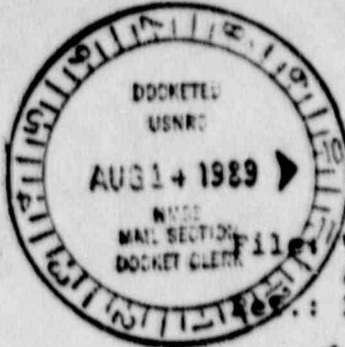


71-9179



August 4, 1989

WO#3523, 680-2
& WO #IY
L-10082

Mr. Charles E. MacDonald, Chief
Transportation Certification Branch
Division of Fuel Cycle and Material Safety
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

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Subject: NuPac 10/140MB Safety Analysis Report Submittal
Docket No. 71-9179

Dear Mr. MacDonald:

Nuclear Packaging, Inc., is pleased to submit a completely revised Safety Analysis Report in application for the use of the NuPac 10/140MB Cask. This cask reflects a major step forward in the design of general Type B waste casks. Included in this design are several new features that add versatility and greater positive containment to the package. Some of these features such as the EnviroSeals™ are new and unique to the NuPac 10/140MB package. For some of the features of this package, Nuclear Packaging is pursuing patent protection.

Enclosed are eight proprietary copies and two non-proprietary copies of the Safety Analysis Report for the NuPac 10/140MB package. If additional copies are required, we will supply them upon request. Since this is a reapplication for this package under an existing docket number, we will assume that our originally submitted \$150 application fee is still valid.

Much of the information required by the NRC to determine the compliance of the design to applicable regulations require the disclosure of trade secrets and patent information; and therefore, our company's competitive position. Enclosed please find our notarized Affidavit to withhold this proprietary information from public disclosure. We request that the proprietary versions of the report be withheld from the Public Documents Room or any other form of public disclosure per the enclosed affidavit.

Both the proprietary and the non-proprietary versions of the SAR are protected under the copyright laws as unpublished material. Photostatic copies of this copyrighted material may be made by NRC review personnel for convenience and for record purposes within the commission files; however, permission to copy the material is expressly denied to persons other than commission personnel for any other reason. Copies of the non-proprietary material may not be released by the commission except to the Public Documents Room.

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July 31, 1989

Charles E. MacDonald, Chief
U. S. Nuclear Regulator Commission

Page 2

Note that the 10/140MB is similar in design to the previous submittal of the same designation (refer to Nuclear Packaging's letter of August 9, 1985, and your docket number 71-9179). The new design being submitted for your review is essentially the same as previously, with the exception of the lid closure mechanism. The earlier design retained the lid with the ratchet binder type fastening devices, whereas the new design utilizes standard bolts.

Your office generated a set of questions in response to the original submittal. In view of the similarity of the new design to the old, we feel that it would be appropriate to reply to these earlier questions with regard to the new design. These replies are enclosed in the form of Attachment A to this letter.

If you have any questions, please do not hesitate to contact me.

Sincerely,

NUCLEAR PACKAGING, INC.



Charles J. Temus
Technical Director

Enclosures: Attachment A
Affidavit
(8) Proprietary 10/140MB SAR
(2) Non-Proprietary 10/140MB SAR
Video tape of Quarter Scale Drop Test

CJT/rlm

ADDENDUM A

1. **Justification should be provided for proposed allowable stress limits that are not consistent with Regulatory Guide 7.6.**

The allowable stress limits not specifically defined by Regulatory Guide 7.6 have been drawn from Sections NB-3000 and Appendix F of ASME Section III. Note that all allowable stress limits utilized in the NuPac 10/140MB Safety Analysis Report are consistent to those used in the evaluation of the NuPac 125-B cask (Docket Number 71-9200).

2. **Drawings do not provide adequate information and are inconsistent**

The drawings have been revised to reflect the latest design features of the NuPac 10/140MB cask. Additional detail has been added so that all licensing-related aspects of the cask design are now available on the drawings. Inconsistencies have been corrected.

3. **The envirolock binders appear to work with the same principles as those of the ratchet binders and are not considered suitable for closure for Type B casks. Refer to letter dated November 25, 1985.**

The EnviroLock binders have been eliminated from the cask design, and have been replaced with standard bolts.

4. **Shock and vibration effects on cask have not been addressed.**

Section 2.6.5 ("Vibration") has been expanded to fully evaluate shock and vibration effects on the cask.

5. **The foam material has not been defined in the impact limiter analysis and design.**

Section 2.1.2.4 ("Impact Limiter Design Criteria") has been expanded to include further detail on characterization of the polyurethane foam used in the impact limiters.

6. **Because of the unusual shape of the impact limiter, results of analysis may have to be verified by tests.**

A comprehensive scale model drop test program was performed to evaluate the performance of the 10/140MB impact limiters. The results of this test program are detailed in Appendix 2.10.4 ("Quarter Scale Drop Test Results") of the S.A.R.

7. **The use of payload weight to counter-balance the impact force is not acceptable.**

All relevant analyses have been revised to consider impact response both with and without payload weight included. The results of these detailed evaluations are presented in Sections 2.6.7.1 ("Normal Conditions of Transport Flat End Drop") and 2.7.1.1 ("Hypothetical Accident Conditions Flat End Drop"), as well as in Appendices 2.10.6 ("Cask Wall Buckling Analysis") and 2.10.7 ("End Drop Lid Analysis").

8. **The lateral pressure on containment shell due to lead slump has been assumed to be uniformly distributed. If this assumption is true, maximum deflection will occur near the mid-height of the shell. However, numerous test results indicated that the maximum deflection occurs near the bottom of the shell. The uniform distribution assumption is not supported by observation.**

The detailed analyses performed in the 10/140MB S.A.R. tend to indicate that axial loading of the shells by the lead shielding, combined with discontinuity effects at the ends of the shells, play a more critical roll in shell response under end drop impact than does lateral pressure exerted by the lead shielding. To illustrate this effect in a modern cask configuration (relatively thick inner and outer shells, rigidly restrained at each end, enclosing a relatively thin layer of lead), the 10/140MB scale model test cask was dropped from a height of 30 feet without impact limiters. The object of this drop was to obtain an exaggerated lead response pattern for evaluate the validity of the analysis assumptions made in the S.A.R.

The resulting lead slump pattern tends to substantiate the fact that the relatively stiff shells exert a considerable influence in restraining lead slump. Details of this extra-regulatory drop test are given in Appendix 2.10.4 ("Quarter Scale Drop Test Results").

9. **The use of uncertain friction force between the lead and shell is not acceptable.**

The anticipated range of friction coefficient acting between lead and steel has been drawn from a standard, widely used engineering reference. In all cases, bounding analyses have been performed to assure that the least favorable value of friction coefficient has been used. In this regard, the evaluation procedure for addressing lead and steel interaction is the same in general as that utilized in the evaluation of the NuPac 125-B cask.

10. The weld strength and weld capacity are generally over-estimated. Larger than actual welded area is used and bending moments are neglected.

Weld analyses have been refined to include all load components. In general, all weld sizes have also been increased.



AFFIDAVIT

Submitted to Nuclear Regulatory Commission
Concerning confidential information
Contained in NuPac's Safety Analysis Report
for the NuPac 10/140MB Shipping Cask

State of Washington)
) ss:
County of King)

I, David M. Dawson, being first sworn, dispose and say:

1. That I am General Manager and a duly elected officer of Nuclear Packaging, Inc., 1010 South 336th Street, Federal Way, Washington 98003;
2. That I have been specifically delegated the function of reviewing proprietary information sought to be withheld from public disclosure and am authorized on behalf of the company to apply for its withholding;
3. That the information sought to be withheld contains trade secrets or privileged or confidential commercial or financial information, the release of which would cause substantial harm to the competitive position of Nuclear Packaging, Inc.; and
4. That the information sought to be withheld from public disclosure is specifically identified below:

Appendix 1.3.1, Drawings
Figures 2.1.2-1 and 2.1.2-2, Foam Stress-Strain Properties
Figure 2.1.2-3, Foam Stress-Strain Properties used for Analysis
Tables 2.6.7-8 through 2.6.7-9
Tables 2.6.7-12 through 2.6.7-13
Tables 2.7.1-8 through 2.7.1-9
Tables 2.7.1-12 through 2.7.1-19
Page 2-268
Pages 2-277 through 2-278

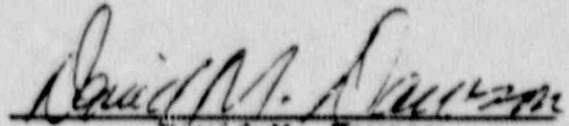
Appendix 2.10.3, Tiedown Lug Loads and Stress Analysis
Appendix 2.10.4, Section 2.10.4.6, Discussion of Impact Limiter Foam Response
Appendix 2.10.6, Cask Wall Buckling Analysis
Appendix 2.10.7, End Drop Lid Analysis
Appendix 2.10.8, Lid Puncture Analysis
Appendix 2.10.9, ANSYS Analysis Output
Appendix 3.6, Thermal Analysis Modeling Notes

All the information referenced above may be found in "Safety Analysis Report for the NuPac 10/140MB Shipping Cask".

Further, and in response to 10 CFR 2.790 (b)(4):

- (i) The information has heretofore been held in confidence by Nuclear Packaging, Inc.;
- (ii) the information is customarily held in confidence by Nuclear Packaging, Inc. since, to disclose such information would benefit NuPac's competitors in future packaging designs;
- (iii) the information has been transmitted to and, to the best of our knowledge, received by the NRC in confidence;
- (iv) the information is not now, nor is it intended in the future to be, in the public domain; should any of NuPac's competitors obtain said proprietary information, they would benefit commercially and to the detriment of Nuclear Packaging, Inc.
- (v) public disclosure of the information is likely to cause substantial harm to the competitive position of NuPac, particularly in light of the extensive engineering and financed effort which NuPac has put forth, to wit: (1) NuPac has been in the business of designing, licensing and fabricating Type B transportation packages for over 12 years, and during this time has developed and refined analytical and design techniques that enable said packages to meet or exceed all applicable federal codes and regulations including 10 CFR 71, (2). NuPac has expended in excess of \$750,000 over the past several years to develop the information sought to be withheld. Public disclosure of said information would put NuPac's competitive position in jeopardy, as it would cause NuPac to lose the design and performance advantages over its competitors which it currently offers to its customers. This would result in substantial loss of sales revenue which, in part, are necessary to offset the large expenditures which NuPac has

invested, or caused to be invested, in the development of transportation packaging designs based on and utilizing this proprietary information.



David M. Dawson
General Manager
Nuclear Packaging, Inc.

Subscribed and sworn to me this 26th day of July, 1989.

Anna M. Hall, Notary Public in and for the
State of Washington, residing at Federal Way, WA.