



17 January 2005

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 RE: Addendum No. 5  
 Placement of Category 5 Oversized Materials  
 By Category 3 Placement Procedures  
 Impacted Materials Placement Plan  
 On-Site Disposal Facility  
 Fernald Closure Project, Fernald, Ohio

Mr. Kumthekar,

This letter is in response to RCI No. 20105-010 Placement of Oversized Material by Category 3 Placement Procedures. We have written an addendum (attached) to the Impacted Materials Placement (IMP) Plan which describes placement procedures as well as criteria for which oversized materials can be placed. The rest of this letter provides information regarding our evaluation of the placement on On-Site Disposal Facility (OSDF) performance.

### **Background**

RCI No. 20105-010 was written because several items were encountered during demolition and excavation operations which do not meet any of the impacted material descriptions identified in the Impacted Materials Placement Plan (IMP Plan). The materials encountered are similar to Category (CAT) 3 materials with the exception that the materials are larger than the 4 ft maximum cross-sectional dimension requirement for Category 3 – Individual Placement procedures. The materials in question cannot be size-reduced in a reasonable manner; therefore, the attached Addendum No. 5 provides an appropriate placement procedure for these oversized materials.

### **Comparison to Existing Categories of Impacted Material**

With the exception of the size criteria, the items described in Addendum No. 5 best meet the description of Category 3 material: *materials that must be individually handled and placed in the OSDF, and that are suitable for having Category 1 material compacted around and against them.* Category 3 material is limited to materials that are a maximum of 4 ft. in maximum cross-sectional dimensions. Relief for the maximum 4 ft. dimension was given for the transite panels (Revision 0 PCN 1 dated 7/7/98 – Page 4-1). Cutting asbestos containing transite panels would have created an unsafe condition. Therefore, bundled transite panels are placed as Category 3 material, and have successfully been stacked to 4 ft. in height with the original panel length of 10 to 12 feet.



The maximum dimensions of the oversized material are compared in Table 1 (attached) to the maximum dimensions for Category 3 materials. This comparison shows that with the exception of the track-hoe arms, ring gear, and undercarriage frame, all the identified oversized items meet the size requirement for individual bundles of transite panels, with lengths on the order of 10 to 12 ft. Therefore, with the exception of track-hoe arms, ring gear, and undercarriage frame, the oversized items identified in Table 1 can be placed using the requirements for Category 3 material. While track-hoe arms, ring gear, and undercarriage frame exceed the maximum allowable dimensions for Category 3 material based on transite panel bundles, they do meet the area requirements set forth in the transite placement Alternate 1 (Side-By-Side) Placement Method which states that up to three (3) transite panels can be placed side-by-side forming an area 12 ft by 12 ft. Therefore, these materials can be placed as individual items and are suitable for having Category 1 material compacted around and against them. Therefore, the requirements for placement of Category 3 material are also applicable to the track-hoe arms, ring gear, and undercarriage frame meeting the 12 ft. by 12 ft. dimension requirement. Oversized items that cannot fit into a 12 ft. by 12 ft. plan area may be placed in the OSDF, however, they need to be evaluated on a case by case basis.

#### **Evaluation of Volume and Unit Weight**

The information in Table 2 (attached) provides the anticipated quantity of each oversized item already identified. Using the estimated quantity and the maximum dimensions, the total volume of oversized material already identified is calculated in Table 2 to be 107 yd<sup>3</sup>.

The total OSDF design capacity is approximately 2,900,000 yd<sup>3</sup>, and the average cell volume is 375,000 yd<sup>3</sup>. Assuming all of the oversized items already identified are placed in one cell, the oversized items represent only 0.03 percent of the total cell volume.

The impacted material considered in the OSDF Final Design Calculation Package had a calculated average unit weight of 125.0 pcf. The oversized equipment has been conservatively assumed to have a unit weight of 490 pcf (i.e., the unit weight of solid steel). If 107 yd<sup>3</sup> (the approximate volume of oversized materials currently identified) of Category 1 material with an average unit weight of 125 pcf is replaced with the same volume of oversized materials having an average unit weight of 490 pcf, the average unit weight of the material in the cell would be increased to 125.1 pcf. This increase in unit weight is considered insignificant and has no impact of the performance of the OSDF and protection of the environment.

#### **Concentration of Stress**

Placement of oversized items can result in the concentration of stress on the OSDF lining system, and therefore, potential impact was evaluated. Stress concentrations will result from the contact pressure of the oversized objects. A hypothetical item that will produce the greatest contact pressure would be a 4 ft. by 4 ft. by 4 ft. counter-weight. The relative influence of the counter-weight is greatest when it is first placed in the

OSDF. This item would produce an added weight of 23,360 pounds (1460 psf) to the surface of the select impacted material. Assuming a 1H:2V zone of influence to transmit the load 5 ft. to the primary geomembrane surface, the added stress concentration at the primary geomembrane surface would be 272 psf.

The stress concentration at the primary geomembrane surface due to oversized items is well below the calculated puncture resistance of 80-mil thick HDPE geomembrane, which is on the order of 14,000 psf. Based upon the above evaluations the select oversized items can be placed directly on top of the 3 ft. thick select impacted material, if necessary.

### Conclusions and Recommendations

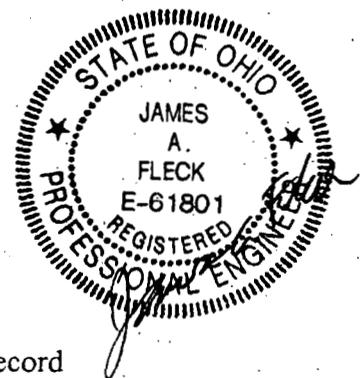
Items which cannot be reasonably size-reduced and can fit into a 12 ft. by 12 ft. plan area and are 4 ft. high or less can be placed according to category 3 methods without impacting the performance of the OSDF or its ability to protect the environment. The oversized items already identified for placement in the OSDF meet the general requirements of Category 3 material, with the exception of the size. Placement procedures for the oversized equipment were developed based on the existing requirements for Category 3 material. The placement of oversized items has a negligible impact on average unit weight of material placed in the OSDF. Calculations presented show a small increase in unit weight of impacted material but does not impact OSDF performance or its ability to protect the environment. Placement of this material will meet the same objectives as placement of Category 3 transite panels.

**It is our recommendation that oversized items that meet the criteria stated in Addendum No. 5, be placed in the On-Site Disposal Facility as described in Addendum No. 5 to the Impacted Materials Placement Plan.**

Respectfully Submitted,  
**GeoSyntec Consultants**



James A. Fleck, P.E.  
Project Manager/Engineer-of-Record



CC:  
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**TABLE 1  
COMPARISON OF OVERSIZED MATERIAL TO CATEGORY 3 REQUIREMENTS**

OVERSIZED MATERIALS CURRENTLY AVAILABLE FOR PLACEMENT	OVERSIZED MATERIAL MAXIMUM DIMENSION <sup>1</sup>	CATEGORY 3 REQUIREMENTS	
		MEETS INDIVIDUAL BUNDLE OF TRANSITE PANEL SIZE REQUIREMENT	MEETS TRANSITE PLACEMENT "ALTERNATE 1 <sup>2</sup> " AREA REQUIREMENT
Concrete Crusher	6 ft. by 3.5 ft. by 3 ft.	Yes	Yes
Concrete Crusher	5 ft. by 3.5 ft. by 2 ft.	Yes	Yes
"Slab Crab" (bucket)	3 ft. by 3.5 ft. by 6 ft.	Yes	Yes
Bucket	3 ft. by 4.5 ft. by 4 ft.	Yes	Yes
Arm w/hydraulic piston	15 ft. by 3 to 8 ft. by 3 ft.	No	Yes
Arm w/hydraulic piston	12.5 ft. by 3 to 8 ft. by 3 ft.	No	Yes
Counter-Weight	3 ft. by 2.5 ft. by 5 ft.	Yes	Yes
Counter-Weight	2.5 ft. by 1.5 ft. by 11.5 ft.	Yes	Yes
Track-hoe Undercarriage Frame	7 ft. by 10 ft. by 1.5 ft.	No	Yes
Wire Cable Coils	5 ft. OD, 2.5 ft. ID by 2 ft. high	No	Yes

- Notes: 1. Estimated maximum dimension is based on the largest measurements in each direction.  
 2. Reference: Impacted Material Placement Plan Section 8.4.2.2 Requirements for Alternate 1 (Side-By-Side) Placement Method



5813

**TABLE 2**  
**ESTIMATED VOLUME OF OVERSIZED MATERIAL<sup>1</sup>**

<b>OVERSIZED MATERIALS CURRENTLY AVAILABLE FOR PLACEMENT</b>	<b>OVERSIZED MATERIAL MAXIMUM DIMENSION<sup>2</sup></b>	<b>MAXIMUM VOLUME OF EACH ITEM</b>	<b>QUANTITY</b>	<b>TOTAL VOLUME OF EACH TYPE OF OVERSIZED MATERIAL</b>
Concrete Crusher	6 ft. by 3.5 ft. by 3 ft.	63 ft <sup>3</sup>	1	63 ft <sup>3</sup>
Concrete Crusher	5 ft. by 3.5 ft. by 2 ft.	35 ft <sup>3</sup>	1	35 ft <sup>3</sup>
"Slab Crab" (bucket)	3 ft. by 3.5 ft. by 6 ft.	63 ft <sup>3</sup>	1	63 ft <sup>3</sup>
Bucket	3 ft. by 4.5 ft. by 4 ft.	54 ft <sup>3</sup>	1	54 ft <sup>3</sup>
Arm w/hydraulic piston	15 ft. by 3 to 8 ft. by 3 ft.	135 ft <sup>3</sup>	1	135 ft <sup>3</sup>
Arm w/hydraulic piston	12.5 ft. by 3 to 8 ft. by 3 ft.	112 ft <sup>3</sup>	1	112 ft <sup>3</sup>
Counter-Weight	3 ft. by 2.5 ft. by 5 ft.	37 ft <sup>3</sup>	26	962 ft <sup>3</sup>
Counter-Weight	2.5 ft. by 1.5 ft. by 11.5 ft.	43 ft <sup>3</sup>	1	43 ft <sup>3</sup>
Track-hoe Undercarriage frame	7 ft. by 10 ft. by 1.5 ft.	105 ft <sup>3</sup>	1	105 ft <sup>3</sup>
Wire Cable Coils	5 ft. OD, 2.5 ft. ID by 2 ft. high.	30 ft <sup>3</sup>	44	1320 ft <sup>3</sup>

Note: 1. Estimated volumes are based on maximum dimensions for each oversized item.

2. Estimated maximum dimension is based on the largest measurements in each direction.

Total Volume of Currently Identified, Oversized Materials = 2,892 ft<sup>3</sup>  
107 yd<sup>3</sup>

