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Site 4 (2)

OCT 30 2000

ENGINEERING DATA TRANSMITTAL

Page 1 of 1
1. EDT 629780

2. To: (Receiving Organization) Distribution		3. From: (Originating Organization) Process Engineering		4. Related EDT No.: 628655	
5. Proj./Prog./Dept./Div.: Spent Nuclear Fuel Project		6. Design Authority/ Design Agent/Cog. Engr.: M. J. Packer		7. Purchase Order No.: N/A	
8. Originator Remarks: EDT documents the structural adequacy of MCOs during 40-year interim storage in CSB.				9. Equip./Component No.: N/A	
11. Receiver Remarks: USQ Screening Number: <i>7 declared CXBI 10/4/00</i>				10. System/Bldg./Facility: 212H/CSB	
11A. Design Baseline Document? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				12. Major Assm. Dwg. No.: N/A	
				13. Permit/Permit Application No.: N/A	
				14. Required Response Date: N/A	

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	SNF-6568	N/A	0	Overhead Vertical Strike Analysis for the MCOs in the CSB	S ^N , Q	1	1	1

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

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1	1	Design Authority	<i>U Goldmann</i>	<i>9/27/00</i>	R3-86	1	1	D. M. Chenault	<i>DM Chenault</i>	<i>9-27-00</i>	R3-86
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1	1	QA D. W. Smith	<i>D W Smith</i>	<i>10/9/00</i>	S2-48						
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		Env.									

18. <i>M J Packer</i> 9/27/00 Signature of EDT Originator Date		19. <i>J R Frederickson</i> 10/30/00 Authorized Representative for Receiving Organization Date		20. <i>J R Frederickson</i> 10/30/00 Design Authority/ Cognizant Manager Date		21. DOE APPROVAL (if required) Ctrl. No. N/A <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments	
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SNF-6568
Revision 0

Overhead Vertical Strike Analysis for the MCOs in the CSB

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

*Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200*

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Overhead Vertical Strike Analysis for the MCOs in the CSB

Division: SNF

M. J. Packer
Fluor Hanford

Date Published
October 2000

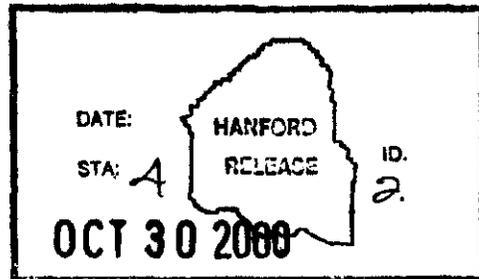
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Printed in the United States of America

Total Pages: 6

SNF-6568, NEW

TABLE OF CONTENTS

1.0	Purpose and Objectives.....	1
2.0	Summary of Final Results and Conclusions	1
3.0	Assumptions.....	1
4.0	Software Applications.....	1
5.0	Computer Model	1
6.0	Input Data.....	1
7.0	Calculations.....	2
8.0	Results.....	2
9.0	References.....	2

Overhead Vertical Strike Analysis for the MCOs in the CSB

1.0 Purpose and Objectives

The purpose of this calculation is to document the structural adequacy of Multi-Canister Overpacks (MCOs) in two separate normal configurations for the 40-year interim period in the storage tubes at the Canister Storage Building (CSB). The two configurations apply when the lower MCO is arranged with 1) just a shield plug mechanical closure or 2) with the canister cover welded over the shield plug.

2.0 Summary of Final Results and Conclusions

Multiple analyses have been conducted to show the MCO design is adequate for drop events involving a lower, passive MCO being struck by an overhead drop load MCO both in vertical position. Minimal plastic deformations are experienced for either the MCO with shield plug or the MCO with cover cap. This survivability at 35 g's demonstrates the package's worthiness for 40 years of storage. The force between the two MCOs created by a drop event far exceed that resulting from stacking two loaded MCOs. The stacking load condition is not a structural concern and is, therefore, acceptable for the design duration of 40 years of storage.

Both mechanical and welded cap models have the lifting ring and associated flat plate for the top unit to rest on and, therefore, easily fit together. Both designs were analyzed for the top unit to be dropped onto the lower unit. The mechanical seal unit only has high localized stress. The capped unit has a tendency to buckle but is still acceptable. Both designs will still be adequate for leakage and pressure during passive storage and are acceptable for the design duration of 40 years.

3.0 Assumptions

See Section 8.1.2, Appendix 7 from Lucas (2000).

4.0 Software Applications

See Appendix A and B from SNF-5328, Rev.0.

5.0 Computer Model

See Appendix A and B from SNF-5328, Rev.0.

6.0 Input Data

See Section 8.1.2, Appendix 7 from Lucas (2000).

See Appendix A from SNF-5328, Rev.0.

7.0 Calculations

See Appendix A from SNF-5328, Rev.0.

8.0 Results

No plastic strains are experienced in the baskets of either the upper or lower MCO. For the first case (MCOs with shield plug only) the maximum equivalent plastic strain is 2.1 %. This is below the calculated effective plastic failure strain of 39%. For the second case (MCOs with cover caps), the equivalent plastic strain is compared against the calculated effective failure strain for two points in time history. For time 0.02 seconds, the equivalent plastic strain is 2.1%. This is below the calculated effective failure strain of 11%. For time 0.023 seconds, the equivalent plastic strain is 2.9%. This is below the calculated effective failure strain of 48% (SNF-5328). The strains resulting from a passive stacked condition are much less than the effective yield strain of the MCO materials and are of no structural concern.

9.0 References

Lucas, D. R., 2000, Multi-Canister Overpack Design Report, HNF-SD-SNF-DR-003, Rev. 3, Fluor Hanford, Incorporated, Richland, Washington.

SNF-5328, Rev.0, 2000, Engineering Report Overhead Strike Analysis for the MCO, Fluor Hanford, Incorporated, Richland, Washington.