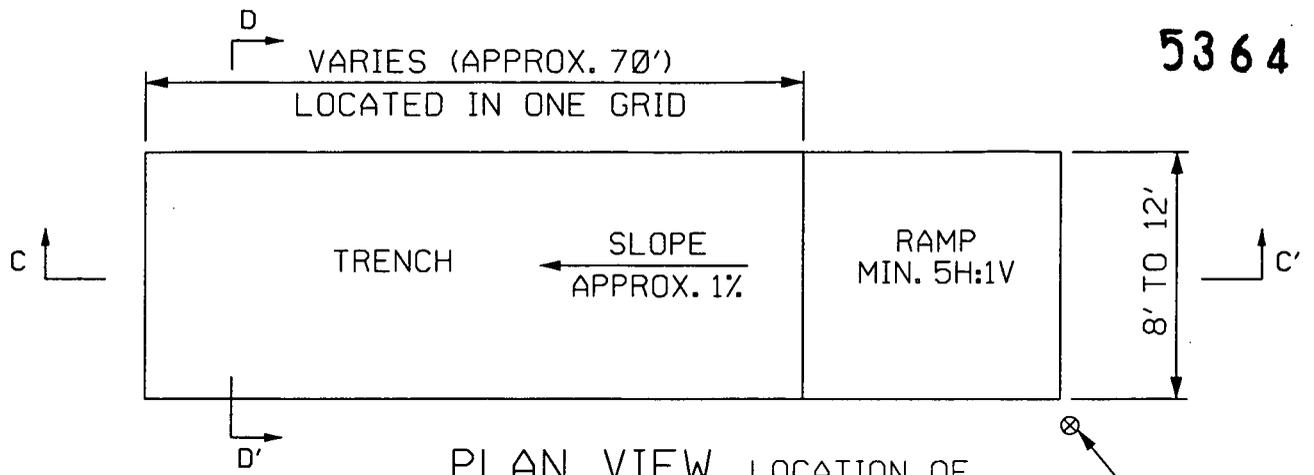


NOTE: FOR PLAN VIEW SEE FIGURE 2 (SHEET 2 OF 3)

SECTION B-B'

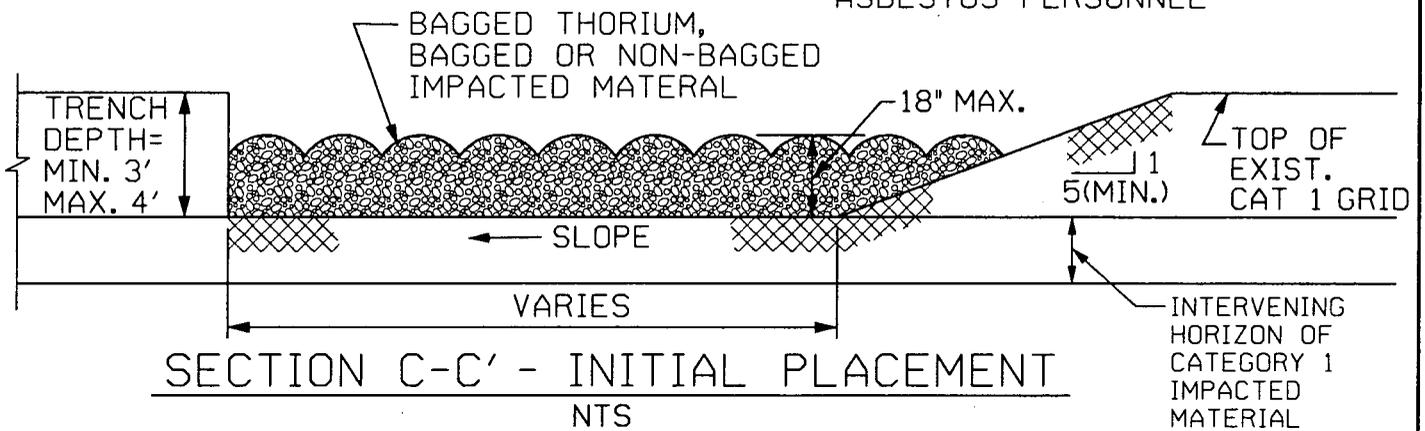
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FIGURE 3
 THORIUM, BAGGED OR NON-BAGGED
 IMPACTED MATERIAL PLACEMENT
 OPTION 1 - GRID METHOD
 CROSS SECTIONS
 SHEET 3 OF 3

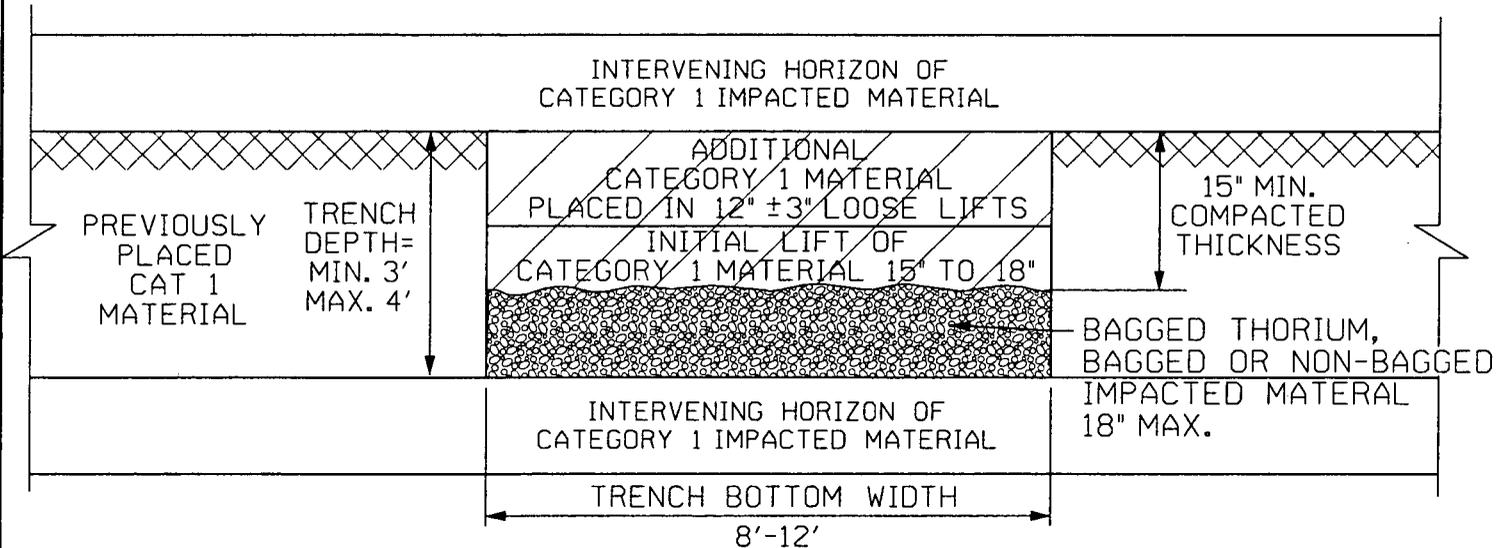


PLAN VIEW
NTS

LOCATION OF
RADIOLOGICAL
CONTROL OR TRAINED
ASBESTOS PERSONNEL



SECTION C-C' - INITIAL PLACEMENT
NTS



SECTION D-D' - FINAL PLACEMENT
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FIGURE 4
THORIUM, BAGGED OR NON-BAGGED
IMPACTED MATERIAL PLACEMENT
OPTION 2 - TRENCHING METHOD
SHEET 1 OF 1