

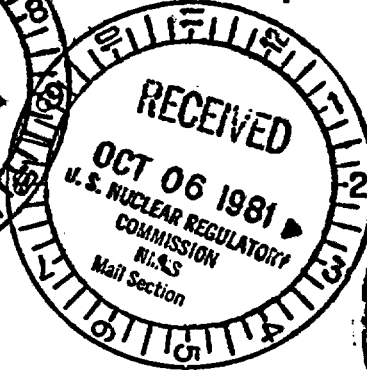
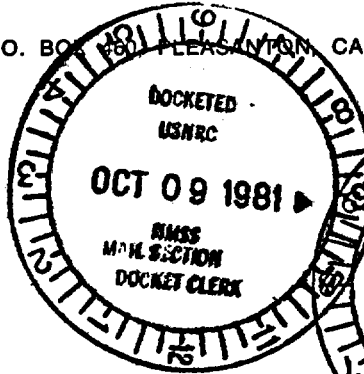
# GENERAL ELECTRIC

71-6400

NUCLEAR ENERGY  
ENGINEERING PDR  
DIVISION *Return to*

GENERAL ELECTRIC COMPANY, P.O. BOX 180, FLEMINGTON, CALIFORNIA 94566

October 1, 1981



*D. CRAMER*  
*396 55*


Mr. Charles E MacDonald, Chief  
Transportation Branch  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. MacDonald,

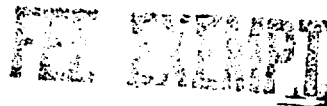
General Electric hereby requests certification or other authorization to use the Model No. 6400 protective overpack (also known as the Super Tiger) for the transport of the specified contents which are described and evaluated in Appendix A hereto. This document supersedes in its entirety that submitted July 15, 1981.

Application and approval fees were paid at that time.

Very truly yours,

  
G. E. Cunningham  
Senior License Engineer  
Vallecitos Nuclear Center

GEC:dc  
Enclosure

  
*add'l info*

B110190607 B11001  
PDR ADDCK 07106400  
C PDR

19766

FROM: <b>General Electric Company</b>		DATE OF DOCUMENT <b>10/1/81</b>	DATE RECEIVED <b>10/6/81</b>	NO.: <b>19766</b>
TO: <b>C.E. Macdonald</b>		LTR. <b>X</b>	MEMO:	REPORT:
CLASSIF.: <b>un</b>		ORIG.: <b>1</b>	OTHER:	OTHER:
POST OFFICE	REG. NO.:	ACTION NECESSARY <input type="checkbox"/>	CONCURRENCE <input type="checkbox"/>	DATE ANSWERED:
DESCRIPTION: (Must Be Unclassified) <b>request authorization to use Model No. 6400 protective over pack.</b>		NO ACTION NECESSARY <input type="checkbox"/>	COMMENT <input type="checkbox"/>	BY:
ENCLOSURES:		FILE CODE: <b>71-6400</b>		
		REFERRED TO	DATE	RECEIVED BY
		<b>Reg File cy</b>	<b>10/9</b>	
		<b>FCTR (3)</b>		
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REMARKS: <b>SEE Report folder</b>				
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U. S. NUCLEAR REGULATORY COMMISSION

MAIL CONTROL FORM

FORM NRC-3265 (6-78)

APPENDIX A  
PACKAGING AND SAFETY ASSESSMENT  
FOR  
TRANSPORTATION OF LARGE EQUIPMENT WASTE

General Electric Company  
Vallecitos Nuclear Center  
Advanced Fuels Laboratory

October 1981

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## 1.0 Introduction

As previously described in Docket No. 71-9136, General Electric is deactivating its Fuels Laboratory at the Vallecitos Nuclear Center which involves the single trip transportation of contaminated equipment to waste disposal facilities. Most of the equipment is Low Level Solid (LLS) and will be packaged and transported in the GE Model 9136 family of packagings in accordance with the authorizations in Docket No. 71-9136.

Some other equipment cannot be surveyed in a manner that assures it would meet the Low Level Solid radioactive material definition required for shipment in the Model 9136 wooden shipping container alone. Although the residual activity is likewise quite low - not more than 2 curies (<1.5 grams of plutonium at the known isotopic ratios) in any one lot (items in one inner most container) and less than 0.5 curies in most lots - this equipment will be further contained in additional packaging to provide at least 3 substantial barriers against any release of significant traces of material during transport and disposal operations. All of these items will be foamed in place within inner wooden containers which, in turn, will be shipped in the Model 6400 overpack (Super Tiger). In some cases an extra wooden container will be used.

## 2.0 Packaging

The contents to be transported in the Model 6400 overpack will be contained within packagings constructed in the same manner as the Model GE-9136 except with dimensions required to best fit the overpack. Equipment not easily fitted with mechanical closures, e.g., metal caps or gasketed bolt-on flanges, will be further contained within a second inner wooden box. The space between the contents and the packaging will be filled with a rigid polyurethane foam.

The Model 6400 Super Tiger is constructed in accordance with Protective Packaging, Inc., Drawing Nos: 32106-1, Sheet 1, Rev. F and 32106, Sheet 2; and either (1) Westinghouse Electric Corporation Drawing No. 2020D08, Sheet 1 and 2, Rev. 0; or (2) Babcock and Wilcox Company Drawing No. 11-D-2130, Rev. 0, as modified by Westinghouse Electric

Corporation letter dated January 12, 1981; or (3) Nuclear Packaging, Inc., Drawing No. EG-60-01D, Sheets 1 and 2, Rev. 0, as modified by Westinghouse Electric Corporation letter dated January 20, 1981; or (4) Lawrence Livermore National Laboratory Drawing Nos. AAA81-108683-00, Rev. 0 and AAA81-110194-00, Rev. 0. A description of the latter is included herewith.

The Model GE-9136 type packaging is constructed in accordance with G.E. Co. drawing Nos. 908E614, Rev. 1 and 908E619, Rev. 2 or 908E648, Rev. 0 or 908E649, Rev. 0 (hereinafter called 9136 type packaging).

The second wooden box will be fabricated of 3/4" plywood on 2" x 4" framing with joints glued and nailed as shown on G.E. sketch No. 272E81-4, 272E81-28, 273E81-29, 272E81-30 or 272E81-31.

The polyurethane foam will be Instapak 200 or equivalent.

### 3.0 Contents

#### 3.1 General

- (a) The space between the contents and the packaging will be filled with a rigid polyurethane foam to a minimum thickness of 1 inch. Void spaces between the contents will be filled with foam (1/2" minimum thickness).
- (b) Equipment contents capable of mechanical closure will be fitted with gasketed metal flanges before loading into the 9136 type packaging.
- (c) Radioactive constituents of residual contamination in equipment are plutonium and uranium.
- (d) Contents will be less than 20 curies and less than 15 grams fissile. Neither neutron absorbers or coolants are required.

- (e) The maximum weight of the contents including the 9136 type second inner packaging, and all dunnage, shoring and bracing will not exceed 30,000 pounds.
- (f) Sufficient dunnage, shoring and/or bracing will be utilized to minimize secondary impact of the secondary packaging within the cavity under normal and accident conditions.
- (g) Secondary (9136-type) and tertiary packaging will not be equipped with lifting eyes or other protrusions
- (h) Secondary (9136-type) packaging will be positioned in the 6400 cavity such that the center of gravity of the loaded package is substantially the same as the center of gravity of an empty package.

### 3.2 Specific

- (a) Large decontaminated equipment such as fume hoods, considered to be primary containment, will be decontaminated to a smearable level of no more than 150,000 d/m/100 cm<sup>2</sup> prior to fixation or until successive decontamination cleaning operations do not reduce the smearable contamination levels by more than ten percent. After fixation, equipment waste surfaces will have a smearable level of contamination no greater than 10,000 d/m/100 cm<sup>2</sup>. Outer surfaces will have a smearable level of contamination no greater than 20 d/m/100/cm<sup>2</sup>.

Prior to fixing of contamination, large equipment waste will be inspected to insure that all sharp or protruding objects have been removed or blunted. Following such inspection, the inner surfaces will be fixed with strip, clear or paint coating. The equipment will be secured to prevent movement during shipment.

- (b) Large equipment such as sintering furnaces, gloveboxes, heat exchangers, filter housings and ducting, hydraulic reservoirs with pumps and atmospheric purifiers, the interiors of which can be sealed using mechanical fittings, will be provided with gasketed flanges, pipe caps or covers after internal contamination levels are determined. External surfaces will have smearable contamination levels no greater than  $20 \text{ d/m}/100 \text{ cm}^2$ . Large equipment waste will be inspected prior to packaging for shipment to assure that protruding objects or sharp corners are blunted or suitably protected to prevent damage to the shipping container. The equipment will be secured to prevent movement during shipment.

Further details concerning the history of these items and means of preparation for packaging are given below.

Glovebox #7, a heavy walled glovebox capable of high vacuum operation, was previously decontaminated to a smearable level of  $8.1 \times 10^5 \text{ d/m}/100 \text{ cm}^2$  (80.6 mCi estimated total activity) and painted before final closure.

The Dri train was used to purify filtered glovebox inert atmosphere. The internals of the Dri train (atmospheric purifier) are not accessible, but its historical use precluded significant contamination. This conclusion was substantiated by very low levels of contamination detected during previous system maintenance checks and disconnection from the glovebox.



The secondary filter housings containing one 2'x 2' filter each, were located downstream of glovebox filters and by previous measurement, filters were determined to contain less than 0.1 Ci total activity each. Conservatively, the filter housing measurement is similar to the filter which results in 0.2 Ci total activity per filter housing.

Heat exchangers were located outside gloveboxes and were used only for water cooling certain glovebox equipment. Water samples yielded measurements of < 0.01 Ci total activity per heat exchanger. The water was removed from the heat exchangers, but for conservatism, the measurements were assigned to the empty heat exchangers.

Hydraulic reservoirs, with pumps, were located outside gloveboxes and were used in conjunction with presses in gloveboxes. Samples of hydraulic fluid yielded < 0.1 and 0.38 Ci total activity respectively for two reservoirs. The hydraulic fluid was removed from the reservoirs, but for conservatism the activity measured in the fluid was assigned to the empty reservoirs.

Rectangular ducting was located downstream of the glovebox and secondary filters which precluded significant contamination. Conservatively, the measurement (13,500 d/m/100 cm<sup>2</sup>) associated with round ducting located between the glovebox and secondary filters was assigned to the rectangular ducting.

The sintering furnace was used less than two years, primarily for very limited testing and production purposes. Similar measurement values of 0.5 Ci total activity were arrived at by two independent indirect methods. The methods involved relating the furnace measurement to nondestructive assay of airlocks attached to the furnace and sintering boats used for sintering fuel. Cribbing will be provided around the furnace ends to prevent damage to the shipping container.

- (c) Equipment items which cannot be sealed using mechanical fittings such as heavy walled process glassware, stainless steel transfer tubes, HEPA filters not in filter housings and round ducting will be capped or double bagged in 12 mil thick PVC with each bag heat sealed. These items will be further protected and restrained in a strong, tight, glued joint plywood container to prevent movement during transport. The plywood container (see G.E. sketch Nos. 272E81-4, 272E81-28, 272E81-29, 272E81-30 or 272E81-31) will be secured in 9136-type packaging.

Further details concerning the history of these items and means of preparation for packaging are given below.

Large heavy walled process glassware will be painted inside and outside to fix contamination and double bagged in 12 mil thick PVC with each bag heat sealed. The total activity of the glassware is less than 2 Ci. The double bagged glassware will be placed in a strong, tight, glued joint plywood container in internal support members covered with soft material to prevent abrasion of the bags and movement of the glassware during transportation (see G.E. sketch No. 272E81-4). The plywood container will be secured in 9136-type packaging.

Stainless steel transfer tubes (by which adjacent glove boxes were connected) have less than 0.5 Ci total activity. These tubes and HEPA filters not in filter housings, will be double bagged in heat sealed 12 mil thick PVC bags and placed in a strong, tight, glued joint plywood container. Such equipment will be suitably protected and restrained to prevent movement during transport. The plywood container (see G.E. sketch No. 272E81-28) will be secured in the 9136-type packaging.

Items such as round ducting will be capped and restrained in a strong, tight, glued joint plywood container. Such equipment will be suitably protected and restrained to prevent movement during transport. The plywood container (see G.E. sketch Nos 272E81-29, 272E81-30 or 272E81-31) will be secured in the 9136-type packaging.

#### 4.0 General Standards for all Packages

Both the Super Tiger and the GE Model 9136 family of containments have been demonstrated to meet the requirements of 10 CFR 71.31 (MRI Report 2378, May 4, 1970; GE applications in Docket 71-9136).

#### 5.0 Normal Conditions of Transport

Both the Super Tiger and the GE Model 9136 family of containments have been demonstrated to meet the requirements of 10 CFR 71.35. (MRI Report 2378, May 4, 1970; GE applications in Docket 71-9136).

#### 6.0 Hypothetical Accident Conditions

All items of equipment are mechanically sealed at all openings where possible or, otherwise, are double-bag sealed and contained in a specially fitted plywood inner box. Then all equipment is foamed in place within the 9136-type container or the special inner container. These containers are then stored within the Super Tiger enclosure for transport.

The Super Tiger has been demonstrated to meet the hypothetical accident conditions when equipped and closed in compliance with the design. Although the thermal tests used inner metal containers rather than plywood containers, the internal cavity temperatures did not exceed 150°F which is of no consequence to the 9136 plywood package integrity. Additionally, the 9136 packages are coated with a fire retardant fiberglass.

#### 7.0 Quality Assurance Program

The Quality Assurance Program which will be used is described by General Electric document No. QAP-1, "Quality Assurance Program for Shipping Packages for Radioactive Material".

DESCRIPTION OF THE  
LAWRENCE LIVERMORE NATIONAL LABORATORY  
SUPER TIGER (MODEL NO. 6400)

General Electric Company  
Vallecitos Nuclear Center  
Advanced Fuels Laboratory

July 1981

I. General Description of the Overpack

The Model No. 6400, Super Tiger, shipping package is owned by the Lawrence Livermore National Laboratory. This package was fabricated by Protective Packaging, Inc. (PPI) according to their drawing #32106. Lawrence Livermore National Laboratory Drawing Numbers AAA81-108683-00, Rev. 0 and AAA81-110194-00, Rev. 0 are a compilation of the results of LLNL's inspections and repair work performed respectively. Deviations from the original design and the repairs are discussed.

II. Deviatons from Original Design

A. Inner Cavity Closure Bolts

The original drawing supplied by PPI specified 1/2"-20 bolts on 10" centers which were not supplied with the original overpack. The actual bolts supplied were 1/2"-13 bolts on 10" centers. The Engineering Evaluation performed on this discrepancy showed that this change is inconsequential; that is, the weakness point in the points is governed by the thread root diameters which is the same for both bolt types as opposed to the number of threads per inch. The bolts have been replaced with new Grade 2 1/2"-13 bolts and hardened steel washers.

B. Outside Bolts

The ten outside bolts will be replaced with Grade 8 1"-8 UNC bolts with malleable washers. This was a recommendation of the engineering report.

C. Gaskets

The inner and outer door gaskets were replaced as recommended.

D. Internal Cavity Panels

The internal cavity panels were inspected using special magnetic fixtures holding a taut line at a given distance from the panel surface. The magnetic fixtures were attached to the steel panels and measurements taken on one-foot grids with a six-inch precision scale held perpendicular to the panel surface. All inside panels did not meet the required criteria of being flat within 3/16 of an inch. The internal cavity panels show no signs of damage. The evaluaton team did not think that the tolerance of 3/16 of an inch flatness was a realistic measurement proposed for a container of this size. No effort will be made to achieve this specification.

E. Support Channels

Two weld cracks were noted on the bottom 6" support channels. These channels do not contribute to the structural integrity of the overpack. The cracks were rewelded.

III. Conclusion

The deviations should not affect the use of this overpack as described in the request for certification.

**THIS PAGE IS AN  
OVERSIZED DRAWING  
OR FIGURE,**

**THAT CAN BE VIEWED AT  
THE RECORD TITLED:  
DWG. NO. 272E81-28  
ASSEM. TUNNELS/FILTERS &  
MISC. CONTAINER - AFL  
WITHIN THIS PACKAGE...OR,  
BY SEARCHING USING THE  
DRAWING NUMBER:  
272E81-28**

**NOTE:** Because of this page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.

**D-1**

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OR FIGURE,**

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THE RECORD TITLED:  
DWG. NO. 272E81-29  
ASSEM. - ROUND DUCT 4" & 6'  
SIZE CONTAINER - AFL  
WITHIN THIS PACKAGE...OR,  
BY SEARCHING USING THE  
DRAWING NUMBER:  
272E81-29**

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**D-2**



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THE RECORD TITLED:  
DWG. NO. 272E81-30  
ASSEM. - ROUND DUCT 3" & 4"  
SIZE CONTAINER - AFL  
WITHIN THIS PACKAGE...OR,  
BY SEARCHING USING THE  
DRAWING NUMBER:  
272E81-30**

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OR FIGURE,**

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THE RECORD TITLED:  
DWG. NO. 272E81-31  
ASSEM. - ROUND DUCT 3",4" &  
6" SIZE CONTAINER - AFL  
WITHIN THIS PACKAGE...OR,  
BY SEARCHING USING THE  
DRAWING NUMBER:  
272E81-31**

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**908E614**

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**D-6**