JAN 17 1997 ENGINEERING DATA TRANSMITTAL

Page 1 of 1
1. EDT 620084

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15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
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1	HNF-SD-SNF-DRCR-001	A11	0	Final Design Review Summary Report	S,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	4. Review		1. Approved	4. Reviewed no/comment
	2. Release	5. Post-Review		2. Approved w/comment	5. Reviewed w/comment
	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		Design Authority	N/A			3	1	L. H. Goldmann	<i>[Signature]</i>	1-16-97 R3-86
		Design Agent	N/A			3	2	K. E. Ard	<i>[Signature]</i>	1-16-97 X3-85
1	2	Cog. Eng.	A. T. Kee	<i>[Signature]</i>	1/16/97 R3-86	3	2	S. Edwards	<i>[Signature]</i>	1-16-97 R3-11
1	2	Cog. Mgr.	R. W. Rasmussen	<i>[Signature]</i>	1/16/97 R3-86	3	2	J. J. Irwin	<i>[Signature]</i>	1-16-97 R3-86
1	2	QA	C. R. Hoover	<i>[Signature]</i>	1/16/97 G1-50	3		D. M. Chenault	<i>[Signature]</i>	1/16/97 R3-86
1	2	Safety	T. D. Merklings	<i>[Signature]</i>	1/16/97	3	2	G. D. Bazinet	<i>[Signature]</i>	1/16/97 B4-55
		Env.	N/A			3	1	C. A. Thompson	<i>[Signature]</i>	1-16-97 R3-85

18. Signature of EDT Originator <i>[Signature]</i> 1-17-97		19. Signature of Authorized Representative for Receiving Organization <i>[Signature]</i> 1-17-97		20. Signature of Design Authority/Cognizant Manager <i>[Signature]</i> 1-17-97		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
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SNF ~~and~~ 1/17/97

Final Design Review Summary Report for the TN-WHC Cask and Transportation System.

Andy Kee

Duke Engineering & Services, Inc.

P.O. Box 350, Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-96RL13200

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Key Words: Final Design and FDAR Comments for the TN-WHC Cask and Transportation System.

Abstract: This document represents comments generated from a review of Transnuclear's Final Design Package distributed on December 10, 1996 and a review of the Final Design Analysis Report meeting held on December 17 & 18, 1996.

The Final design describes design features and presents final analyses performed to fabricate and operate the system while meeting the Cask/Transportation Functions and Requirements, WHC-SD-SNF-FRD-011, Rev. 0 and specification WHC-S-0396, Rev. 1.

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Release Approval

Date

Approved for Public Release

Cask/Transportation Final Design Review

Table of Contents

Topic	Page #
Final Design Review Comments	1
Final Design Drawings referenced by review comments pp. 1-4	5
Final Design Review Checklist	22
Final Design Review Checklist Committee Comments	35
Final Design Review Comments	45
Final Design Review Participants	51

C/T Final Design Drawing Review

- 1) NAC Dwg 105, Sht 1:

Fittings on platform - Verify proper application of the railing fittings with the fittings manufacturer.

- 2) Dwg 3035-3, Sht 1:

Verify bolt material property is in compliance with ASME code.

- 3) Dwg 3035-3, Sht 2:

Weld inspection criteria is not identified on dwg - how is inspection criteria identified to fabricator?

- 4) Dwg 3035-3, General Comment:

Weld sizes in decimal format with tolerancing of $\pm .12$ per note 2 of sht 2. Suggest fractional dimensions or specify the weld size tolerances. Certain welds in the primary load path (see view E-E, Sht 4) are marginal and the specified tolerance allows for inadequate welds. Correct deficiency and resubmit.

- 5) Dwg 3035-3, Sht 2:

Item 5 3035-3. This feature is required to be .12" minimum to facilitate the water circulation function. The $\pm .12$ tolerance does not ensure this requirement is met. Correct dwg deficiency and resubmit.

- 6) Dwg 3035-3, Sht 2:

Detail D - The 45° angle on the transition from the 24.25 diameter dimension to the 25.50 diameter dimension is not specified on the drawing. Revise drawing to identify this feature.

- 7) Dwg 3035-3, Sht 4:

The material for items 9 and 10 are specified only as "304 SST". The minimum specified yield strength ranges from 25 to 30 ksi for 304 SST depending on grade. Specify the grade, or optional grades, to be used. Revise drawing and resubmit.

View E-E - Independent stress calculations identify weld stresses greater than 10 ksi for the .25" fillet weld joining items 9 and 10 to item 2. The maximum allowable stress for a 304 SST with a minimum yield of 30 ksi is 10 ksi. The weld design appears to be deficient.

There is no weld called out for the vertical joint and top joint between items 9 and 10. This appears to be a drafting error.

C/T Final Design Drawing Review

8) Dwg 3035-3, Sht 4:

Where does note 7 apply? Is this component specific or general? RT is not possible for several weld configurations identified.

9) Dwg 3035- 7, Sht 1:

View A-A - Per AISC code, the .25 groove weld effective throat allows for as low as 1/8" following surface grinding. What is the required effective throat and how is it controlled? Does the DAR analysis assume a full thickness joint?

10) Dwg 3035- 7, Sht 1:

See view "Side View" - should the weld symbol be "all-around" for the .5" fillet weld? If not, how is the .5x8.88x10.00 plate joined to the trailer frame?

11) Dwg 3035- 7, Sht 1:

Are the gussets placed on both sides of the trailer frame beam?

Are they welded to the beams and if so what are the weld call-outs?

The gussets are not shown in View A-A. The gussets need detailing in sufficient detail to facilitate fabrication. Revise the drawing and resubmit.

12) Dwg 3035-7, Sht 2;

View "Cask Tie Down..." - There is no material call-out for the nut.

How does welding effect the strength of the nut?

It appears to require a full nut, not a "lock nut". What are the structural requirements of the nut?

The weld symbol calls for both a tack weld and a .25 "all-around". Which is it?

13) Dwg 3035- 7, Sht 2:

The views are not consistent. In the "Cask Tie Down..." view, the "1.00" inch thick pad is not shown.

The detailing for welding and parts is insufficient to determine design and fabrication requirements.

In the "Cask Tie Down..." view, what parts are joined by the .62 groove weld?
In the "Hold Down..." view, how are the vertical plates welded to the "pad"?

C/T Final Design Drawing Review

- 14) Dwg 3035-7, Sht 2:

View "Clamp Detail" - The full penetration weld specified does not appear to be possible. Is the weld correctly specified? What is required?

- 15) Dwg 3035-7, Sht 2:

Section C-C - It is not clear what this section is detailing. This section, the Clamp Detail View, and the Cask Tie Down and Hold Down view are not consistent. Components are identified (ie, pad, shim, etc) but not detailed in the drawing or identified in a materials list. Correct the deficiency and resubmit.

- 16) Dwg 3035-7, Sht 2:

Section B-B - The bolts are specified as a high strength material and secured with a "lock nut". What are the structural requirements and material properties of the "lock nut"? Insufficient information is provided in the drawing to specify and purchase the nut. Correct the deficiency and resubmit.

- 17) Dwg 3035-7, Sht 3:

The "lock nut" call-out requires clarification. Hardened washers are required under either the nut or bolt head, depending on which item is rotated during installation. Correct the deficiency and resubmit.

- 18) Dwg 3035-7, Sht 3:

There is no material call-out for the "bottom plate". Correct the deficiency and resubmit.

- 19) Dwg 3035-7, Sht 3:

Is the "T" section joined to the bottom plate and, if so, how?

- 20) Dwg 3035-7, Sht 3:

Where are the washers used?

- 21) NAC Dwg 102, Sht 1:

Check the specified welds. The welds seem to be heavy and perhaps not physically possible (potential problems with getting the electrode in the joint).

- 22) NAC Dwg 102, Sht 2:

Check the welds. These welds seem large in relation to the joined materials.

- 23) NAC Dwg 103, Sht 1:

C/T Final Design Drawing Review

Are the seal tubes part of the seal or separate components? If separate components, include in the bill of material.

24) NAC Dwg 108, Sht 1:

The lateral restraints (to react the cask handling loads) need to be incorporated in the drawings. Revise and resubmit.

PARTS LIST

ITEM NO.	REV.	NOMENCLATURE	DESCRIPTION
1	-	CASK ASSEMBLY	
2	1	CASK BODY	SEE DWG. 3035-3 SECT. 2
3	1	LID	SEE DWG. 3035-3 SECT. 4
4	1	O-RING SEAL	PARKER 275 DIA. X SECT. X 31370. BUTYL # 8612 70 OR EQUIV.
5	12	LID BOLT	SA-178-400 NOT BOLTED OR EQUIV.
6		DELETED	
7		DELETED	
8	2	LID ALIGNMENT PIN	SA-193-68 OR EQUIV.
9	12	WASHER	150" DIA. FLAT, SST

NOTE 7

NOTE 7, NOTE 4 *

A

NOTES:

1. DELETED
2. DELETED
3. DELETED
4. * INDICATES NON SAFETY RELATED ITEM.
5. THIS PARTS LIST IS FOR SHEET 1 ONLY.

A

6. TORQUE REQUIREMENTS:
LID BOLTS: 300 FT. LBS. $\pm$ 10 FT. LBS.
VENT & DRAIN PORT COVER SCREWS:

15 FT. LBS. $\pm$ 3 FT. LBS.ALIGNMENT PINS: 40 FT. LBS. $\pm$ 5 FT. LBS.

7. LID BOLTS & ALIGNMENT PINS TO BE CHROMIUM PLATED (THREADS ONLY) PER QQ-C-320-B, CLASS 2, TYPE 1 (.0002" MIN. THK.) BOLT TO BE INSPECTED TO NB-2580 OF ASME B & PV CODE, SECTION II, INCLUDING VT (VISUAL EXAMINATION) & LP (LIQUID PENETRANT EXAMINATION), BEFORE PLATING.

8. LUBRICATE BOLTS WITH NEOLUBE AS NEEDED.

4	1/4"	SEE DCN 3035-14	ED	PS	PS	ED	GG
3	1/4"	SEE DCN 3035-11	JTG	PS	PS	ED	GG
2	1/4"	SEE DCN 3035-6	JTG	PS	PS	ED	GG
1	1/4"	SEE DCN 3035-1	JTG	PS	PS	ED	GG

NO. DATE REVISIONS DWN. CHKD. M.D. O/A. PROJ.

APPROVALS DATE

G.G. JTG

ED. JTG

O/A. JTG

PS. JTG

MECH. DES. JTG

PS. JTG

CHKD. BY JTG

J.T.G. JTG

DWN. BY JTG

TRANSNUCLEAR, INC.
HAWTHORNE, N.Y.TN-WHC CASK
TRANSPORTATION SYSTEM
ASSEMBLY & PARTS LIST
WHC DWG. NO. H-1-81535NONE B 3035-3 4
SCALE SIZE DWG. NO. REV.

SHEET 1 OF 5

LID ALIGNMENT PIN

TOLERANCE: $\pm$.03"
SURFACE FINISH: 125

LID BOLT

TOLERANCE: $\pm$.03"
SURFACE FINISH: 125

ITEM NO. 7

WHC SPECIFICATION NO. WHC-S-0396

WHC PURCHASE ORDER NO. MJK-SPX-452727

Glen Guerra

12/3/96

Rev C

These welds are much smaller than would be use with 2" to 3" material. Normally this would be a $\frac{3}{8}$ " single pass weld. This weld is critical and we need to make sure there is fusion between the metal parts.

PARTS LIST

ITEM NO.	QTY REQD	NOMENCLATURE	DESCRIPTION	MATERIAL
1	-	LD ASSEMBLY		
2	1	LD	SEE FIELD	SA-38-TPX OR RMVCE
3		DELETED		
4	1	PORT COVER	SEE DWG 3035-1 PAGE 5	304 SST
5	1	QDSC. COUPLING	HANSEN 1-HK-LLT-K-4	303 SST
6	1	COUPLING ADAPTER	SEE DWG 3035-1 PAGE 5	304 SST
7	2	O-RING (ADAPTER)	PARKER 3-904	BUHLER 1862-7 OR FLM
8	4	SOC HD CAP SCREW	SEE DWG 3035-1 PAGE 5	SA-38-SS OR FLM
9	2	GUSSET	SEE FIELD	304 SST
10	2	LIFTING BRACKET	SEE FIELD	304 SST
11	2	TRUNNION	SEE FIELD	304 SST
12	4	HELICOL THREADED INSERT	# 1185-8CN-0500	SST
13	1	PORT COVER O-RING	PARKER 2-341	BUHLER 1862-7 OR FLM

NOTES:

1. FOR CASK ASSEMBLY SEE DWG. 3035-3, SHEET 1
2. TOLERANCE, UNLESS OTHERWISE SPECIFIED:
2 PLACE DECIMALS: $\pm .12"$
3 PLACE DECIMALS: $\pm .010"$
ANGLES: $\pm 1^\circ$
3. REMOVE ALL BURRS & WELD SPLATTER AND
BREAK ALL SHARP EDGES.
4. SURFACE FINISH, UNLESS OTHERWISE SPECIFIED: 125
5. RADIUS TO BE SPECIFIED BY FABRICATOR.
6. DELETED
7. FABRICATOR HAS OPTION TO USE SA-240, TYPE
PLATE, WELDED TOGETHER, RT & PT REQUIRED.
8. * INDICATES NON SAFETY RELATED ITEM.
9. THIS PARTS LIST IS FOR SHEETS 4 AND 5 ONLY.
10. BOLTS TO BE CHROMIUM PLATED (THREADS ONLY
PER QQ-C-320-B, CLASS 2, TYPE 1 (00002" MIN
- △ 11. TOLERANCE THICKNESS PER PLATE MANUFACTURE
SPECIFICATION, DURING FABRICATION, LOCAL
IRREGULARITIES, ETC. PER TOLERANCE FROM

4	7/1/44	SEE DCN 3035-17	qtr	PS
3	7/8/44	SEE DCN 3035-14	J.T.G.	P.S.
2	9/5/44	SEE DCN 3035-9	J.T.G.	P.S.
1	8/6/44	SEE DCN 3035-4	J.T.G.	P.S.

NO. DATE		REVISONS		DWN. ICHD. M.D.		10/A PROJ.	
APPROVALS	DATE	TRANSCNUCLEAR, INC. HAWTHORNE, N.Y.					
G.G.	24 JUN 96						
PROJ.	24 JUN 96						
E.D.	24 JUN 96						
O/A	24 JUN 96	TN-WHC CASK TRANSPORTATION SYSTEM LID WHC DWG. NO. H-1-81535					
P.S.	24 JUN 96	NONE SCALE B 3/25-3 DWG. NO. 045, NO. 4 REVISIONS					
MECH. DES.	24 JUN 96						
P.S.	24 JUN 96						
CHD. BY	24 JUN 96						
J.T.G.	24 JUN 96						
DWN. BY	24 JUN 96						

SHEET 4 OF 5

11

SHEET 1 OF 3

REV	0	3035-7	NONE	SCALE	1/4" = 1'-0"	DATE	12/3/96	BY	PS	CHECKED	PS	DATE	12/3/96	APPROVED	PS	DATE	12/3/96	PROJECT	TN-WHC CASK TRANSPORTATION SYSTEM	WHC DWG. NO. H-1-81539	ITEM NUMBER	7	WHC SPECIFICATION NUMBER	WHC-S-0356	WHC PURCHASE ORDER NUMBER	WHC-SPX-452727
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Handwritten notes:
 I assume this is the weld that will be made on the inside of the lid. I will need to be on this all the time.
 10 we'll stick to the all around.

- NOTES:
1. FOR DETAILS SEE DWG. 3035-7, SHEETS 2 & 3.
 2. TOLERANCES, UNLESS OTHERWISE SPECIFIED, $\pm .001$.
 3. STEEL COMPONENTS SHALL BE PAINTED WITH AERON AMERCOAT 400 PRIMER, AERON AMERCOAT 450S FINISH COAT, RT-8304 WHITE.
 4. REMOVE ALL BURRS, BREAK ALL SHARP EDGES AND REMOVE WELD SPATTER FROM AREAS WHICH CASK WILL CONTACT AND INTERFERE WITH OPERATING OF THE TEDOWN SYSTEM.
 5. SURFACE FINISH UNLESS OTHERWISE SPECIFIED: 250.
 6. TRAILER MANUFACTURER TO INSTALL NEOPRENE AS REQUIRED TO MAINTAIN A MAXIMUM .12\" CAP AT FINAL FIT UP WITH CASK AS SHOWN, ADHESIVE PER MANUFACTURE RECOMMENDATION.
 7. NON-SAFETY RELATED.
 8. LUBRICATE BOLTS WITH NEOLUBE AS REQUIRED.
 9. TORQUE CLAMP BOLTS TO 200 FT. LBS.
 10. ALL MATERIAL PROPERTIES (INCLUDING NEOPRENE) USED FOR DESIGN OF THE TEDOWN SYSTEM SHOULD BE TAKEN AT 150°F.

SIDE VIEW

VIEW A-A

Handwritten note:
 As shown this would be a 1/2\"/>

NOTES:

1. FOR TIE DOWN SYSTEM ASSEMBLY SEE DWG. 3035-7, SHEET 1 FOR ADDITIONAL DETAILS SEE 3035-7, SHEET 2.
2. TOLERANCE, UNLESS OTHERWISE SPECIFIED:
2 PLACE DECIMALS (XX): $\pm .06$
3 PLACE DECIMALS (XXX): $\pm .010$
ANGLES: $\pm .2^\circ$
3. REMOVE ALL BURRS, BREAK ALL SHARP EDGES AND REMOVE WELD SPLATTER FROM AREAS WHICH CASK WILL CONTACT AND INTERFERE WITH OPERATING OF THE TIEDOWN SYSTEM.
4. SURFACE FINISH, UNLESS OTHERWISE SPECIFIED: 250/
5. WHEN TRAILER IS IN THE UNLOADED CONDITION, MATCH MARK HOLES FROM CLAMP, THEN WHEN TRAILER IS AT LOADED CONDITION (DURING LOAD TEST) MATCH MARK HOLES FROM CLAMP, THEN LOCATE AND DRILL HOLES AND WELD TUBES BETWEEN THE TWO SETS OF MATCH MARKS TO ASSURE PROPER BOLT ALIGNMENT.

NO.	DATE	REVISIONS	OWN/CHKD/M.D.	TO/APPROV.
1	12/1/96			
2	12/1/96			
3	12/1/96			
4	12/1/96			
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89	10.00			
90	10.00			
91	10.00			
92	10.00			
93	10.00			
94	10.00			
95	10.00			
96	10.00			
97	10.00			
98	10.00			
99	10.00			
100	10.00			

TN-WHC CASK
TRANSPORTATION SYSTEM
TIE DOWN SYSTEM DETAILS
WHC DWG. NO. H-1-81539

NONE B 3035-7 0
SCALE SIZE DWG. NO. REV.

SHEET 3 OF 3

Glenn Guerra
12/2/96

50.96025

B

A

PARTS LIST			
ITEM NO.	QTY	NOMENCLATURE	DESCRIPTION MATERIAL
1	-	CASK BODY ASSEMBLY	
2	1	CASK SHELL	SEE FIELD SA-1187E 154" OR EQUIV.
3	1	BOTTOM	SEE FIELD SA-1187E 154" OR EQUIV.
4	-	DELETED	
5	4	MCO STANDOFF	.12" THK X 2.00" DIA. SST
6	1	NAME PLATE	SEE DWG. 3035-4 SST
7	1	COVER	SEE DWG. 3035-3 304 SST
8	4	SOC HD CAP SCREW	SEE DWG. 3035-3 304 SST
9	1	O-RING	PARFET 2-341 B812-70 BUTYL
10	1	ODISC COUPLING	HANSEN UL6-HP-12 OR EQUIV. 303 SST
11	1	COUPLING ADAPTER	SEE DWG. 3035-3 304 SST
12	2	O-RING	PARFET 2-341 B812-70 BUTYL
13	12	THREADED INSERT	HELICOIL 1185-24CN-3000 SST
14	4	THREADED INSERT	HELICOIL 1185-24CN-3000 SST

NOTES:

1. FOR CASK ASSEMBLY SEE DWG. 3035-3, SHEET 1
2. TOLERANCE, UNLESS OTHERWISE SPECIFIED: +/-.12" ANGLES: +/-1°
3. NUMBER & LOCATION OF FULL PENETRATION WELDS TO BE SPECIFIED BY FABRICATOR, RT & PT REQUIRED.
4. REMOVE ALL BURRS & WELD SPLATTER AND BREAK ALL SHARP EDGES.
5. SURFACE FINISH, UNLESS OTHERWISE SPECIFIED: 125/
6. DELETED
7. * INDICATES NON SAFETY RELATED ITEM
8. THIS PARTS LIST IS FOR SHEETS 2 AND 3 ONLY.
9. BOLTS TO BE CHROMIUM PLATED (THREADS ONLY), PER QQ-C-320-B, CLASS 2, TYPE 1 (0.0002" MIN. THK)
10. LUBRICATE BOLTS WITH NEOLUBE AS NEEDED.
11. NAMEPLATE TO BE CENTERED ABOUT 0° AXIS.

4	1/16	SEE DCN 3035-15	9/10	PS	PS	ED	ED	G.G.
3	3/16	SEE DCN 3035-12	J.T.G.	PS	PS	ED	ED	G.G.
2	1/16	SEE DCN 3035-7	J.T.G.	PS	PS	ED	ED	G.G.
1	1/16	SEE DCN 3035-2	J.T.G.	PS	PS	ED	ED	G.G.
NO. DATE REVISIONS DWN. CHKD. M.D. 10/A PROL								
APPROVALS DATE								
PROJ. G.G. 21 JUNE 96								
ED. 21 JUNE 96								
O/A 21 JUNE 96								
PS 21 JUNE 96								
MECH. DES. 21 JUNE 96								
PS 21 JUNE 96								
CHKD. BY 21 JUNE 96								
J.T.G. 21 JUNE 96								
DWN. BY 21 JUNE 96								
NONE SCALE B SIZE 3035-3 4 REV.								
DWG. NO. 3035-3								
TN-WHC CASK TRANSPORTATION SYSTEM CASK BODY & PARTS LIST WHC DWG. NO. H-1-81535

Glenn Guerra
12/3/96

50.96025

S.O. 96025

B

A

DETAIL B

DETAIL C

TOP VIEW
① LID ASSEMBLY

VIEW E-E

SECTION A-A

⑪ TRUNNION

NOTE 8 *

NOTE 8 *

NOTE 8 *

NOTE 10

NOTE 11

NOTE 11

NOTE 11

NOTE 11

NOTES:

1. FOR CASK ASSEMBLY SEE DWG. 3035-3, SHEET 1

2. TOLERANCE, UNLESS OTHERWISE SPECIFIED:

2 PLACE DECIMALS: $\pm .12$ 3 PLACE DECIMALS: $\pm .010$ ANGLES: $\pm 1^\circ$

3. REMOVE ALL BURRS & WELD SPLATTER AND BREAK ALL SHARP EDGES.

4. SURFACE FINISH, UNLESS OTHERWISE SPECIFIED: 125/

5. RADIUS TO BE SPECIFIED BY FABRICATOR.

6. DELETED

7. FABRICATOR HAS OPTION TO USE SA-240, TYPE 304 PLATE, WELDED TOGETHER, RT & PT REQUIRED.

8. * INDICATES NON SAFETY RELATED ITEM.

9. THIS PARTS LIST IS FOR SHEETS 4 AND 5 ONLY.

10. BOLTS TO BE CHROMIUM PLATED (THREADS ONLY) PER QQ-C-320-B, CLASS 2, TYPE 1 (0.0002 MIN. THK.).

11. TOLERANCE THICKNESS PER PLATE MANUFACTURER SPECIFICATION, DURING FABRICATION, LOCALIZED SURFACE IRREGULARITIES, ETC. PER TOLERANCE FROM NOTE 2.

CONTROLLED COPY NO. 2

Authorized By *[Signature]* Date DEC 03 1998UNCONTROLLED COPY ☐

ITEM NO. 7

WHC SPECIFICATION NO. WHC-S-0396

WHC PURCHASE ORDER NO. MJK-SPX-452727

PARTS LIST

ITEM NO.	NO. OF QTY.	NOMENCLATURE	DESCRIPTION	MATERIAL
1	1	LID ASSEMBLY		
2	1	SEE FIELD		
3	1	DELETED		
4	1	PORT COVER	SEE DWG. 3035-3, SHEET 5	304 SST
5	1	ODISC. COUPLING	HANSEN 1-HK-LL1-K-4	303 SST
6	1	COUPLING ADAPTER	SEE DWG. 3035-3, SHEET 5	304 SST
7	2	O-RING (ADAPTER)	PARKER 3-904	BUTYL BR 70 OR EQUIV.
8	4	SOC HD CAP SCREW	SEE DWG. 3035-3, SHEET 5	SA-240 OR EQUIV.
9	2	GUSSET	SEE FIELD	304 SST
10	2	LIFTING BRACKET	SEE FIELD	304 SST
11	2	TRUNNION	SEE FIELD	304 SST
12	4	HEXCOL THREADED INSERT	# 1185-BCN-0500	SST
13	1	PORT COVER O-RING	PARKER 2-341	BUTYL BR 70 OR EQUIV.

TRANSNUCLEAR, INC.
HAWTHORNE, N.Y.

TN-WHC CASK
TRANSPORTATION SYSTEM
LID
WHC DWG. NO. H-1-81535

NO.	DATE	REVISIONS	BY	CHKD.	DATE
4	1/14/98	SEE DCN 3035-17	PS	PS	
3	1/14/98	SEE DCN 3035-14	JTG	PS	
2	1/14/98	SEE DCN 3035-9	JTG	PS	
1	1/14/98	SEE DCN 3035-4	JTG	PS	
APPROVALS					
PROJ.	G.G.	DATE	21 JUNE 98		
E.D.		DATE	21 JUNE 98		
O/A		DATE	21 JUNE 98		
P.S.		DATE	21 JUNE 98		
MECH. DES.		DATE	21 JUNE 98		
P.S.		DATE	21 JUNE 98		
CHKD. BY		DATE	21 JUNE 98		
DWN. BY	JTG	DATE	21 JUNE 98		
NONE	SCALE	B	SIZE	3035-3	4
				DWG. NO.	REV

SHEET 4 OF 5

Glenn Guerra
12/3/96

S.O. 96025

ANAC INTERNATIONAL			
K BASIN IMMERSION PAIL SEAL LID			
TN WHC TRANSPORT CASK, WHC DWG NO: H-1-81546			
PROJECT 457	DESIGN PACKAGE	DRAWING 103	REV 0
SCALE NOTED	CSF WT.	SH 2 OF 2	3/20/00

99 SEAL LID ASSEMBLY

PROJECT INFORMATION
WHC SPECIFICATION NO.: WHC-S-0396
ITEM 7
WHC P.O. NO.: MJK-SPX-452727
TRANSMUCLEAR, INC. PROJECT NO.: 3035

1. FABRICATE PER NAC SPECIFICATION 457-S-02.

NAC
INTERNATIONAL

K BASIN IMMERSION PAIL
SEAL LID
TN WHC TRANSPORT CASK,
WHC DWG NO: H-1-81546

SECTION B-B

ANAC INTERNATIONAL			
K BASIN IMMERSION PAIL SUPPORT STRUCTURE			
TN WHC TRANSPORT CASK			
WHC DWG NO: H-1-81545			
PROJECT 457	DESIGN PACKAGE	DRAWING 102	REV 0
SCALE 1/12	EST. WT.	IN 2 OF 2	3.00 11-10-98

PROJECT INFORMATION
 WNC SPECIFICATION NO. WNC-S-0396
 WNC P.O. NO. W-K-SPX-452727
 TRANSCULCAR, INC. PROJECT NO. 3035

ITEM	DESCRIPTION	QUANTITY	UNIT	REMARKS
1	1/2" DIA BAR	1	EA	
2	1/2" DIA BAR	1	EA	
3	1/2" DIA BAR	1	EA	
4	1/2" DIA BAR	1	EA	
5	1/2" DIA BAR	1	EA	
6	1/2" DIA BAR	1	EA	
7	1/2" DIA BAR	1	EA	
8	1/2" DIA BAR	1	EA	
9	1/2" DIA BAR	1	EA	
10	1/2" DIA BAR	1	EA	
11	1/2" DIA BAR	1	EA	
12	1/2" DIA BAR	1	EA	
13	1/2" DIA BAR	1	EA	
14	1/2" DIA BAR	1	EA	
15	1/2" DIA BAR	1	EA	
16	1/2" DIA BAR	1	EA	
17	1/2" DIA BAR	1	EA	
18	1/2" DIA BAR	1	EA	
19	1/2" DIA BAR	1	EA	
20	1/2" DIA BAR	1	EA	
21	1/2" DIA BAR	1	EA	
22	1/2" DIA BAR	1	EA	
23	1/2" DIA BAR	1	EA	
24	1/2" DIA BAR	1	EA	
25	1/2" DIA BAR	1	EA	
26	1/2" DIA BAR	1	EA	
27	1/2" DIA BAR	1	EA	
28	1/2" DIA BAR	1	EA	
29	1/2" DIA BAR	1	EA	
30	1/2" DIA BAR	1	EA	
31	1/2" DIA BAR	1	EA	
32	1/2" DIA BAR	1	EA	
33	1/2" DIA BAR	1	EA	
34	1/2" DIA BAR	1	EA	
35	1/2" DIA BAR	1	EA	
36	1/2" DIA BAR	1	EA	
37	1/2" DIA BAR	1	EA	
38	1/2" DIA BAR	1	EA	
39	1/2" DIA BAR	1	EA	
40	1/2" DIA BAR	1	EA	
41	1/2" DIA BAR	1	EA	
42	1/2" DIA BAR	1	EA	
43	1/2" DIA BAR	1	EA	
44	1/2" DIA BAR	1	EA	
45	1/2" DIA BAR	1	EA	
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47	1/2" DIA BAR	1	EA	
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49	1/2" DIA BAR	1	EA	
50	1/2" DIA BAR	1	EA	
51	1/2" DIA BAR	1	EA	
52	1/2" DIA BAR	1	EA	
53	1/2" DIA BAR	1	EA	
54	1/2" DIA BAR	1	EA	
55	1/2" DIA BAR	1	EA	
56	1/2" DIA BAR	1	EA	
57	1/2" DIA BAR	1	EA	
58	1/2" DIA BAR	1	EA	
59	1/2" DIA BAR	1	EA	
60	1/2" DIA BAR	1	EA	
61	1/2" DIA BAR	1	EA	
62	1/2" DIA BAR	1	EA	
63	1/2" DIA BAR	1	EA	
64	1/2" DIA BAR	1	EA	
65	1/2" DIA BAR	1	EA	
66	1/2" DIA BAR	1	EA	
67	1/2" DIA BAR	1	EA	
68	1/2" DIA BAR	1	EA	
69	1/2" DIA BAR	1	EA	
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71	1/2" DIA BAR	1	EA	
72	1/2" DIA BAR	1	EA	
73	1/2" DIA BAR	1	EA	
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80	1/2" DIA BAR	1	EA	
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82	1/2" DIA BAR	1	EA	
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84	1/2" DIA BAR	1	EA	
85	1/2" DIA BAR	1	EA	
86	1/2" DIA BAR	1	EA	
87	1/2" DIA BAR	1	EA	
88	1/2" DIA BAR	1	EA	
89	1/2" DIA BAR	1	EA	
90	1/2" DIA BAR	1	EA	
91	1/2" DIA BAR	1	EA	
92	1/2" DIA BAR	1	EA	
93	1/2" DIA BAR	1	EA	
94	1/2" DIA BAR	1	EA	
95	1/2" DIA BAR	1	EA	
96	1/2" DIA BAR	1	EA	
97	1/2" DIA BAR	1	EA	
98	1/2" DIA BAR	1	EA	
99	1/2" DIA BAR	1	EA	
100	1/2" DIA BAR	1	EA

8 7 6 5 4 3 2

HN-SS-SNT Rev D

99 WORK PLATFORM ASSEMBLY

MAC INTERNATIONAL		K BASIN TRANSPORT TRAILER WORK PLATFORM TN WHC TRANSPORT CASK WHC DWG H-1-81548	
PROJECT	457	DESIGN PACKAGE	105
SCALE	1/15	DATE	12078
		REV	2
		DATE	7/1/81

4410-200-001-0000-001
Rev D

97 SLING STORAGE BOX ASSY.

25 SLING BOX HANDLE
SCALE: 1/4

MAC INTERNATIONAL			
K BASIN IMMERSION PAIL, SUPPORT EQUIPMENT, TN WHC TRANSPORT CASK WHC DWG NO: H-1-81554			
PROJECT 457	DESIGN PACKAGE	DRAWING 1111	REV 0
SCALE 1/8	10" x 10"	10" x 10"	10" x 10"

④ BRACE

94 VENT HOSE
SCALE: 1/4

5 SUPPORT
SCALE: 1/4

[illegible]

99 WORK PLATFORM

95 WORK PLATFORM

98 RESERVOIR
SCALE: 1/4
WT: 45#

[illegible]

- NOTES CONTINUED ON PAGE 3

2. REMOVE ALL OIL AND GREASE FROM CARBON STEEL SURFACES PER SSPC-S-1. ABRASIVE BLAST PER SSPC-SP 10. PRIME WITH ONE COAT AMERCOAT NUMBER 64 PRIMER AND FINISH WITH TWO COATS WHITE AMERCOAT NUMBER 66 SEAL GLOSS TOPCOAT.
1. FABRICATE PER NAC SPECIFICATION 457-S-02.

NOTES

NAC INTERNATIONAL						K BASIN IMMERSION PAIL, SUPPORT EQUIPMENT. TN WHC TRANSPORT CASK WHC DWG NO: H-1-81554							
						PROJECT 457		DESIGN PACKAGE		DRAWING 111		REV D	
						SCALE 1/8"		EST. WT.		SH 1 OF 3		P 0	

REV	REVISION	BY	APPROVED BY	DATE
0	INITIAL ISSUE

PROJECT INFORMATION
 WHC SPECIFICATION NO.: WHC-S-0396
 ITEM 7
 WHC P.O. NO.: MJK-SPX-452727
 TRANSCNUCLEAR, INC. PROJECT NO.: 3035

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NAC INTERNATIONAL

K BASIN IMMERSION PAIL
 INTERFACE CONTROL DRAWING
 IN WHC TRANSPORT CASK,
 WHC DWG NO: H-1-81551

PROJECT 457 DESIGN PACKAGE 108 REV 6
 SCALE 1/12 EST. BY SH 1 OF 2

C/T Final Design Review Checklist

Cask/Transportation System
Design Review Checklist

This checklist is comprised of excerpts from the WHC-S-0396 performance specification for the K Basins MCO cask and transportation equipment. The referenced paragraph numbers are from the specification.

Paragraph 3.3.1

The cask and operations equipment meet the interface requirements of the loadout pit areas of the K Basins, located in buildings 105 K East and 105 K West (see Figures 4 and 7).

Paragraph 3.3.1.1

The cask exterior and interior surfaces shall be capable of decontamination to this [specified allowables table] limit over the casks useful life. The Seller shall provide a method and/or equipment to preclude contamination or decontaminate and verify that all surfaces are within acceptable limits

Paragraph 3.3.3.1

At the K Basins and the CSB, a dropped cask accident scenario during in-facility handling operation shall be addressed by the Seller's design. Under the dropped cask accident condition, the fuel assemblies shall remain in the MCO, the MCO shield plug shall remain in place, and the MCO shall remain in the cask.

Paragraph 3.3.3.3

The cask shall be equipped with features that permit circulation of heated water in the annulus between the cask and MCO. This feature is required to assist in the MCO draining/drying operation.

Paragraph 3.3.3.4

The cask interior shall be designed to allow the MCO to be freely inserted and removed under all normal conditions of transport and operations. MCO enveloping dimensions are provided in Figure 15.

C/T Final Design Review Checklist

Paragraph 3.4.1

The cask and transportation system, including the interface equipment, shall be capable of removal and delivery of all K Basin fuel to the CSB facility in the 200 East area within the allotted schedule.

Paragraph 3.4.2

The cask and transport system shall be designed and constructed in a manner reliable and capable of finishing the total fuel shipment (2,100 metric tons) within two years from the first shipment date.

Paragraph 3.5.1

The design features of the fuel casks shall be consistent with the ALARA requirements of ICRP Publication-37 and NCRP 91. Exposure of personnel to radiological and other hazardous materials associated with the loading, closure, tiedown, transfer, and off-loading of the package shall be minimized.

Paragraph 3.5.2

- The conveyance, fully loaded, shall have tiedown capability to withstand a design basis earthquake loads as identified in the document number SCS-W-96-1453 "CVD Trailer Seismic Restraints", Paragraph 1.5.2, Table "Strut Loads", dated August 2, 1996.
- The cask shall be designed to meet the acceptance criteria as delineated in Section 5.3.2 of the specification. The ASME B&PV Code, Section III, shall be used as a guideline for the design of transportation packages with HRCQ material and defined as Safety Class 1.
- The conveyance shall be a National Highway Traffic Safety Administration (NHTSA) registered trailer.

Paragraph 3.5.3

The Cask and Transport system shall be capable of performing its mission during the environmental conditions listed in Table 3 of WHC-S-0396.

C/T Final Design Review Checklist

Paragraph 3.5.5

The materials used in the cask, transporter, tie-downs, handling equipment, and any other ancillary equipment shall be such that no significant (ie. will not effect operations or safe use of components) chemical, galvanic, or other reaction shall occur between them. All materials shall be corrosion resistant in the environment in which they will be used.

Paragraph 3.5.7

- Component identification and critical information shall be indicated on the components by nameplates with a permanent marking method. Markings and identification shall be legible, visible, and where necessary include cautionary labels to protect equipment and personnel. Markings on routinely maintainable components shall be placed so that the components can be easily identifiable.
- Components to be handled by lifting equipment shall be marked to indicate the weight of the component and identify lifting points and handling orientation (e.g., "this side up").

Paragraph 3.5.8

- The cask and its constituent components shall be designed to minimize maintenance or testing requirements. Features requiring maintenance shall be designed in accordance with As Low As Reasonably Achievable (ALARA) principles.
- The cask, transport systems and any ancillary equipment shall be designed to use standard replacement parts to the extent possible. Any parts, materials or assemblies expected to degrade or wear during normal use or exposure shall be easily replaceable.
- Components shall be designed to be permanently lubricated to the maximum extent possible. If lubrication is required, the equipment shall be designed to allow lubrication through the use of fittings and without requiring the disassembly of any parts other than the simple removal of protective caps or booting.

C/T Final Design Review Checklist

Paragraph 3.5.9

It is desirable to transport all casks with the same conveyance system, therefore the cask and conveyance systems shall be interchangeable. The Seller shall indicate within the design media which assemblies and components are interchangeable based on maximum operational latitude and economical considerations.

Paragraph 3.5.10.1

All drawings and calculations shall be stamped by a currently registered Professional Engineer. Fully detailed, dimensioned and toleranced drawings shall be submitted to the Buyer prior to construction.

Paragraph 3.5.10.6.1.2

An assembly drawing shall be submitted at the formal design review. This drawing shall show the required positioning of the packaging and transport system in sufficient detail to determine handling, tiedown, assembly, and disassembly sequences, and shall identify all other components needed to load the packaging system, and transport the packaging system to the storage site.

Paragraph 5.1.1

The cask packaging system meets the interface requirements with the following systems:

- Transportation System Interface
- Lifting and Tie-down Interface
- MCO Interface
- K Basins Facility Interface
- K Basins Loading Interface
- CSB Load-out Interface

Paragraph 5.2.1.1

- All containment boundary penetrations shall be leakage rate testable. Closures shall be securely closed with a positive fastening devices that cannot be opened unintentionally. The cask payload cavity shall be provided with the capability to be filled and purged with inert gas.

C/T Final Design Review Checklist

Paragraph 5.2.2

- The dimensions for the internal cavity of the cask must be sufficient to accommodate the Multiple Canister Overpack(s).
- All minimum/maximum tolerance conditions as well as thermal conditions have been considered.

Paragraph 5.2.2.2

Maximum gross weight of the cask system shall consider operations at the K basins loadout facility, so that no single pick will exceed the crane capacity of 27,210 kg (60,000 lb).

Paragraph 5.2.2.4

The cask shall be outfitted with a drain port and high point vent that will permit removal of liquids from the cask cavity with or without a fully loaded MCO loaded into the cask. The drain port and high point vent shall be capable of being opened and closed using remote handling equipment.

Paragraph 5.2.2.6

- The cask shall be equipped with features that permit circulation of a minimum of 76 L/min (20 gpm), 50 °C (122 °F), water through the cask/MCO annulus.
- This feature shall provide a uniform water temperature flow around the MCO.
- The Seller shall provide double shut-off quick release interfaces to the inlet and outlet ports on the cask.
- The design shall include features that will retain the MCO in the cask for all normal and off-normal pressures in the annulus.

Paragraph 5.3.1.1

- All materials, including lead (if required for shielding purposes), shall be ASME/American Society of Testing and Materials (ASTM) certified materials.

C/T Final Design Review Checklist

- The materials shall be compatible with, or provide adequate resistance to the corrosive effects of materials (liquids, vapors, gases and solids) with which they will be in contact throughout their life cycle.
- The materials shall also be selected to minimize contamination adhesion and chemical-galvanic reactions between payload components and other cask materials.
- The structural containment bounding materials for the packaging shall comply with material requirements identified in NUREG/CR-3854, *Fabrication Criteria for Shipping Containers* (Fischer and Lai 1985). The materials of construction shall meet the fracture toughness requirements of Regulatory Guide 7.11 (NRC 1991a) or Regulatory Guide 7.12 (NRC 1991b), as applicable.
- There shall be an equivalent wall thickness (all wall materials) of at least 7.62-cm (3-in.) steel, based on providing puncture resistance.

Paragraph 5.3.1.2

- Fabrication criteria for a Category I packaging, as delineated in NUREG/CR-3854 (Fischer and Lai 1985) shall be followed.
- All welds shall be sufficiently smooth to enable easy decontamination.
- The design shall consider avoiding potential contamination traps to the greatest extent practicable.
- All containment welds shall be radiographed per ASME requirements.

Paragraph 5.3.1.4

- The lifting attachments for the cask shall be designed per ANSI N14.6 (non-critical lift) with a factor of safety of three to yield or five to ultimate, whichever is most restrictive.
- The lifting attachments shall be compatible with the cranes in the facility loadout areas.

Paragraph 5.3.1.5

- An engineered tiedown system shall be used to secure the packaging system to the transport vehicle(s).

C/T Final Design Review Checklist

- The tiedown system shall meet the requirements and be designed per the International Atomic Energy Agency Safety Series 37 (IAEA 1990).
- The tiedown attachments for those requirements shall be capable of resisting the forces for road, as described below.

Load Factors for Tiedown Systems

Mode	Longitudinal	Lateral	Vertical
Road	+ 2g	+/- 1g	3g down, 2g up

Paragraph 5.3.2.1

For conditions normally incident to transport, the DAR shall evaluate the packaging design for its ability to maintain containment and shielding for the following conditions:

Reduced External Pressure. An external pressure of 24.5 kPa (3.5 psi) absolute.

Increased External Pressure. An external pressure of 140 kPa (20 psi) absolute.

Internal Pressure. An internal working pressure of 1033 kPa (150 psig) unless otherwise specified.

Vibration. The casks shall be evaluated to confirm containment integrity when exposed to normal vibration due to the transportation from the 100 K West and East basins to the CSB in the 200 East Area by the selected transport vehicle. The shock and vibration design limits by truck/trailer are those stated in ANSI N14.23, *"Draft American National Standard - Design Basis for Resistance to Shock and Vibration of Radioactive Material Packages Greater Than One Ton in Truck Transport."*

Water Spray. The cask shall be evaluated to confirm containment integrity through a water spray that simulates exposure to rainfall of approximately 5 cm (2 in.) per hour for at least one hour.

C/T Final Design Review Checklist

Free Drop. The package shall be evaluated to demonstrate containment after to a 0.3-m (1-ft) free drop onto a horizontal, essentially unyielding surface in an orientation to cause maximum damage. During the free drop, the MCO shall not be exposed to greater than 100g's.

Penetration. Impact of the hemispherical end of a vertical steel cylinder of 3.2 cm (1.25 in.) diameter and 6.00 kg (13 lb) mass, dropped from a height of 1.00 m (40.00 in) onto the exposed surface of the package which is expected to be most vulnerable to puncture. The long axis of the cylinder must be perpendicular to the package surface.

Paragraph 5.3.2.2.1 Containment (Normal Conditions).

The cask shall be designed to maintain containment under normal conditions of transport. Containment is defined by maintaining a leakage rate not exceeding 1×10^{-7} scc/s, air.

Paragraph 5.3.2.1.2 Shielding (Normal Conditions).

- For normal conditions of transport as described in Section 5.3.2.1, the maximum surface dose on the accessible surface of the cask shall be less than or equal to 100 mrem/h (1 mSv/h).
- The dose rate 2 meters (6.5 ft) from the surface shall be less than or equal to 10 mrem/hr (0.10 mSv/h).
- The dose in any normally occupied space in the transfer vehicle shall be less than or equal to 2 mrem/hr (0.02 mSv/h).
- The shielding design shall take into consideration the limits on existing facility cranes and achieve dose limits as low as practicable.

Paragraph 5.3.2.2 Accident Conditions.

The cask system shall be designed so that during accident conditions the package maintains confinement of the MCO, as demonstrated by analysis and/or testing.

Paragraph 5.3.2.2.1

The cask system shall be designed so that during accident conditions (Section 5.3.2.2) the package maintains confinement of the MCO, as demonstrated by analysis and/or testing.

C/T Final Design Review Checklist

Paragraph 5.3.2.2.2

Subsequent to all credible or probable accident events as described in Section 5.3.2.2, the dose 1 m (3.3 ft) from the surface of the packaging system shall not exceed 1 rem/hr.

Paragraph 6.1.1.1

The conveyance system shall operate on the roads shown in Figure 1. The conveyance system shall interface with the K Basin loading bay and the CSB unloading facility shown in Figures 7 and 21.

Paragraph 6.1.1.2

The conveyance system shall be compatible with a typical tractor described as follows:

- King pin height 127-132 cm (50-52 inches, typical)
- King pin setting 46-61 mm (1.8-2.4 inches, typical) or industry equivalent to provide a swing clearance of 244 cm (96 in.).
- Axle Capacities: front axle - 5,900 kg (13,000 lb), Tandem Axles - 15,450 kg (34,000 lb)

The conveyance, with package installed, shall be capable of being detached from the tractor.

Paragraph 6.1.1.3

- The conveyance system shall easily accept the cask during loading and unloading, using existing overhead cranes and equipment at the Buyers facilities.
- A means of securing the cask to the conveyance system shall be provided by the Seller.

Paragraph 6.1.1.4

- The conveyance system must be compatible to the environmental conditions identified in Section 3.5.3. and Table 3.
- The conveyance system shall lend itself to decontamination processes.

C/T Final Design Review Checklist

Paragraph 6.2.1.1

Roadway system load limits are as follows:

Single Axle Weight	The total weight transmitted to the road by all wheels whose centers may be included between two parallel transverse vertical planes 1.0 m (40 in) apart, extending across the full width of the vehicle. The single weight limit on the roadway is 9,100 kg (20,000 lb).
Tandem Axle Weight	The total weight transmitted to the road by two or more consecutive axles whose centers may be included between parallel transverse vertical planes spaced more than 1.0 m (40 in) and not more than 2.4 m (96 in) apart, extending across the full width of the vehicle. The tandem axle weight limit on the roadway is 15,400 kg (34,000 lb). The minimum tire contact area shall comply with AASHTO HS 20-44 standard truck loading.

Paragraph 6.2.1.2

The design of the conveyance system shall account for the following G loadings. The G factor includes and adjusts for the effect of shock load in the stress calculations.

Transport: (trailer)
2.5 G down vertical
2.0 G up vertical
1.5 G lateral both directions
2.0 G fore
1.5 G Aft

Parked: (trailer)
1.5 G down vertical

Paragraph 6.2.1.3

The Conveyance System, with or without the cask system, shall be able to negotiate the proposed route(s) at speeds not in excess of 64 km/h (40 mph) for the roads see Figure 1 and Section 6.1.1.1.

C/T Final Design Review Checklist

Paragraph 6.2.1.4

- The trailer landing gear shall incorporate pads capable of accommodating a fully loaded conveyance system on soil or pavement. Allowable soil bearing pressure is 95.7 kPa (2000 lb_f/ft²).
- The landing gear shall be hydraulic, with sand pads capable of accommodating the fully loaded conveyance system weight.

Paragraph 6.2.2.1

- The conveyance system design shall provide for decontamination of all exposed surfaces. Any decking the system may incorporate shall be smooth without cracks or crevices. There shall be no blind or hidden corners or joints in areas potentially exposed to contamination that cannot be readily accessed from the top side by hand held spray devices. Any deck joints shall be cover or seal welded and where applicable shall be ground flush. Any use of deck sheeting shall allow expansion and contraction to account for thermal changes, so that deck buckling does not occur.
- Width of the tractor/trailer combination, without cask system, shall not exceed 3.96 m (13 ft). Height of the loaded system shall be limited to less than 6.15 m (20 ft - 2 in).

Paragraph 6.2.2.3.1

- All trailer structural components shall meet a 2:1 factor of safety, on typical yield strength, for the applied concentrated load consisting of the maximum payload plus ancillary equipment.
- Materials for all structural members, (e.g. main beams, cross beams, supports, bracing, suspension attachments, upper coupler, etc.) shall be selected in accordance with industry accepted procedures (e.g., ANSI/AWS D1.1, for steel, or ANSI/AWS D1.2 for aluminum).

Paragraph 6.2.2.3.2

- An engineered tiedown system shall be used to secure the packaging system to the conveyance. The tiedown system shall meet the requirements and be designed per the International Atomic Energy Agency Safety Series 37 (IAEA 1990). The tiedown attachments for those requirements shall be capable of resisting the load factors for tiedown systems noted as follows:

C/T Final Design Review Checklist

Transport	Longitudinal	Lateral	Vertical
Road	±2g	±1g	3g down, 2g up

- The suspension of the trailer must be capable of meeting the payload plus ancillary equipment and shall have readily available replacement parts for maintenance.
- The suspension shall be an air suspension system.
- The axles shall have a minimum capacity with oil seals, as determined by the Seller to meet payload requirements.
- The wheels shall be disc wheels, 10 hole. Paint wheels per the requirements of Protective Coatings section.
- The tires shall be radial type of adequate capacity for the GVWR of the trailer.

Paragraph 6.2.2.5

- The trailer lights shall conform to FMVSS-108 requirements.
- Connections shall be seven-way standard contact.
- Lamps shall be protected by dock bars and wiring protected with rock covers.
- All wiring shall be sealed in metal or plastic conduit.

Paragraph 6.2.2.6

- Trailer rear-end protection device height and width shall comply with DOT regulations (49 CFR Part 393.86).
- There shall be two (2) mud flaps, anti-sail, and spray guards at wheel areas.
- There shall be four (4) metal Highway Route Controlled Quantity placard frames designated and placed on the trailer per 49 CFR 172 Subpart F requirements.
- The brakes will be an air brake system. They shall be S cam, air

C/T Final Design Review Checklist

actuated brakes with 30 type air chambers which drive 15.2 cm (6 in.) automatic or self adjusting slacks. Air system and hoses shall meet current Federal Motor Vehicle Safety Standard (FMVSS) -121 and FMVSS-106.

- Glad-hands shall be centered on the front cross-member.

Paragraph 6.3.2

The conveyance system will be regularly cleaned with strong detergents and solvents that may be heated and applied with pressure washing systems. All exposed surfaces of the conveyance system and its control, hydraulic and electrical lines shall be protected or resistive to these washing methods.

Paragraph 7.3.1

The Seller shall determine the required testing of the components, subassemblies and systems, to verify compliance with the specification requirements. The Seller shall prepare test plans that define the extent of the test program, the objectives of the tests and the test evaluation criteria.

The verification matrix shall define how each requirement within the specification shall be verified. The matrix contains various categories of verification such as analysis, inspection, and test.

C/T Final Design Review Checklist
Design Review Committee Comments

Resolution of Cask/Transportation Final Design Review Checklist
as identified in WHC-S-0396, Rev. 1

The Final Design Package was reviewed against the Design Review Checklist (attached). The following is the design review team comment summary:

Paragraph 3.3.1

Comment: The design meets the K Basins interface requirements of basins interface requirements, including the upgrade modifications to the K Basins 30 ton trolley hoist.

Disposition: Design meets requirement - Closed

Paragraph 3.3.1.1

Comment: The pail immersion lid provides the required function.

Disposition: Design meets requirement - Closed

Paragraph 3.3.3.1

Comment: This requirement has been addressed with separate analyses. Well covered.

Disposition: Design meets requirement - Closed

Paragraph 3.3.3.3

Comment: The high vent, drain port, and stand offs at the bottom are identified on drawing H-1-81535 (same response for paragraphs 5.2.2.5 & 5.2.2.6). These features provide the water circulation function. Separate calculations (QMetrics) confirm that the design meets the requirement. The acceptance test activity will confirm the calculations.

Disposition: Design meets requirement - Confirm during acceptance testing.

Paragraph 3.3.3.4

Comment: The design meets the interface definitions established in ECN 63499.

Disposition: Design meets requirement - Closed

C/T Final Design Review Checklist
Design Review Committee Comments

Paragraph 3.4.1

Comment: Table A6.5-1 (page A6-9) in the DAR addresses this comment. Could move a cask through the building in a 24 hour period (almost two).

Disposition: Design meets requirement - Closed

Paragraph 3.4.2

Comment: Same response as paragraph 3.4.1 - supporting information is in Table A6.5-1.

Disposition: Design meets requirement - Closed

Paragraph 3.5.1

Comment: The design evolution, and overall final design, clearly reflects the substantial interest and commitment to the ALARA program. The overall design minimizes operator dose by precluding cask contamination, allowing the operators to quickly access and operate ports and closures, and by equipping the trailer with a fixed work platform for easy access to the cask lid.

Only one item has been identified as an ALARA concern. This is the drain port cover. The contact dose on the drain port cover is estimated to be approximately 200 mrem/hr. TN points out that the design is ALARA as there are only four fasteners required to secure the cover which can be quickly installed and removed. The design maintains operator exposures to well below that which is acceptable at commercial sites. However, remote handling features would allow the port cover to be installed and removed just as quickly while allowing the operator to stay in a low dose (approximately 2 mrem/hr) field.

This is a dose management issue that can be readily addressed with a design modification to the port cover and or cask (not a show stopper).

Disposition: Design, in general, meets requirement. DE&SH have developed prototype tooling for use in installing and removing the drain port cover. The design modification required to make the TN furnished port cover design interface with the handling tool will be transmitted to TN for incorporation in the TN-WHC design package. DE&SH & TN action, Open

C/T Final Design Review Checklist
Design Review Committee Comments

Paragraph 3.5.2

Comment: First bullet - Acceptable per section A.4 of the DAR.

Disposition: Design meets requirement - Closed

Comment: Second bullet - Acceptable - same as spec 5.3.2.1.

Disposition: Design meets requirement - Closed

Comment: Third bullet - The name for this requirement does not show up on the drawings. This is a standard requirement & TN will identify the nameplate the addendum to the Final Design Report.

Disposition: The design meets the requirement, TN will identify the trailer nameplate in the FDR addendum - Open, TN action

Paragraph 3.5.3

Comment: See comments and disposition on Specification paragraph 5.3.2.1

Paragraph 3.5.5

Comment: See comments and disposition on Specification paragraph 5.3.1.1

Paragraph 3.5.7

Comment: First bullet - The design information indicates that this requirement has been met for all components with the exception of the trailer.

Disposition: To be provided for the trailer in addendum to the Final Design Analysis Report. Open - TN action

Comment: Second bullet - Addressed in drawing 81434 and 81536.

Disposition: Design meets requirement, the trailer registration nameplate information will be provided in the FDR addendum - Open, TN action

Paragraph 3.5.8

Comment: Both the first and second bullet requirements are adequately addressed in the operations manual.

Third bullet - Addressed on drawings H-1-81539 and H-1-81545, and referenced in the operations manual.

Disposition: Design meets requirement - Closed

C/T Final Design Review Checklist
Design Review Committee Comments

Paragraph 3.5.9

Comment: TN confirmed that all components (cask body, cask lid, port covers, and trailer systems) are interchangeable. The design media has no match drill or match fit requirements, allowing compliance with this requirement.

Disposition: Design meets requirement - Closed

Paragraph 3.5.10.1

Comment: All drawings are stamped in accordance with the requirement.

Disposition: Design meets requirement - Closed

Paragraph 3.5.10.6.1.2

Comment: This requirement is adequately addressed on drawings 3035-2 and H-1-81534.

Paragraph 5.1.1

Comment: The design meets the intent of this requirement. It is noted that the weld requirement for the MCO, resulting from design changes to the MCO, has been deleted. Tom Danner of NAC suggested that the MCO surface finish, in the pail lid inflatable seal area, be identified as an interface control surface.

Disposition: Design meets requirement - Closed.

Paragraph 5.2.1.1

Comment: Both bullets - Okay per paragraph A2.1.1 of the DAR.

Disposition: Design meets requirement - Closed

Paragraph 5.2.2

Comment: First bullet - The cask drawing (H-1-81535) reflects the required interface control dimensions and tolerances.

Disposition: Design meets requirement - Closed

Comment: Second bullet - The cask design is sized to accommodate differential thermal expansion of the MCO. However, the analyses are not in the FDR.

Disposition: Design meets requirement - TN to furnish thermal effects analysis in addendum. Open, TN action

C/T Final Design Review Checklist
Design Review Committee Comments

Paragraph 5.2.2.2

Comment: The design meets the requirement as identified in Section A2.5.1 of the TN furnished DAR.

Disposition: Design meets requirement - Closed

Paragraph 5.2.2.4

Comment: The features are identified in drawing H-1-81535.

Disposition: Design meets requirement - Closed

Paragraph 5.2.2.6

Comment: All bullets are adequately addressed in the operations manual and drawing H-1-81535.

Disposition: Design meets requirement - Closed

Paragraph 5.3.1.1

Comment: First, second, and third bullets - adequately addressed in DAR Appendix 9.1 statement A2.2.

Disposition: Design meets requirement - Closed

Comment: Fourth bullet - adequately addressed in DAR Section A2.3 and A2.4.1.

Disposition: Design meets requirement - Closed

Comment: Fifth bullet - The design function and equipment structural analyses are adequately addressed (see page A9.2-2 of DAR).

Disposition: Design meets requirement - Closed

Paragraph 5.3.1.2

Comment: First bullet -Addressed on drawing H-1-81535.

Disposition: Design meets requirement - Closed

Comment: Second bullet - Addressed on drawing H-1-81535, note 4.

Disposition: Design meets requirement - Closed

Comment: Third bullet - Addressed on drawing H-1-81535.

Disposition: Design meets requirement - Closed

C/T Final Design Review Checklist
Design Review Committee Comments

Comment: Fourth bullet - Addressed on drawing H-1-81535, note 3.

Disposition: Design meets requirement - Closed

Paragraph 5.3.1.4

Comment: First bullet - Requirement met as identified in DAR paragraph A2.4.2.

Comment: Second bullet - The trunnion design is the interface requirement for the new trolley hoist. By default, the requirement is met.

Disposition: Design meets requirement - Closed

Paragraph 5.3.1.5

Comment: First bullet - Adequately addressed in DAR Section A4.2.

Disposition: Design meets requirement - Closed

Comment: Second and third bullets - Adequately addressed in Appendix B7.3 of the DAR.

Paragraph 5.3.2.1

Comment: All bullets - Adequately addressed in DAR Section B4.3.

Disposition: Design meets requirement - Closed

Paragraph 5.3.2.2.1

Comment: Independent review, documented the MCO cask Safety Analysis Report for Packaging (SARP), confirms compliance with this requirement.

Disposition: Design meets requirement - Closed

Paragraph 5.3.2.1.2

Comment: In general, both the DAR and independent review, documented the MCO cask Safety Analysis Report for Packaging (SARP), confirms compliance with this requirement. One exception is the cask drain port cover contact dose. Estimates for surface dose range from 167 mrem/hr (DAR, last paragraph page B3-7) to 310 mrem/hr (SARP).

C/T Final Design Review Checklist
Design Review Committee Comments

Disposition: The only identified design deficiency is at the drain port cover contact dose. It is not at all clear that the design can be modified to reduce the contact dose to 100 mrem/hr at this location without eliminating the requirement for quick disconnect fittings at the drain port. This is really a dose management (ALARA) issue that can be readily resolved through use of long reach tools for operation of this component. In addition, the access area to the drain port must be identified as a high dose area. This will be addressed by, after receipt at the Hanford site, installing a chain and placard. The chain will be installed along the outside edge of the trailer (on the drain port side only).

Closure of Paragraph 3.5.1 closes this requirement review.

Paragraph 5.3.2.2

Comment: The DAR and independent SARP confirm compliance with this requirement with the exception of the cask lid bolt material temperature dependent properties.

Disposition: Design meets requirement with exception of providing references on the cask lid bolt temperature dependent structural material properties (Table B4.2-1).

Open - TN to provide the ASME related references for the materials property data in the addendum to the DAR.

Paragraph 5.3.2.2.1

Comment: This requirement is satisfied as identified in Section B4.4 of the DAR and independent review as documented in the SARP.

Disposition: Design meets requirement - Closed

Paragraph 5.3.2.2.2

Comment: The shielding is unaltered by the hypothetical accident conditions. The summary tables in Section B3 of the DAR (Table B3.4-1 and Table B3.4-2 are sufficient to satisfy compliance with this requirement. Independent review in the SARP confirms the shielding results.

Disposition: Design meets requirement - Closed

C/T Final Design Review Checklist
Design Review Committee Comments

Paragraph 6.1.1.1

Comment: The transportation system meets the dimensional envelope required in the performance specification. The trailer is in full compliance with Section 6.2 of the performance specification. This constitutes compliance with this requirement.

Disposition: Design meets requirement - Closed

Paragraph 6.1.1.2

Comment: First and second bullet - Addressed on drawing H-1-81555.

Disposition: Design meets requirement - Closed

Comment: Third bullet - The trailer axle capacities meet the requirements of the specification.

Disposition: Design meets requirement - Closed

Paragraph 6.1.1.3

Comment: First bullet - The dimensioning and tolerancing of the cask and trailer allow this requirement to be met. The requirement will be demonstrated with fit-up test. To be provided in the Facility Acceptance Test Plan.

Disposition: Design meets requirement - Comment remains open until completion of the fit-up test. Open, TN action

Comment: Second bullet - Addressed on drawing H-1-81356.

Disposition: Design meets requirement - Closed

Paragraph 6.1.1.4

Comment: First bullet - Okay per appendix A of the DAR.

Disposition: Design meets requirement - Closed

Comment: Second bullet - In general, the design meets the requirement. Two areas need attention; 1) Drain holes in king pin area are required and 2) Some type of radioactive-compatible caulking is required in cask cup area.

Disposition: There are two open action items identified in the comment. TN to address in the FDR addendum. Open, TN action

C/T Final Design Review Checklist
Design Review Committee Comments

Paragraph 6.2.1.2

Comment: Compliance with this requirement is satisfied in Section A.4 of the DAR.

Disposition: Design meets requirement - Closed

Paragraph 6.2.1.3

Comment: All components are designed speeds in excess of 45 mph.
Will be addressed in factory acceptance test plan.

Disposition: Design meets requirement - Closed

Paragraph 6.2.1.4

Comment: Addressed in DAR A4.1 and drawing H-1-81355.

Disposition: Design meets requirement - Closed

Paragraph 6.2.2.1

Comment: First bullet - Same response as 6.1.1.4.

Disposition: Design meets requirement - Closed

Comment: Second bullet - Addressed on drawing H-1-81555.

Disposition: Design meets requirement - Closed

Paragraph 6.2.2.3.1

Comment: First bullet - section A4 of DAR. Need clarification of peak stresses in the addendum. second bullet - drawing H-1-81555, DAR A2.3.3

Paragraph 6.2.2.3.2

Comment: First bullet - Same response as 5.3.1.5.

Disposition: Design meets requirement - Closed

Comment: All other bullets - Addressed on drawing H-1-81555.

Disposition: Design meets requirement - Closed

Paragraph 6.2.2.5

Comment: First bullet - Addressed on drawing H-1-81555.

Disposition: Design meets requirement - Closed

Comment: Second bullet - Addressed in the operations manual.

C/T Final Design Review Checklist
Design Review Committee Comments

Disposition: Design meets requirement - Closed

Comment: Third bullet - Forward lamps protected by wide flange, a couple of rubber bumpers will be added to the trailer for the aft lights. Closed

Disposition: Design meets requirement - Closed

Comment: Fourth bullet - Addressed in operations manual.

Disposition: Design meets requirement - Closed

Paragraph 6.2.2.6

Comment: First and second bullets - Addressed on drawing H-1-81555.

Disposition: Design meets requirement - Closed

Comment: Third bullet - The drawing does show the placement of the placards. However, this is not a design issue.

Disposition: Design meets requirement - Closed

Comment: Fourth and fifth bullets - Addressed on drawing H-1-81555. Glad hand will be positioned for convenience with the building supply air system on the side.

Disposition: Design meets requirement - Closed

Paragraph 6.3.2

Comment: Lines are sealed in plastic per specification requirement.

Disposition: Design meets requirement - Closed

Paragraph 7.3.1

Comment: First bullet - To be provided in the facility acceptance test plan (piece-meal submittal).

Disposition: This is an acceptance test activity, not a design requirement - Closed

Comment: Second bullet - To be provided.

Disposition: The verification matrix is an open item - Open, TN action

**GROUP REVIEW COMMENTS FOR
TN-WHC CASK & TRANSPORTATION SYSTEM
01/07/97**

DISCIPLINE	NAME	SECTION/ PAGE	COMMENTS
Comment 1 Technical Manuals	T. Jochen	Overall	Suggest the following be added to O&M Data: 1. Operating instructions for CSB operations (K Basin Procedure Only). 2. Safety precautions and instructions seem inadequate. 3. Emergency operations or abnormal operations. 4. Corrective maintenance items seem lacking. 5. Training Requirements.
Comment 2 "	J. Zatarack	Overall	1. 3035-3 Lid Bolts (Item 5) - No cycle limits specified, replacement or inspection may be required. 2. Safety precautions need to be added to specific maintenance & operation steps. 3. Lifting limits should be specified for normal operations at the K Basin and at the SNF CSB.
Comment 3 Mechanical	D. Saenz	H-1-81535 Sh. 4	On view E-E the 1/4" weld on the 2" plates looks small for supporting the weight of the cask. Should be checked.
Comment 4 "	J. Strickler	H-1-81535 Dwg. 3035-3, Rev. 4, Sh. 2	A large chamfer of 1/2" X 1" deep at the top of the cask body to aid the insertion of a MCO into the cavity would be helpful.
Comment 5 "	"	H-1-81535 Dwg. 3035-3, Rev. 4, Sh. 4	The welding of the 2" plates supporting the lifting lugs appear inadequate.

CSB Review Comments
C/T Final Design

Response

CSB Review Comments
C/T Final Design

Comment 1:

The information identified will be developed and identified in facility specific operations manuals and procedures. This activity is planned and budgeted for organizations other than the C/T contractor.

No action required.

Comment 2:

The service life of the bolts is adequate for the duration of the K Basins fuel removal campaign. Each cask is used approximately 40 times and the specified bolt preload is low (300 lb-ft) considering the lid bolt size. Each bolt is inspected for abnormal wear at each lid removal/installation operation. No action required for this comment.

Safety precautions will be included in the facility specific procedures. There is sufficient information in the vendor supplied information to develop the procedures and handling precautions. No action required for this comment.

Lifting limits are specified in the C/T performance specification, and for the new K Basins trolley. Lifting and handling procedures/limits will be included in Hanford site documents. No action required to address this comment.

Comment 3:

The final design drawings included a significant change from previously submitted drawings. The Item 10 to Item 2 weld (TN Dwg 3035-3, Sht 4) was changed from a full penetration weld to a 1/4" fillet weld. This was done to limit distortion in the weldment. Independent calculations show a negative margin of safety for the 1/4" weld. This comment is addressed in the drawing review comments. Satisfactory disposition of the design drawing comment closes this comment. Open - TN action.

Comment 4:

The MCO is nominally 24" in diameter with a large radius on the bottom and the Cask opening has a 25.5" diameter. Loading an empty MCO into the cask is a cold operation and operators can easily guide the MCO into the cask. The design appears to be adequate to facilitate the MCO loading operation - no action required.

Comment 5:

Same as Comment 3 - no action required.

FDR Comments/Questions

Design Review Comments/Questions
December 17, 1996

1. To ensure that there are no voids in the cask, what tests will you be doing? Helium leakage rate test. UT as volumetric inspection of the forging itself to verify material integrity. Required by ASME code, subsection NB. This is what's being done to validate material integrity. Closed
2. What is the maximum lift load of the crane when lifting cask/pail? Addressed in Design Analysis Report pages A9.2-19-21. Pail slings need to be deleted from Table 5.3.5. Correct numbers are in paragraph A2.5.3. Closed
3. The weld between the gusset and lid is 1/4 inch. Normally this would require a 5/16 single pass weld. Typically you would not put that small of a weld on that thick of material because it sucks the heat out. TN will take a look and make sure the lid weld is within requirements. Have developed a special weld procedure for this weld. Weld procedures will be transmitted to DESH. Closed
4. Where in the Design Analysis Report is the thermal expansion report? Will let you know. In the addendum - will be provided by TN. Open - TN action
5. How is Mike going to get load to apply to testing? Distributed loads around the flange. How will you verify. Normally we do a calculation from bolt distance to lifting attachments. Four bolts have been proven to be adequate. If you overload the bolts from testing, how are you going to recover? Will be in factory test plan. Open - TN action
6. Advanced copy of UT reports and CMTRs for forgings from PCC need to be transmitted to Andy (Jack Jones). Open

Note: Per conversation (Dave Dawson/Andy Kee), the inspection reports will be available at PCC for review/copy. Advanced copies are not required. Closed

7. 3035-7 sheet 2 of 3 (81539) - What is locking nut material? Safety related, need to be more specific. TN to clarify component material and whether it is weldable. Open - TN action
8. Same sheet - Weld symbol is not correct. Leonard to review weld callouts and red-line a drawing that will be sent to TN as record copy for comment resolution. Open - DE&SH action to provide comments, TN action to resolve comments

FDR Comments/Questions

9. How do we perform load test with the tiedown in place? Looks like if we do at PCC shop, we can only do with 20 ton (versus 30 ton). How do we get the extra weight into it? Will there be a first trailer available for checkout earlier than the scheduled delivery date. Nelson Manufacturing is working the issue. Potential deflection problem. Who has ownership of weight issue (loading of cask - adding payload to the cask)? Load test is with PCC. Need mockup MCO. A lot of operations need a mockup MCO. Shouldn't we get Lou to make one? Off line discussion with Dave on how we get to there from here.

How do we load and fit-up test the full cask/trailer system? Part of factory acceptance test plan. Open - TN action

10. John Irwin and Andy to come up with new lid concept for CVD facility - works for CSB as it exists now. The name of this component is misleading. Satisfies requirement for which it was intended (CSB). Closed
11. What is the immersion pail seal operating pressure range? George to check on maximum. Looking for control setting? What is the control setting on seal? Open - TN action
12. What is the pressure inside the immersion pail to maintain contamination free environment. Head of 4 to 8 feet - head pressure of about 4 psi will be maintained. Closed
13. Some of the uses of the handrail components in the design of the structure are different than the manufacturer assumed. The base of hand rail which is assembled using a frictional clamp should be validated for the 200 lb lateral OSHA loading to verify that the manufacturer will accept in that configuration (TN action). Open - TN action
14. Lateral restraints between rail and support structure - have they gone away? When we went to leveling with screw jacks they were taken out, but replaced with lug at lock plates. Are they anchor bolted in? Will go through this at installation. Concept sketch will be provided to DESH for review and comment. Open - TN action
15. [In reference to the installation and structural design of the support structure.] Is it reasonable to weld a bar to the structure [to the adjustment nut on the bottom plate jack screw] rather than having to fish around for it. How do we get down there to get a hold of the bolts of the pail structure. Can't just leave on the jack screws? Very close to giving you 3000 psi bearing stress (right now 2600). The bottom plate has not been evaluated and structurally defined/designed to carry the load of the cask. Could be increased in size to 2-inch plate. Enabling assumption for

FDR Comments/Questions

getting the support structure in the basin was to grout under the base plate of the support structure. TN requires grouting design information by 3/1/97. Open - DE&SH action

16. Will it make any difference if you install this structure or MCO loading structure first? Is there a sequence to follow? Don't know for sure, but think MCO structure should be installed first. Bill needs to look at this. Open - DE&SH action
17. Do you leave the crane hooked up while you torque the lid bolts? Nothing requiring you to take the crane away. Closed
18. Design Analysis Report states that instrument quality air for inflatable seals is required (page C-13, "compressed air of instrument quality is required") - air coming from the old system won't be instrument quality. NAC to clarify what instrument quality means. Will contact vendor for qualification of air to be used with the seals. Open - TN action
19. Water addition operations for immersion pail was reviewed. There are no design issues. Closed
20. How do we get the cask/MCO annular space filled with water? Pail lid and top of cask - what is the flow rate? There is a nominal 3/8" clearance between bottom of pail lid and the top of cask. Water flows through that gap. Closed
21. DESH action to verify there is no damage to trailer by rail wheel chocks. Open - DE&SH action
22. DESH to verify the MCO mating surface for the inflatable seal is adequate. Open - DE&SH action

SARP

23. DESH action to develop a qualified process to verify containment at assembly. Open - DE&SH action
24. Need to reconcile bolt material. If its clear that we are going to hot rolled condition, we can evaluate using that. Need to generate properties for the bolt. Room temperature properties. Have concern about higher temperatures. TN will provide strength and material at various temperature properties. RFSH will revise SARP analysis to include XM19 material. Open - TN action
25. Chromium plated bolts - have had problems in the past. End up with non-standard threads. TN uses them on all their casks. Haven't had any problems. How would TN accomodate the chrome

FDR Comments/Questions

plaste build-up? Haven't run across problems. As long as they meet standard requirements - there is no problem. Precision Components is aware of the problem and will address.
~~Open - TN action~~

Note: As discussed in the review, PCC is experienced with the fabrication and plating process. TN is obligated to provide the components per the design drawing requirements. Closed

26. Qualification testing (leakage rate) on the MCO too or just the cask? SARP covers cask only. Get a qualified procedure/process and training program. Have to qualify MCO - need to check leakage rate of MCO before leaves CVD. DESH to resolve this issue. Open - DE&SH action
27. SARP requirement for 24 hours use a fire hose? Where are you going to get a fire hose in K Basins (filtered water). Pumper truck full of water. SARP doesn't specify. Don't need water at the basins (in the facilities)'. Would recover by putting cask back into the basin. Can revise it to say chill. RFSH will revise the SARP to clarify cooling requirements. Open - DE&SH action

Cask/Transportation Final Design Review Attendance List.

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Project Title/Work Order		EDT No. 620084
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Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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Loftis, CB	S7-41	X			
Williams, NH	R3-11				X
Hudson, FG	R3-11				X
Rasmussen, RW	R3-86	X			
Kee, AT	R3-86	X			
Chenault, DM	R3-86	X			
Field, JG	G1-11	X			
Hoover, CR	G1-50				X
Mathews, JD	R3-85				X
Merkling, TD	R3-09				X
Edwards, WS	G1-12				X
Ard, KE	X3-85				X
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SNF Project Files	R3-11	X			