APR 29 1997

20) ENGINEERING DATA TRANSMITTAL

Page 1 of 2
1. EDT 621078

2. To: (Receiving Organization) Packaging Engineering		3. From: (Originating Organization) Packaging Engineering		4. Related EDT No.: 621077	
5. Proj./Prog./Dept./Div.: 03E00		6. Design Authority/ Design Agent/Cog. Engr.: J. S. Boettger		7. Purchase Order No.: N/A	
8. Originator Remarks: This safety evaluation for packaging is being submitted for approval and release.				9. Equip./Component No.: N/A	
				10. System/Bldg./Facility: N/A	
11. Receiver Remarks: 11A. Design Baseline Document? ☐ Yes ☒ 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	HNF-SD-TP-SEP-064	N/A	0	Safety Evaluation for Packaging (Onsite) Product Removal Can Containers		SQ	1,2	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	JG Field	4/25/97	H1-15	1	/	RJ Smith	4/25/97	4/25/97	H1-15
1	/	Design Agent	JS Boettger	4/25/97	H1-15						
1	/	Cog.Eng.	JS Boettger	4-25-97	H1-15						
1	/	Cog. Mgr.	JG Field	4/25/97	H1-15						
1	/	QA	CR Hoover	4/25/97	H1-15						
1	/	Safety	EJ Krejci	4/29/97	B1-19						
1		DF Baker			T5-56						

18. J. S. Boettger Signature of EDT Originator		19. Authorized Representative Date for Receiving Organization		20. J. S. Boettger Design Authority/Originator Manager Date		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
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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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1	/	Design Authority	JG Field	4/25/97	H1-15	1	/	RJ Smith	4/25/97	H1-15	
1	/	Design Agent	JS Boettger	4/25/97	H1-15						
1	/	Cog. Eng.	JS Boettger	4/25/97	H1-15						
1	/	Cog. Mgr.	JG Field	4/25/97	H1-15						
1	/	QA CR	Hoover	4/26/97	H1-15						
1	/	Safety	Ep Krcjci	4/29/97	H1-19						
1	/	DF	Baker	4/29/97	75-56						

18. J. S. Boettger Signature of EDT Originator Date: 4-25-97		19. Authorized Representative Date for Receiving Organization		20. J. S. Boettger Design Authority/Charismatic Manager Date: 4/25/97		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
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Safety Evaluation for Packaging (Onsite) Product Removal Can Containers

J. S. Boettger

Rust Federal Services Inc. Northwest Operations, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 621078

UC: 513

Org Code: 03E00

Charge Code: KP526

B&R Code: EW7050000

Total Pages: 9

Key Words: transport, PR Can, PUREX, Plutonium Finishing Plant

Abstract: This safety evaluation for packaging allows the transport of nine Product Removal (PR) Cans with their Containers from the PUREX Facility to the Plutonium Finishing Plant.

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J. S. Boettger
Release Approval

4-29-97
Date

Release Stamp

Approved for Public Release

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LIST OF TERMS

Ci	curie
cm	centimeter
dpm/cm ²	disintegrations per minute per square centimeter
ft·lb	foot-pound
in.	inch
kg	kilogram
km	kilometer
lb	pound
mi	mile
N·m	newton meter
PR	Product Removal
PUREX	Plutonium-Uranium Extraction (Facility)
SARP	Safety Analysis Report for Packaging
wt%	weight percent

SAFETY EVALUATION FOR PACKAGING (ONSITE) PRODUCT REMOVAL CAN CONTAINERS

1.0 GENERAL INFORMATION

1.1 BACKGROUND

Nine Product Removal (PR) Cans and Containers are located within the Plutonium-Uranium Extraction (PUREX) Facility. Each can is expected to contain a maximum of 3 g of residual radioactive material, consisting mainly of plutonium isotopes.

The PR Can Containers were previously authorized by Safety Analysis Report for Packaging (SARP) SD-RE-SAP-070 (Nelson-Jensen 1986) for the interarea transport of up to 10 g of plutonium. The SARP was canceled in 1993 because no further use for the container was foreseen.

1.2 PURPOSE

The purpose of this safety evaluation for packaging is to allow the transport of nine PR Cans with their Containers from the PUREX Facility to the Plutonium Finishing Plant.

2.0 PACKAGING DESCRIPTION

The PR Can Package is defined as the PR Can inside the PR Can Container.

2.1 EMERGENCY PR CAN PACKAGE

The Emergency PR Can, Drawing H-2-58129, is constructed of 6-in. Schedule 80S stainless steel pipe 68.6 cm (27.0 in.) in length. The can is identified by numbers stamped directly under the lifting lug. Identification numbers begin with the number E301 and continue consecutively through E605.

The Emergency PR Can Container, Drawing H-2-58130, is 58.4 cm (23.0 in.) in diameter and 105 cm (41.5 in.) high. A more detailed description of the package is contained in the safety analysis report for packaging (Nelson-Jensen 1986).

2.2 STANDARD PR CAN PACKAGE

The Standard PR Can, Drawing H-2-52967, is constructed of 6-in. Schedule 80S stainless steel pipe that is 52.1 cm (20.5 in.) in length. The can is marked by identification numbers 1.27 cm (0.50 in.) high stamped on the lifting trunnion.

The Standard PR Can Container, Drawing H-2-52984, is constructed of 0.64-cm (0.25-in.) carbon steel, 55.9 cm (22.0 in.) in diameter and 81.3 cm (32.0 in.) in height. The container is identified by numbers 2.54 cm (1.00 in.) wide and 15.2 cm (6.00 in.) high on the side of the container and on the lid of the container. A more detailed description of the package is contained in the SARP (Nelson-Jensen 1986).

2.3 MARK IV AND MARK V PR CAN PACKAGE

The Mark IV PR Can, Drawing H-2-26417, is constructed of 6-in. Schedule 40S pipe stainless steel and is 80.0 cm (31.5 in.) in overall length. The Mark V PR Can is identical except for being constructed of Schedule 80S pipe. When in transport, the PR Can is placed in the PR Container that is 58.4 cm (23.0 in.) in diameter and 105 cm (41.5 in.) in height. The Mark IV and Mark V PR Cans are stamped with numbers 0.64 cm (0.25 in.) high on the end of the lifting trunnions. Mark IV identification numbers begin with 701. Mark V identification numbers begin with 901. A more detailed description of the package is contained in the SARP (Nelson-Jensen 1986).

3.0 CONTENTS

Each PR Can contains no more than 3 g of radioactive material. The maximum source term, assuming 12% ^{241}Pu , is shown in Table 3-1.

Table 3-1. Maximum Source Term.

Isotope	Wt%	Total activity (Ci)
^{238}Pu	0.1090%	5.6 E-02
^{239}Pu	85.3100%	1.6 E-01
^{240}Pu	12.0650%	8.3 E-02
^{241}Pu	2.2200%	6.7 E+00
^{242}Pu	0.3035%	3.6 E-05
^{241}Am	0.1407%	1.4 E-02
Total	--	7.0 E+00

The effective A_2 value for this mixture of radionuclides is 0.0848 Ci, the total activity is 7.0 Ci. Therefore, the contents are Type B, fissile excepted.

4.0 BASIS OF SAFETY

The safety of this shipment is based on the following.

1. The PR Can Container was previously evaluated and authorized for interarea shipments of up to 10 g of plutonium. This safety evaluation for packaging will only authorize 3 g of plutonium.
2. The interarea shipment will be one time, for a distance of approximately 16.1 km (10.0 mi).
3. Operating controls of Section 5.0, based on the original SARP (Nelson-Jensen 1986), will provide an additional level of safety.
4. This safety evaluation for packaging will be canceled after the shipment or one year after release, whichever comes first.

5.0 OPERATING REQUIREMENTS

1. Ensure all applicable instructions and procedures for onsite shipment of radioactive material comply with WHC-CM-2-14, *Hazardous Material Packaging and Shipping*.
2. The external surface of the PR Cans and PR Containers shall be inspected for structural defects or evidence of leakage before moving.
3. The residual material in the PR Can Packages shall not exceed 3 g of plutonium.
4. Emergency and Standard PR Cans shall be fitted with the modified lid, Drawing H-2-95644, and torqued to 44.3 ± 3.70 N·m (60.0 ± 5.00 ft·lb).
5. A #14 snug-fitting, rubber stopper, Drawings H-2-26417, H-2-95644, and H-2-95926, shall be placed on the Emergency, Mark IV, and Mark V PR Can lid hex head bolts prior to shipping.
6. Mark IV and Mark V PR Can lid bolts shall be tightened snug with a hand-held wrench while ensuring all components come into proper contact. When the components are snug, an additional 1/2 turn (1/3 minimum to 2/3 maximum) shall be applied.
7. A gasket shall be in place on all PR Container lids.
8. Emergency, Mark IV, and Mark V PR Container lids shall be tapped with a mallet while torquing the bolt to 29.5 ± 3.00 N·m (40.0 ± 4.00 ft·lb). Lever type closure rings shall not be used.

9. The outside of the PR Can Packages shall be surveyed prior to shipment. The outside of the PR Container shall have less than 2.2 dpm/cm² alpha and less than 22 dpm/cm² beta-gamma smearable contamination.
10. Radiation dose rates at the surface of the package shall not exceed background levels.
11. The outer container must be sealed with a security seal, which is not readily breakable and, while intact, would be evidence that the package has not been opened by unauthorized persons.
12. The allowable gross vehicle weight limit shall not be exceeded.
13. The PR Can Packages shall be secured on the transport vehicle in accordance with Figure 5-1. The PR Can Packages shall be transported in a closed transport vehicle.
14. No more than 12 PR Can Packages, of which 3 can be Standard, shall be shipped on a truck at one time.
15. Standard PR Can Packages are to be shipped in the front row only (row nearest the cab of the truck) with any combination of PR Can Packages behind, in rows of three.
16. Each row of three containers is to be tightly strapped to the side of the truck. Two straps per row are to be used, with each strap having a minimum manufacturer's rated capacity of 1134 kg (2500 lb).
17. One Ancra¹ bar shall be placed over each row, except for the Standard PR Can Package row, which shall have two Ancra bars placed across it. Ancra bars shall be within 7.62 cm (3.00 in.) of the top of the containers.
18. Two Ancra bars shall be installed behind the container array, as close as possible to the rear row.
19. The route to be traveled shall be free of driving hazards, such as road repair or construction activities, that would endanger the safe transport of the shipment.
20. One operator is required to ride in the transport vehicle with the driver.
21. The speed of the transport vehicle shall be in compliance with the posted speed limits.
22. In an accident situation, one of the first recovery steps shall be to upright the container if necessary.

¹Ancra is a trademark of Ancra International LLC.

Figure 5-1. Tiedown System.

For above example: 7 ANCHOR Bars and 8 straps are required.

6.0 REFERENCES

Nelson-Jensen, K., 1986, SD-RE-SAP-070, Rev. 2, *Safety Analysis Report for Packaging, Interarea Transport of Unloaded PR Cans and Containers*, SD-RE-SAP-070, Rev. 2, Rockwell Hanford Company, Richland, Washington (canceled 1993, Rev. 3, Westinghouse Hanford Company, Richland, Washington).

WHC-CM-2-14, *Hazardous Material Packaging and Shipping*, Westinghouse Hanford Company, Richland, Washington.

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Packaging Engineering	Date Apr. 29, 1997
Project Title/Work Order		EDT No. 621078
Safety Evaluation for Packaging (Onsite) Product Removal Can Containers (HNF-SD-TP-SEP-064, Rev. 0)		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
D. F. Baker	T5-56	X			
J. S. Boettger	H1-15	X			
J. G. Field	H1-15	X			
C. R. Hoover	H1-15	X			
E. J. Krecji	B1-19	X			
R. J. Smith	H1-15	X			
Central Files	A3-88	X			
HNF-SD-TP-SEP-064 File	H1-15	X			