

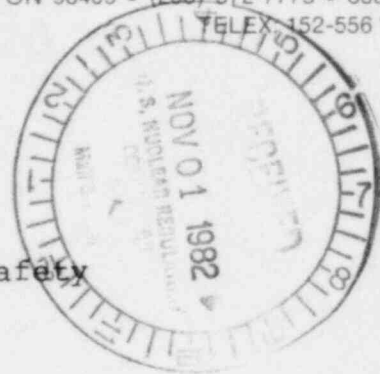
# NUCLEAR PACKAGING, INC.

71-9159

815 SO. 28TH STREET • TACOMA, WASHINGTON 98409 • (206) 572-7775 • 838-1243  
TELEX 152-556 "SEA"

October 29, 1982

Mr. Charles E. MacDonald, Chief  
Transportation Certification Branch  
Division of Fuel Cycle and Material Safety  
Nuclear Regulatory Commission  
Washington, D.C. 20555



REFERENCE: Docket Number 71-9159  
NUPAC Series A Packaging

Dear Mr. MacDonald:

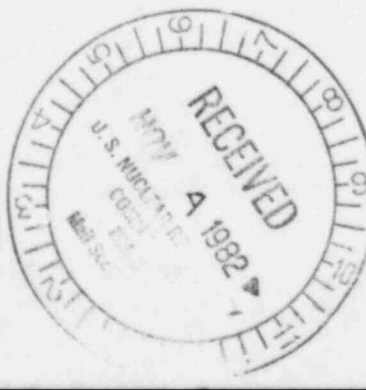
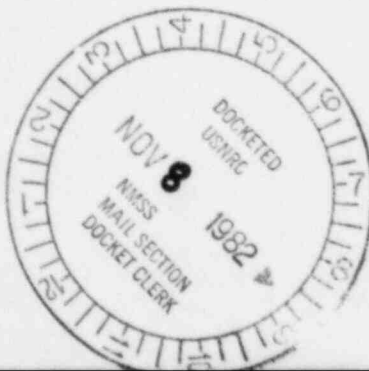
Please find enclosed Revision 1 Amendments to the NUPAC Series A Safety Analysis Report. Eight copies of the complete report are attached. All amended pages have been noted as usual. These amendments are being provided in response to your comments of September 2, 1982.

Changes to both the cask design and analysis have been made as a result of your comments. The most significant changes occurred to the lifting/tiedown lugs. The lug dimensions were increased and a finite element analysis was done to give a detailed description of the stresses in the cask outer shell due to lug tiedown loads. Responses to each of your comments are enclosed as Attachment 1 to this letter to aid in your review.

The information embodied in this Safety Analysis Report and amendments thereto is the property of Nuclear Packaging, Inc., Tacoma, Washington, and is considered PROPRIETARY DATA. A notice with respect to this information is provided as Attachment 2 to this letter and is intended for those parties who may come into possession of this material.

We are aware of your requirements to place this Safety Analysis Report and any amendments thereto in the Public Documents Room. This may be done with our permission; however, this permission should not be construed as a waiver of or in any way prejudicial to our lawful proprietary rights to this material. It is done only to facilitate the issuance of a Certificate of Compliance.

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Docket Number 71-9159  
October 29, 1982  
Page 2



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Two of these Type A casks have been ordered for use in the Three Mile Island cleanup effort and we therefore would appreciate your earliest response.

Please feel free to contact us for any additional information.

Sincerely yours,

NUCLEAR PACKAGING, INC.

A handwritten signature in cursive script that reads "Larry J. Hansen".

Larry J. Hansen

LJH/pro

Attachments: Response to N.R.C. Comments  
Proprietary Notice

Enclosures: Safety Analysis Report, Revision 1



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NOTICE

This Safety Analysis Report for the NuPac Series A Cask Family and all associated drawings including amendments thereto are the property of Nuclear Packaging, Inc., Tacoma, Washington. This material is being made available for the purpose of obtaining required certifications from the U.S. Nuclear Regulatory Commission and to enable others to register with the U.S.N.R.C. as a user of this package. No other use of this material is authorized unless by written consent of Nuclear Packaging, Inc. Parties who may come into possession of this material are cautioned that the information is PROPRIETARY to the interests of Nuclear Packaging, Inc. and is not to be reproduced in any form without the prior written consent of Nuclear Packaging, Inc.

Docket 71-9159  
October 29, 1982



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RESPONSE TO N.R.C. COMMENTS ON  
NUPAC SERIES A PACKAGING S.A.R.

Drawings

COMMENT 1. Provide manufacturers specification sheet for the NuPac ratchet binder. The specification sheet should provide dimensional data and material specification for the various components of the ratchet binder.

Response: The specification sheet has been included as Appendix 2.10.3.

COMMENT 2: The model number of NuPac ratchet binder given on the drawing does not agree with the model number given in the Safety Analysis Report (SAR). The drawing should specify the number of binders required.

COMMENT 3: Clarify the statements both on the drawing and in the SAR relative to the drain line, i.e., drawing calls for 3/4" Sch. 80 pipe and an option to use a 1/2" NPT pipe plug while the SAR calls for a 3/8" NPT pipe plug.

COMMENT 4: Section A-A of Drawing No. X-20-204D does not seem to agree with the description given in Section 1.2.1.3 of the SAR. The SAR indicates there is a primary seal and a redundant seal.

COMMENT 5: Chamfers on the opposing faces of the flange joint shown in Section A-A Drawing No. X-20-204D should be dimensionally limited to assure sufficient contact surface is available.

COMMENT 6: Tabulation on Sheet 1 of Drawing No. X-20-204D should be expanded to include maximum outside diameter of the packaging gaskets.

COMMENT 7: The vertical dimensions of the lug shown in View F-F do not agree with the dimension given on page 2-9 of the SAR.

Response: The above inconsistencies between the drawing and the SAR have been resolved.

COMMENT 8: Drawing should specify the dimensional controls (flatness, surface finish, etc.) required on all sealing surfaces and torquing requirements of all closures.



COMMENT 9: Specify weld inspection criteria for all welds.

Response: The information requested has been added to the drawings with the exception of sealing surface dimensional controls. A post fabrication pressure test requirement has been included to insure adequate sealing capability.

Structural

1. Section 2.4.3.1 Package Lifting Lugs

COMMENT a. The moment induced by the lifting force and the lug offset distance should be included in the analysis of the lug to shell welds.

Response: The analysis has been so revised.

COMMENT b: Provide justification that a greater effective throat area and a greater allowable stress of welds may be used in the analysis than as specified in AISC Manual of Steel Construction. Note also that weld capacity should be reduced if not fully inspected.

Response: Analysis of the welds is considered adequate for several reasons. The throat areas used follow standard practice (e.g., .707 times the weld leg dimension for a fillet weld). The weld allowable is also commonly used. Note that the shear allowable of the weakest metal being joined is always used, even when the higher tensile allowable might be justified. Note also that the analysis is not required to follow the AISC Manual. The weld capacity is not reduced because the weld quality is carefully controlled through welder qualification requirements and quality control inspection.

2. Section 2.4.4 Tiedowns

Comment a: The offset moment produced by the tie-down force should be included in the analysis of the tie-down welds. The effective throat, the allowable stress, and the weld capacity should be addressed as required in lb. above.

Response: See responses to 1a and 1b above.

Comment b: The analysis of the cask shell only considers local shear and pull-out effects of the tie-down force. The appropriate analysis should also include the bending moments and stresses in the outer shell.

Docket 71-9159  
October 29, 1982



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Response: A finite element analysis of the cask wall and lug was done which gives detailed stress and deflection information.

COMMENT 3: It is not clear how the fracture toughness criteria for Category III containers as set forth in NUREG/CR-1815 has been met as claimed. Please specify which one (or more) of the criteria in Table 1, NUREG/CR-1815 will be met by the NuPac Series A Casks.

Response: A more detailed explanation of the cask fracture toughness capabilities has been included.

COMMENT 4: Provide an analysis for the side drop condition for cask impacted directly on the tie-down lug. Show that the deformations of the cask cylinder will not be large enough to compromise the cask seal.

Response: Added analysis has been so provided.

COMMENT 5: Section 2.6.6.3 Corner Drop

Comment a: Ratchet binder - the analysis should be revised to take into consideration the bending moment produced by the weight of the contents impacted on the lid as well as the additional moment due to impacting on the lid corner which extends beyond the cask cylinder.

Response: Added analysis has been so provided.

Comment b: Lugs - the analysis has ignored the moment produced by the offset distance; the analysis has been arbitrarily based on ultimate strength of materials without proper justifications that the cask will remain sealed under the circumstances; the analysis has been based on criteria that weld shear capacity exceeds the plate capacity.

Response: The lug analysis has been revised to include offset moment. Yield allowables are used in place of ultimate and the plate capacity is also calculated.

Comment c: The condition of impact on one of the ratchet binders should be considered.

Response: This has been included.

Docket 71-9159  
October 29, 1982



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Comment d: Secondary Lid - the analysis of the secondary lid studs should consider the moment due to payload impacting on the lid.

Response: This has been included.

Comment e: The extent of damage to the cask drain and the bottom plate to shell welds should be investigated for the bottom corner drop conditions.

Response: This has been addressed. Note that the position of the drain is now slightly higher, thus providing more protection.

#### Containment

Comment 1: Please clarify or correct the inconsistency between Section 1.2.1.7 and 4.1.2 and Detail C note on NuPac Drawing No. X-20-204D, Sheet 2, Rev. 0 concerning a drain line.

Response: The inconsistencies have been resolved.

Comment 2: Address initial and periodic leak testing of packagings.

Response: Leak Testing requirements are called out.

#### Thermal

Comment 1: Derive a maximum heat load for each package design taking into account the definition of low specific activity material (10 CFR 71.4(g)(4)) and the maximum shielding capability of the packaging.

Comment 2: Derive the maximum center line temperatures for waste solidified in asphalt and concrete if these solidifying mediums will be used. Evaluate the effects on containment of any pressure rise and hydrogen buildup.

Response: A maximum heat load has been calculated and found to be much less than the 400 watt load previously used. Therefore, the cask wall temperature analysis was left unchanged. A maximum centerline temperature is shown to be less than 5°F above the maximum wall temperature and thus have no significant effects.

#### Operating Procedures

Comment 1. Operating procedures should be revised to take into account proper torquing of package closures, i.e., ratchet binders, studs and nuts, and drain line.

Docket 71-9159  
October 29, 1982



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Comment 2: Monitoring of radiation and contamination levels should be required to be in accordance with DOT limits.

Comment 3: Procedures should be revised to take into account the requirements of 10 CFR 20.205 concerning receipt of packages.

Response: The Operating Procedures have been rewritten to address the above concerns.

Acceptance Tests and Maintenance Program

Comment 1: Provide acceptance criteria and procedures for inspecting sealing surfaces, alignment of lid(s) (guide pins), and closure devices.

Comment 2: Provide leak test criteria and leak test procedures for initial acceptance and periodical testing. In the absence of guide pins to limit the lid(s) orientation, the leak testing should be conducted for each possible orientation of the lid(s).

Comment 3: Provide criteria and procedures for performing an initial gamma-ray radiation survey of the packaging shielding capability.

Comment 4: Provide your maintenance program.

Response: This section has also been rewritten to address the above concerns.