## Engineering Data Transmittal

**To:** (Receiving Organization)  
**From:** (Originating Organization)  
SNF Storage Projects

**Project/Program/Dept./Div.:**  
Spent Nuclear Fuel Project

**Design Authority/Design Agent/Cogn. Engr.:**  
K. E. Smith

**Originator Remarks:**  
For Release

**Receiver Remarks:**  
11A. Design Baseline Document? [ ] Yes [X] No

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<td>9/15/98</td>
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**DOE Approval:**

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- **Approved:** N/A
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**Signature of EDT Originator:**  
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(Signature)  
Date: 9/15/98

**Authorized Representative for Receiving Organization:**  
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(Date)  
9/15/98

**Design Authority/Cognizant Manager:**  
J. D. Cloud  
(Date)  
9/15/98

**DoD Approval:**

- **N/A**
- **No**
- **Yes**
- **Approved**
- **Approved w/comments**
- **Disapproved w/comments**
Multi-Canister Overpack Design Pressure Rating

K. E. Smith
DE&S Hanford, Inc., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

Abstract: The SNF project was directed to increase the MCO pressure rating by the U.S. Department of Energy, Richland Operations Office (RL) unless the action was shown to be cost prohibitive. This guidance was driven by RL's assessment that there was a need to improve margin and reduce risks associated with assumptions supporting the bounding pressure calculation for the MCO Sealing Strategy. Although more recent pressure analyses show a bounding MCO pressure of 50 psig, RL still considers it prudent to retain the pressure margin the 450 psig rating provides. This rating creates a real, clearly definable margin and significantly reduces the risk that the safety basis will be challenged.

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Issue Closure Package

Issue: MCO Design Pressure Rating

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MCO Implementation  
Manager, DE&S Hanford

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Nuclear Safety: Robert G. Morgan  
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DE&S Hanford  
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9/30/98

MCO Design Authority: L. H. Goldmann  
DE&S Hanford  
Signature  
9/15/98
Introduction

The MCO Sealing Strategy increased the MCO design pressure from 150 psig to 450 psig. The basis for selection of the 450 psig pressure rating is documented in Reference 1.

Discussion

The SNF project was directed to increase the MCO pressure rating by the U. S. Department of Energy, Richland Operations Office (RL) unless this action was shown to be cost prohibitive. This guidance was driven by RL’s assessment that there was a need to improve margin and reduce risks associated with assumptions supporting the bounding pressure calculation for the MCO Sealing Strategy. Review of the MCO design indicated that through minimal modifications the MCO pressure rating could be increased from 150 to 450 psig, which is within the strength of the MCO main body (0.5” wall). Subsequent refined calculations and fuel characterization have provided greater margin and confidence in the bounding pressure analysis. However, RL still considers it prudent to retain the pressure margin the 450 psig provides.

The initial bounding ($10^{-6}$ probability) pressure analysis for the MCO Sealing Strategy was provided in HNF-1523, Rev. O in November, 1997. This was a formally released and peer reviewed document. It calculated a bounding pressure of 133 psig based on limited characterization data and assumptions of fuel cleaning efficiencies, including 70% of aluminum hydroxide coatings. The proximity of this bounding pressure to the MCO pressure rating of 150 psig, and challenges to the analysis due to limited characterization data and bases for supporting assumptions prompted RL to request an increase in MCO pressure margin. Subsequent pressure calculations performed in HNF-SD-SNF-TI-040, Rev. 2 provide a refined model which better accounts for bound water behavior and does not require aluminum hydroxide coating cleaning. It calculates a bounding pressure of 50 psig. Characterization data supporting this analysis includes whole element drying tests, particulate and coating measurements, and uranium hydrate TGAs. This analysis demonstrates significant pressure margin for processing and storage of MCOs.

The original cost estimate to increase the MCO pressure rating was about $3M in MCO fabrication costs, mostly due to the addition of higher strength collar material. Subsequent refinements in the MCO pressure rating strategy resulted in a change back to the 150 psig rating for the mechanical closure only, while retaining the 450 psig rating once the cover cap is welded in place. This change permitted the return to a lower cost material for the collar (304L/304
stainless steel). Refer to HNF-3267 for a discussion of the dual pressure rating approach.

Conclusion

The SNF Project endorses the higher MCO pressure rating and continues to retain the 450 psig pressure rating requirement on the final welded MCO with concurrence from RL. This rating creates a real, clearly definable margin and significantly reduces the risk that the safety basis will be challenged. It also reduces the necessity for pressure monitoring of the MCOs during interim storage.

Reference

1. Interoffice Correspondence, J.R. Frederickson to J.D. Cloud, MCO 450 PSIG Pressure Rating Basis, JFR-98-016, dated July 28, 1998
# DISTRIBUTION COVERSHEET

Subject: MCO ISSUE PAPERS PER ATTACHED DISTRIBUTION INDEX

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The Multi-Canister Overpack Issue papers listed below are being distributed as a package to facilitate future reference and use by SNF Project personnel. The following issue papers are attached:

1. HNF-2876, Oxygen Gettering Issue Closure Package
2. HNF-3265, MCO Number of Shield Plug Ports
3. HNF-3399, MCO Necessity of the Rupture Disk
4. HNF-3267, MCO Dual Pressure Rating
5. HNF-3293, MCO Ultrasonic Examination of Closure Weld
6. HNF-3354, MCO Monitoring Issue Closure Package and HNF-3312, MCO Monitoring Activity Description
7. HNF-3292, MCO Sealing Configuration
8. HNF-3266, MCO Design Pressure Rating
9. HNF-3255, ASME Code Requirements for MCO Design and Fabrication
10. HNF-3398, MCO Inservice Inspection and Maintenance
11. HNF-3420, MCO Internal HEPA Filters
12. HNF-3036, Low Reactive Surface Area Issue Closure Package
13. HNF-3270, MCO Pressure Testing