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ENGINEERING DATA TRANSMITTAL

Page 1 of 1
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(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Trans- mittal	Originator Dispo- sition	Receiver Dispo- sition
1	HNF-3399		0	Multi-Canister Overpack Necessity of the Rupture Disk	S	1	1	1

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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	4. Review	1. Approved	4. Reviewed no/comment		
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		3. Information	6. Dist. (Receipt Acknow. Required)	3. Disapproved w/comment	6. Receipt acknowledged		

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Design Authority L. H. Goldman	<i>[Signature]</i>	10/11/98	R3-86			SNF Project Files			R3-11
		Design Agent									
1	1	Cog.Eng. K. E. Smith	<i>[Signature]</i>	10/14/98	R3-86						
1	1	Cog. Mgr. J. D. Cloud	<i>[Signature]</i>	10-11-98	R3-86						
		QA									
1	1	Safety R. P. Omberg	<i>[Signature]</i>	10-11-98				DOE/RL KR			H2-53
		Env.									

18. Signature of EDT Originator <i>[Signature]</i> 10/14/98		19. Authorized Representative Date for Receiving Organization		20. Design Authority/Cognizant Manager <i>[Signature]</i> 10-11-98		21. DOE APPROVAL (if required) Ctrl. No. N/A ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments 10/29/98	
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Multi-Canister Overpack Necessity of the Rupture Disk

K. E. Smith

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Abstract: The Multi-Canister Overpack (MCO) rupture disk precludes the MCO from pressurization above the design limit during transport from the K Basins to the Cold Vacuum Drying (CVD) Facility and prior to connection of the CVD process piping. Removal of the rupture disk from the MCO design would: a) result in unacceptable dose consequences in the event a thermal runaway accident occurred; b) increase residual risk; and c) remove a degree of specificity from the dose calculations. The potential cost savings of removing the rupture disk from the MCO design is offset by the cost of design modifications, changes to hazard analyses and safety analyses, and changes to existing documentation. Retaining the rupture disk mitigates the consequences of MCO overpressurization, and considering the overall economic impacts to the SNF Project, is the most cost effective approach.

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Release Approval Date

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Issue Closure Package

Issue: MCO Necessity of the Rupture Disk

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MULTI-CANISTER OVERPACK

NECESSITY OF THE RUPTURE DISK

1.0 SUMMARY

Removal of the rupture disk from the design of the MCO was considered. From a safety perspective, the rupture disk performs two main functions.

- Mitigates consequences of MCO overpressurization and reduces residual risk
- Provides a specific accident initiation point for quantification of accident consequences in the Cold Vacuum Drying Facility (CVDF)

By retaining the rupture disk in the MCO design, perturbations to each of the above functions are avoided. Because pressurization of the MCO beyond the design pressure of the mechanical closure is a credible event prior to commencement of CVDF processing (e.g. operator fails to open vent path), retention of the rupture disk in the MCO design is necessary to preclude pressurization above the design limit. In addition, removing the rupture disk from the MCO design at this stage of the project would have adverse impacts on both cost and schedule.

2.0 STATEMENT OF THE ISSUE

With incorporation of the MCO Sealing Strategy, the rupture disk is no longer required after CVDF processing and during the forty year storage period. An evaluation of the need for the rupture disk up through completion of the CVDF processing is warranted.

3.0 BASIS FOR CLOSURE

The safety analysis group has considered the impacts of retaining or deleting the rupture disk from the MCO design. Removal of the rupture disk from the MCO design would: a) result in unacceptable dose consequences in the event a thermal runaway accident occurred; b) increase the residual risk; and c) remove a degree of specificity from the dose calculations. It has also been concluded that removal of the rupture disk does not in any way benefit the safety case. Removal of the rupture disk at this stage of the project would have a disruptive effect with respect to design changes to both the MCO and the CVDF process piping, modification of existing safety analysis, identification and

definition of specific MCO failure mechanisms, and revision of supporting documentation for the safety basis. Any cost savings that may be realized by removing the rupture disk from the MCO design would be offset by design modifications, changes to hazards analyses and safety analyses, and changes to existing documentation. Removal of the rupture disk offers no increased margin of safety and results in the need for additional analyses and design modifications. Based on the above considerations, the rupture disk should remain in the MCO design.

4.0 DISCUSSION

The present design of the MCO includes four (4) ports on the shield plug. Each port permits filtered or screened access to the interior of the MCO. A rupture disk is fitted as part of Port #4 and is set to actuate when pressure within the MCO reaches 150 psig.

Prior to and during CVDF processing, the most critical time from a safety perspective, the rupture disk is active. Following processing at the CVDF, the port containing the rupture disk is blanked off and is not available for any pressure relief.

Removal of the rupture disk would result in the MCO being without adequate pressure relief capability while at the K Basins, during transport to CVDF, and prior to connection of the process lines to the MCO at the CVDF. During transport and prior to connection to CVDF equipment, overpressurization of the MCO may result from failure to maintain a vent path. Though unlikely, this event is considered credible.

During processing at the CVDF, the MCO confinement boundary and structural integrity are protected by facility systems. The rupture disk provides a secondary relief path function to relieve pressure in a controlled manner in the event that an MCO would pressurize. The point at which pressure is relieved is important because it is directly proportional to the dose consequences. In addition to providing a quantifiable method for determining the unmitigated dose consequences, the rupture disk port also provides a pathway of sufficient relief capacity for the thermal runaway events. If the rupture disk is removed from the MCO design, the design of the CVDF process piping will need to be modified to establish a quantifiable point at which releases from the MCO begin. This purpose is currently served by the existing MCO rupture disk. Removal of the rupture disk will involve two design changes; one to remove the rupture disk from the MCO and one to modify the CVDF process piping to accomplish an equivalent function.

The rupture disk is installed as part of the process valve located in Port #4. In addition to providing overpressure protection, this process valve/rupture disk assembly acts as a backup process port for the cold vacuum drying process in the event Port #2 or the MCO internal filters become

inoperational, blinded, or blocked. Even if the rupture disk were not needed from a safety perspective, it is prudent to maintain the capability to process through Port #4 to address potential operating difficulties.

The potential cost savings to be realized from deletion of the rupture disk is approximately \$200 per MCO (\$80K for 400 MCOs). This savings would be offset by design modification costs to the MCO and CVDF subprojects, hardware costs to the CVDF, and significant costs to modify hazards analyses, safety analyses, and other project documentation. A rough order of magnitude estimate for these costs is \$200K to \$300K. Considering the overall economic impacts to the SNF Project, retaining the rupture disk is the most cost effective approach.

DISTRIBUTION COVERSHEET

Subject: MCO ISSUE PAPERS PER ATTACHED DISTRIBUTION INDEX

DISTRIBUTION

Name	Location	w/att
<u>Spent Nuclear Fuel Project</u>		
W. C. Alaconis	R3-86	X
G. D. Bazinet	S8-06	X
J. D. Cloud	R3-86	X
D. R. Duncan	R3-86	X
J. R. Frederickson	R3-86	X
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E. D. Sellers	S7-41	X
J. B. Sullivan	S7-41	X

DISTRIBUTION INDEX

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