

ENGINEERING CHANGE NOTICE

Page 1 of 5

1. ECN 710038

Proj.
ECN

2. ECN Category (mark one)

- Supplemental ☐
 Direct Revision ☒
 Change ECN ☐
 Temporary ☐
 Standby ☐
 Supersedure ☐
 Cancel/Void ☐

3. Originator's Name, Organization, MSIN, and Telephone No.

E.P. BONADIE, VAULT OPS, T5-55
373-2545

4. USQ Required?

☒ Yes ☐ No

5. Date

7/12/00

6. Project Title/No./Work Order No.

NUCLEAR MATERIALS
STABILIZATION

7. Bldg./Sys./Fao. No.

234-52/74/2Z

8. Approval Designator

SQ

9. Document Numbers Changed by this ECN (includes sheet no. and rev.)

HNF-5460, rev. 1

10. Related ECN No(s).

11. Related PO No.

N/A

12a. Modification Work

- ☐ Yes (fill out Blk. 12b)
☒ No (NA Blks. 12b, 12c, 12d)

12b. Work Package No.

N/A

12c. Modification Work Completed

N/A

Design Authority/Cog. Engineer Signature & Date

12d. Restored to Original Condition (Temp. or Standby ECNs only)

N/A

Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? ☒ Yes ☐ No

Added Item #10 Nuclear Material Container (NMC-5); Added Item #11 NMC-8
 Added Item #12 Nuclear Material Container Over Pack-5 quart (NMCOP-5)
 Added Item #13 NMCOP-8
 The document title is being adjusted to encompass all containers

14a. Justification (mark one)

- Criteria Change ☐
 Design Improvement ☒
 Environmental ☐
 Facility Deactivation ☐
 As-Found ☐
 Facilitate Const. ☐
 Const. Error/Omission ☐
 Design Error/Omission ☐

14b. Justification Details

This container type provides a more robust and filtered method/tool for handling items bulged with pressures in the area of 20+ psig, or with a potential to vent.

15. Distribution (include name, MSIN, and no. of copies)

E.P. BONADIE T5-55
 R.E. GREGORY T5-08
 D.R. GROTH T4-15
 B.D. SKEELS T5-09
 R.W. SZEMPRUCH T5-55
 R.G. WILBANKS T5-08
 S.E. NUNN T5-11
 Central Files BI-07

RELEASE STAMP

AUG 22 2000
 DATE
 STA: 5
 HANFORD
 RELEASE
 ID: 12

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710038

[illegible]

**UNREVIEWED SAFETY QUESTION (USQ)
SCREENING AND EVALUATION**

1. Identification Number: HNF-5460, Rev. 2	USQ SCREENING	Page 1 of 3
2. Title: PFP VAULT OPERATIONS CONTAINERS FOR PLUTONIUM HANDLING AND STORAGE CRITICAL CHARACTERISTICS		

INSTRUCTIONS: Respond to each question and provide justification for each response. A restatement of the question does not constitute a satisfactory justification or basis. An adequate justification provides sufficient explanation such that an independent reviewer could reach the same conclusion based on the information provided [DOE 5480.21, 10.e.1].

DESCRIPTION: This screening addresses the critical characteristics for food industry type cans and containers used for handling and storage of special nuclear materials at the Plutonium Finishing Plant (PFP). HNF-5460, Revision 0 specified a minimum tin plate of 0.50 lb./base box. Since the food pack cans currently used and that have been tested have a listed tin plate of 0.20 lbs. per base box, Revision 1 reduced the tin plate to ≥ 0.20 lb./base box (i.e., No. 20 tinned commercial steel or heavier).

This revision lists Critical Characteristics for two (2) large filtered containers, and associated shielding over-packs. These new containers are called "Nuclear Material Containers" (NMCs). They are supplied in various sizes, which can be nested, one inside another. The PFP will use NMCs with volumes up to 8-quarts as needed to over-pack largely bulged containers.

INTRODUCTION: Decades of operational experience in storing plutonium at the PFP (References 1 and 2) have demonstrated the acceptability of the use of food industry tin plated steel cans for plutonium storage. While precautions are taken to prevent bulging during the process and storage of plutonium-bearing material, containers can bulge and in the worst cases, even breach. For mitigation of the largely bulged container, a HEPA filtered/vented steel container over-pack is desired. This screening addresses the use of the vented over-pack container for transport of largely bulged food pack containers (or those containers with a potential for release of contamination) to a glovebox.

AFFECTED SSC:

This screening affects Systems 74 and 73T, and containers for the handling of certain bulged items during retrieval from room storage and subsequent transport to a glovebox.

AUTHORIZATION BASIS:

The authorization basis reviewed included those listed in FSP-PFP-5-8, section 2.23, Appendix A. These are:

HNF-SD-CP-SAR-021 Revision 1
WHC-SD-CP-OSR-010, Revision 0-N

CONCLUSION:

The additions to this list of critical characteristics have no detrimental effect on the descriptions and parameters related to handling plutonium-bearing materials in the authorization basis. Because no parameters or sequences exceed the limits described in the authorization bases, no accident or abnormal conditions are affected. The addition of a HEPA filtered over-pack does not require an evaluation.

**UNREVIEWED SAFETY QUESTION (USQ)
SCREENING AND EVALUATION**

1. Identification Number: HNF-5460, Rev. 2	USQ SCREENING	Page 2 of 3
2. Title: PFP VAULT OPERATIONS CONTAINERS FOR PLUTONIUM HANDLING AND STORAGE CRITICAL CHARACTERISTICS		

REFERENCES:

1. RHO-HS-SA-59P, *The Effectiveness of Corrective Actions Taken to Preclude Events Involving Tin Cans and Plutonium*, R. W. Szempruch, May 1984.
2. WHC-SD-CD-TRP-068, Rev 0, *Plutonium Inventory Characterization Report 2*, G. R. Wittman and E. P. Bonadie, September, 1996.
3. HNF-SD-CP-SAR-021 Revision 2, *Plutonium Finishing Plant Final Safety Analysis Report*
4. HNF-3533 Revision 0, *CSER 98-010 Criticality Safety Evaluation Report for Transportation of Bulged/Damaged cans in NMC-8 Threaded Containers*

QUESTIONS

1. Does the proposed change or occurrence represent a change to the facility or procedures as described in the Authorization Basis?

☐ N/A ☒ No ☐ Yes/Maybe

BASIS: This change does not represent a change to the facility, as described in HNF-SD-CP-SAR-021, Rev. 2, Section 5.2, "Process and Support Building", specifically 5.2.8, "2736-Z Support/Storage Complex". This revision does not represent any change to procedures described in Sections 6.2.5.2., "Repackaging" or 6.2.9.1.2 "Criticality Safety Evaluations", or Section 6.3.3, "Mechanical Systems" which describes the required inspections and characteristics of the stored material and equipment used to contain it. Section 6.3.3.1. "Functional Description" states "Specifications for food pack cans require that the can and lid be commercially available, double-seam can of steel construction". Procedure ZO-200-033 requires that a pressurized or suspect can, when discovered in vault storage, be over-packed and transported to a glovebox for repackaging. The Nuclear Material Container (NMC) adds a strong walled, filtered/shielded alternative for over-packing.

2. Does the proposed change or occurrence represent conditions that have not been analyzed in the Authorization Basis?

☐ N/A ☒ No ☐ Yes/Maybe

BASIS: These changes do not represent conditions that need new analysis in HNF-SD-CP-SAR-021. No new analyses are required because of this change. Results of the performance tests and full accident analyses of the double sealed food industry container can be found in Drop Tests and Leak Tests performed at the PFP over the past two decades. Spills from radioisotope-bearing powder containers are addressed in chapter 9 of HNF-SD-CP-SAR-021, Rev.1, specifically chapter 9.1.3, "Radioisotope-Bearing Powder Spills" and 9.1.4, "Radioisotope-Bearing Pressurized Powder Containers". Paragraph "Rupture of Container in Storage Vault, page 9-291 As the NMCs will be used to contain fissile material a criticality evaluation has been performed. Reference 4 addresses the Criticality Safety associated with the use of NMCs.

**UNREVIEWED SAFETY QUESTION (USQ)
SCREENING AND EVALUATION**

1. Identification Number: HNF-5460, Rev. 2	USQ SCREENING	Page 3 of 3
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No changes are proposed that impact analyses performed in the safety basis or require new analyses.

3. Does the proposed change represent a test or experiment NOT described in the Authorization Basis that may affect the safe operation of the facility?

☒ N/A ☐ No ☐ Yes/Maybe

BASIS: Changes to the list of critical characteristics is neither a test nor an experiment.

4. Does the proposed change or occurrence represent a change to the Technical Safety Requirements or a reduction in the margin of safety defined in the Technical Safety Requirements?

☒ N/A ☐ No ☐ Yes/Maybe

BASIS: No Technical Safety Requirements (TSR) are affected by these critical characteristics or by the use of the containers listed, nor are any new TSRs needed. There are no safety limits defined in the PFP Operational Safety Requirements (OSRs/TSRs). Therefore, no defined margin of safety exists and changes to this list can have no effect on the non-existent "margin".

USQE #1 **Errol P. Bonadie**

(Print Name)

USQE #2 **R. W. Szempruch**

(Print Name)


Signature

Date: **8/10/00**


Signature

Date: **8/10/00**

If there is a YES/MAYBE response to questions 1, 2, 3, or 4, then a USQ Evaluation must be completed.

The following guidance should be considered when completing this screening. This guidance should not be considered all-inclusive; additional factors may need to be considered depending on the nature of the proposed change.

Does the proposed change:

- 1) Modify, add, or delete a safety class function of a structure, system or component stated in the authorization basis?
- 2) Alter the design of a structure, system or component as described in the authorization basis?
- 3) Modify, add, or delete the description of operation, operating environment, or analyses of any system or component described in the authorization basis?
- 4) Modify, add, delete or conflict with any of the design bases stated in the authorization basis?
- 5) Conflict with the principle or general design criteria stated in the authorization basis?
- 6) Modify, add, or delete any plant design features described in the authorization basis?
- 7) Modify, add, or delete a flow diagram or facility drawing provided in the authorization basis?
- 8) Create the potential for new system or component interactions (e.g., seismic, electrical breaker coordination)?

PFP VAULT OPERATIONS CONTAINERS FOR PLUTONIUM HANDLING AND STORAGE CRITICAL CHARACTERISTICS

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

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

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Date: _____

PFP VAULT OPERATIONS CONTAINERS FOR PLUTONIUM HANDLING AND STORAGE CRITICAL CHARACTERISTICS

Document Type: DC

Division: NMS

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Assistant Secretary for Environmental Management

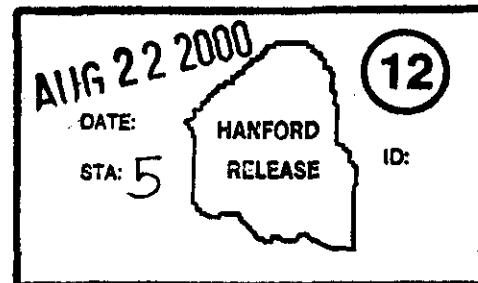
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Release Approval

8/21/00
Date



Release Stamp

HNF-5460
Revision 2

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KEYWORDS

PFP, Plate Weight, Tin Plate, Commercial Steel, Food Pack Can, Nuclear Material Containers, NMC-8, NMC-5, NMCOP5, NMCOP8, Hanford Convenience Container (HCC), Filter, Critical Characteristics

ABSTRACT

This document defines the critical characteristics of containers procured for use in PFP's Vault Operations.

1.0 PURPOSE

This document specifies the critical characteristics for containers procured for PFP's Vault Operations system as required by HNF-PRO-268 and HNF-PRO-1819. These are the minimum specifications that the equipment must meet in order to perform its safety function.

2.0 BACKGROUND

PFP's Product Handling and Storage System includes primarily storage containers of the type used in the food industry. These include slip-lid, open top for crimp sealing and various other containers. There are numerous container configurations utilized at the PFP that involve the nesting of several containers, one inside another. Each container in a particular configuration provides one or more safety related functions but typically no two cans provide the same functions. For example, some cans are required to be hermetically sealed while others are not.

Decades of operational experience in storing plutonium at the PFP (References D and E) have demonstrated the acceptability of the use of food industry tin plated steel cans for plutonium storage. Operational requirements for storage of plutonium are controlled by OSD-Z-184-00013. Containers used for plutonium handling and storage are designated Safety Significant in HNF-SD-CP-SAR-021. This Critical Characteristics Document provides a means to document detailed characteristics of food pack containers used at the PFP which previously were specified in individual purchase orders and specifications. The characteristics contained herein are intended to capture documented and undocumented operational experiences, container pressure and drop test results, physical constraints (e.g. storage position size), container monitoring methods, and safety related (e.g. Criticality Prevention Limits on size) requirements of cans used at the PFP. Reference D addresses can pressurization, while references F and G, describe results of container drop tests. Federal Specification PPP-C-96E, Cans, Metal, 28 Gage and Lighter is used by agencies of the U.S. Government for the procurement of such cans. Typically, commercial suppliers of food pack cans easily meet the requirements of PPP-C-96E. The Federal Specification is a good source of information to gain an understanding of some of the terminology used within this document.

Some containers in storage may develop pressures above 15 psig. In this state the food pack can will exhibit a bulge well above the height of its seam seal. For the transfer of these dangerously bulged cans from storage to a glovebox, a filtered vented container has been recommended for use as a substitute for the plastic bucket Isolated transportation Container (ITC). These filtered containers are designated as a Nuclear Material Container (NMC), followed by its volume in quarts. For example, the 5-quart NMC can be correctly designated as: NMC-5, NMC-05 or NMC5. These NMCs are designed by Nuclear Filter Technology Incorporated (on Evaluated Supplier List), and can be supplied with removable shielding or Nuclear Material Container Over-Pack (NMCOP).

The procurement requirements associated with containers include inspection characteristics to be defined by the Design Authority, in accordance with HNF-PRO-268, "Control of Purchased Items and Services." This document defines those characteristics.

3.0 SCOPE

The following list of critical characteristics details specifications for the container configurations currently specified in OSD-Z-184-00013 used for plutonium handling and storage. Material (i.e., metal and electrolytic tin plate thickness) used in the manufacture of the cans should be documented in the vendor catalog or in a letter or Certificate of Conformance provided by the manufacturer of the materials actually used. The other listed characteristics can be measured at FDH receiving.

4.0 CRITICAL CHARACTERISTIC LISTING

1. 307 X 510 (PUREX Slip-Lid Cans)

Critical Characteristics

- Diameter: 3-7/16 (-1/16) inches
- Height: 5-5/8 (+1/32) inches
- "Fold-Lock" (double seam) or welded side body seam
- Double seam sealed bottom w/gasket
- 70 lb. Plate (minimum): >0.0077 (+0.072/-0.0005) inches
- No. 20 tinned commercial steel or heavier (0.000012 inch on each surface)
- Lid: Slip-top

2. 310 X 510 Cans (PFP Slip-Lid)

Critical Characteristics

- Diameter: 3-5/8 (-3/16) inches
- Height: 5-5/8 (+1/32) inches
- "Fold-Lock" (double seam) or welded side seam
- Double seam sealed bottom w/gasket
- 70 lb. Plate (minimum): >0.0077 (+0.072/-0.0005) inches
- No. 20 tinned commercial steel or heavier (0.000012 inch on each surface)
- Lid: Slip-top

3. 401 X 604 (PUREX Secondary Open Top Can)

Critical Characteristics

- Diameter: 4-1/16 ($\pm 1/32$) inches
- Height: 6-1/4 ($+ 1/32$) inches
- Double seam sealed bottom & lid with gasket
- Welded side seam
- 85 lb. Plate (minimum): 0.0094 ($+0.064/-0.0015$) inches
- No. 20 tinned commercial steel or heavier (0.000012 inch on each surface)

4. 401 X 608 (PFP Secondary Open Top Can)

Critical Characteristics

- Diameter: 4-1/16 ($\pm 1/32$) inches
- Height: 6-1/2 ($+1/32$) inches
- Double seam sealed bottom & lid with gasket
- Welded side seam
- 85 lb. Plate (minimum): 0.0094 ($+0.064/-0.0015$) inches
- No. 20 tinned commercial steel or heavier (0.000012 inch on each surface)

5. 404 X 700 (7-inch Can)

Critical Characteristics

- Diameter: 4-1/4 ($\pm 1/32$) inches
- Height: 7 ($+1/32$) inches
- Beaded or paneled wall
- Double seam sealed bottom & beaded lid with gasket
- 85 lb. Plate weight (minimum) 0.0094 ($+0.064/-0.0015$)
- No. 20 tinned commercial steel or heavier w/lacquered inside surface

6. 306 X 800 (Innermost Hanford Convenience Can)

Critical Characteristics

- No organic material allowed
- Diameter: 3-3/8 ($\pm 1/32$) inches
- Height: 8-inch ($+ 1/32$) inches
- Double seam sealed bottom without gasket
- Welded side seam (no lining stripe)
- 85 lb. Plate (minimum): 0.0094 ($+0.064/-0.0015$) inches
- No. 20 tinned commercial steel or heavier (0.000012 inch on each surface)
- Lid: 0.0094 ($+0.064/-0.0015$) inches without gasket

7. 310 X 804 (Second Inner Hanford Convenience Can)

Critical Characteristics

- Diameter: 3-5/8 ($\pm 1/32$) inches
- Height: 8-1/4 ($+1/32$) inches
- Double seam sealed bottom & lid with gasket
- Welded side seam
- 85 lb. Plate (minimum): 0.0094 ($+0.064/-0.0015$) inches
- No. 20 tinned commercial steel or heavier (0.000012 inch on each surface)

8. 401 X 900 (Third Hanford Convenience Can)

Critical Characteristics

- Diameter: 4-1/16 ($\pm 1/32$) inches
- Height: 9-inch ($+1/32$) inches
- Double seam sealed bottom & lid with gasket
- Welded side seam
- 85 lb. Plate (minimum): 0.0094 ($+0.064/-0.0015$) inches
- No. 20 tinned commercial steel or heavier (0.000012 inch on each surface)

9. 404 X 908 (Outermost Hanford Convenience Can)

Critical Characteristics

- Diameter: 4-1/4 ($\pm 1/32$) inches
- Height: 9-1/2 ($+1/32$) inches
- Double seam sealed bottom & lid with gasket
- Welded side seam
- 85 lb. Plate (minimum): 0.0094 ($+0.064/-0.0015$) inches
- No. 20 tinned commercial steel or heavier (0.000012 inch on each surface and inside may also be lacquered)

10. Nuclear Material Container (NMC-05)

Critical Characteristics

- Outer Diameter: < 6-7/8 inches
- Inside Height (to top of thread ring): < 9-1/4 inches
- Wall Thickness: 22 Gauge (0.0299 inches)
- Lid Outer Diameter: < 7-1/2 inches
- Documentation Package with:
 - Certificate(s) of Compliance for:
 - ✓ Type 304 Stainless Steel
 - ✓ Viton O-Ring
 - ✓ Individual water pressure test of lid and body at 5" to 10".
 - ✓ NucFil-013-G (Gortex) Carbon-Bonded Carbon Filters
 - ✓ RTV Silicone
 - ✓ Weld Wire
 - Certificate of Test for Housings
 - Welder's Qualification
 - Pressure Test for Gore-Tex Filters

11. Nuclear Material Container (NMC-08)

Critical Characteristics

- Outer Diameter: < 8 inches
- Inside Height (to top of thread ring): < 11 inches
- Wall Thickness: 22 Gauge (0.0299 inches)
- Lid Outer Diameter: < 8-3/4 inches
- Documentation Package with:
 - Certificate(s) of Compliance for:
 - ✓ Type 304 Stainless Steel
 - ✓ Viton O-Ring
 - ✓ Individual water pressure test of lid and body at 5" to 10".
 - ✓ NucFil-013-G (Gortex) Carbon-Bonded Carbon Filters
 - ✓ RTV Silicone
 - ✓ Weld Wire
 - Certificate of Test for Housings
 - Welder's Qualification
 - Pressure Test for Gore-Tex Filters

12. Nuclear Material Container Over Pack (NMC-OP, 5 Quart)

Critical Characteristics

- Inner Diameter: $(\geq 6\text{-}3/4 \text{ but } < 7\text{-}1/16)$ inches
- Height: $\leq 8\text{-}3/4$ inches
- Wall Thickness ≥ 0.06 inches
- Shielding Material of Construction: American Pewter
- Slide Latch: Spring Loaded

13. Nuclear Material Container Over Pack (NMC-OP, 8 Quart)

Critical Characteristics

- Inner Diameter: $(\geq 8\text{-}1/16 \text{ but } < 8\text{-}1/2)$ inches
- Height: $\leq 10\text{-}1/4$ inches
- Wall Thickness ≥ 0.06 inches
- Shielding Material of Construction: American Pewter
- Slide Latch: Spring Loaded

5.0 APPENDIX

Container configurations utilized at the PFP involve the nesting of several containers, one inside another. Each container in a particular configuration provides one or more safety related functions, but typically no two cans provide the same functions. For example, some cans are required to be hermetically sealed while others are not. The configurations described below are approved for storing and/or transporting Special Nuclear Materials. Table 1 describes the packaging configuration using nominal dimensions of each can. Table 2 describes the packaging configuration using the Hanford Convenience Can Packaging dimensions.

Table 1. Thermal Stabilization Product Container Configuration

Configuration Element	"Names" of Configuration Element	Description	Nominal Dimensions (inches)	Nominal Volume (liters)
Can holding oxide	PUREX or PFP Slip Lid Can (307 X 510) or (310 X 510)	Tin plated can with slip lid top	3-7/16 D x 5-5/8 H or 5-5/8 D x 5-5/8H	0.8 or 0.9
Plastic Bag	Bagout Bag	Heat sealed plastic bag	.006 polyethylene or .012 PVC	N/A
Secondary Can	PUREX or PFP Secondary Can (401 X 604) or (401 X 608)	Tin plated can with crimp sealed ends	4-1/16 D x 6-1/4 H or 4-1/16 D x 6-1/2 H	1.27 or 1.33
Outer Can	7 inch or Juice Can (404 X 700)	Tin plated can with crimp sealed ends	4-1/4 D x 7 H	1.5

Table 2. Hanford Convenience Container (HCC) Package Configuration

Configuration Element	"Names" of Configuration Element	Description	Nominal Dimensions (inches)	Nominal Volume (liters)
Material (oxide) Can	Organic-free Open Top HCC (306 X 800)	Tin plated can with non-gasketed lids top & bottom	3-3/8 D x 8 H	1.05
Can to hold Material Can	HCC Secondary Can (310 X 804)	Tin plated can with elastomeric gaskets on lids	3-5/8 D x 8-1/4 H	1.35
Plastic Bag	Bagout Bag	Heat sealed plastic bag	.006 polyethylene	N/A
First Contamination-free Can	HCC Tertiary Can (401 X 900)	Tin plated can with crimp sealed ends	4-1/16 D x 9 H	1.86
Outermost Can	HCC Outer Can (404 X 908)	Tin plated can with crimp sealed ends	4-1/4 D x 9-1/2 H	2.15

5.1 CRITICAL CHARACTERISTIC BASES

5.1.1 Slip-Lid Cans

Can Dimensions: As designated in section 4.0, above.

Basis: required for nesting into next larger can as shown on Table 1.

Can Wall Thickness: >70# plate (>.0077 inches).

Basis: pressure and drop test of "bare" cans. (ref. G).

Can Lid Thickness: >70# plate (>.0077 inches).

Basis: pressure and drop test of "bare" cans. (ref. G).

Tin Plating Thickness: >0.20# (>.000012 inch) both sides.

Basis: PFP experience in storage, observations in (Wittman and Bonadie 1996). Corrosion resistance.

Inner surface can lining: None.

Note: lining stripe over welded seal is not permitted for cans that will be placed into DOE-STD-3013-96 compliant containers.

Basis: Storage experience at PFP (Past versions of OSD-Z-184-00013 specified cans intended for storage of wet or damp foods)

Can Closure: Slip-top lid to provide friction surface seal. Can bottom (closed end) either double seam sealed or drawn or spin formed.

Basis: Hermetic sealing not required since this can is nested in other hermetically sealed containers.

Can Side Seams: Welded (preferred) or crimped (folded) seam sealed.

Basis: Certain storage/shipping configurations can result in can temperatures that approach melting point of temperature solders.

Can Wall and Lid Design: Straight wall or beaded design as specified in purchase specification.

Basis: Beaded can walls and lids are desirable from a mechanical strength standpoint.

5.1.2 Open Top Cans

Can Type: Type I, Class 3 Packer's Can as defined in PPP-C-96E. Can shall be round, open-top style, with compound-lined, double seamed ends. The material can in the HCC packaging shall not contain any organic compound lining or gaskets.

Can Dimensions: As designated in section 4.0, above.

Basis: required for nesting into next larger can as shown on Table 1 and Table 2.

Can Material: Electrolytic tinplate. **Basis:** Corrosion resistance.

Can Wall Thickness: >85# plate (>.0094 inches).

Basis: pressure and drop test of "bare" cans and DOT-6M contents testing

Can Lid Thickness: >85# plate (>.0094 inches).

Basis: pressure and drop test of "bare" cans (refs. D, F& G). Compatibility with pressure monitoring via the Vault Safety and Inventory System (VSIS) and visual inspections. Provides adequate deflection for monitoring while providing adequate margins before failure due to overpressurization.

Tin Plating Thickness: >0.20 lbs./base box (>.000012 inch) both sides. Outermost can may contain lacquer on its inside surface.

Basis: PFP experience in storage, observations in Reference E. Corrosion resistance.

Inner surface can lining: None, except lining stripe over welded seal is permitted. However, the material can in the Hanford Convenience Can (HCC) packaging shall not contain any organic compound lining.

Basis: Storage experience at PFP (Past versions of OSD-Z-184-00013 specified cans intended for storage of wet or damp foods). Radiolytic reactions are to be avoided in the HCC.

Can Closure: Hermetic seal by use of industry standard double crimp seal method. Elastomeric gasket on lids and closed end seams (unless closed end has no seam such as drawn or spin formed cans or material can in the HCC packaging).

Basis: Hermetic sealing needed to exclude air/moisture to preserve stabilized oxide product integrity. Provides contamination barrier.

Can Closure Gaskets: Gaskets shall not be broken, cut, torn, chipped or cracked. Gaskets shall not be improperly applied. The material can in the HCC packaging shall not contain organic gaskets.

Basis: Hermetic sealing needed to exclude air/moisture to preserve stabilized oxide product integrity. Provides contamination barrier.

Can Side Seams: Welded in a continuous and uniform way throughout the length of the seam.

Basis: Welding assures hermetic seal along seal. Welded seams provide of better lid seam seals at the side seam than crimped seam joints, enhancing ability to obtain hermetic seal. Welding is specified because certain storage/shipping configurations can result in can temperatures that approach melting points of solders.

Can Wall and Lid Design: Straight or beaded wall.

Basis: Nested can arrangement usually requires straight wall cans because of close clearances between cans.

5.1.3 Nuclear Material Container (NMC)

Container Type: Container shall be a right circular cylinder featuring all stainless steel construction, screw top closure and carbon-carbon filter welded to lid.

Basis: The NMC line of containers has significant engineering and Quality Assurance to verify positive closure and 100% interchangeability of lids and bodies from batch to batch. Each NMC is helium leak tested after final assembly.

Container Dimensions: As designated in section 4.0, #10 and # 11, above.

Basis: Required for containing food pack cans, as wide as 4.75-inches and as tall as 9-inches tall. Nested can arrangement usually requires straight wall cans because of close clearances between cans.

Container Material: 304 Stainless steel.

Basis: Strength and corrosion resistance.

Container Wall Thickness: 22 gauge (0.0299 inches)

Basis: Pressure and drop test performed by LANL.

Container Lid Thickness: 22 gauge (0.0299 inches)

Basis: Pressure and drop test performed by LANL.

Filter in Lid: Nuclear Filter Technology carbon-carbon High Efficiency Particulate Air (HEPA) Filter.

Basis: High efficiency filtration (filter efficiency for dispersed 0.3 to 0.5 micron DOP Dioctylphthalate is $\geq 99.97\%$), and successful PFP experience with Nuc-Fil drum filters.

Lid Closure: Threaded.

Basis: No special tools required, accomplishes rapid closing of NMC. Lids can be easily interchanged.

Lid Closure O-Ring: O-rings shall not be brittle, scored or broken.

Basis: Hermetic sealing needed to exclude air/moisture to preserve stabilized oxide product integrity. Provides contamination barrier.

5.1.4 Nuclear Material Container Over Pack (NMCOP)

Container Type: Container shall be a right circular cylinder, with spring-loaded latch.

Basis: A fast acting latch assures the shielding over-pack is rapidly and reliably affixed to the NMC to protect operators from high gamma dose emitted from contents in NMC.

Container Dimensions: As designated in section 4.0, #12, and #13, above.

Basis: To be used exclusively in combination with NMCs for securely containing and shielding NMCs.

Container Material: Lead-free American Pewter.

Basis: Shielding provided by 92% tin, 7% antimony and 1% copper.

Container Wall Thickness: ≥ 0.06 inches

Basis: Absorbs $\geq 99.9\%$ of gamma radiation emitted from Americium-241.

Workmanship: Cans shall be free of lamination, blisters, slivers, rolled-in scales, tears, cracks, cuts, splits, fractures, buckling, dents, wrinkles, or die marks. Plating shall be free of porosity and pits. **Basis:** PFP experience in storage, observations in Reference E.

6.0 REFERENCES

- A. HNF-PRO-268, "Control of Purchased Items and Services".
- B. HNF-PRO-1819, "PHMC Engineering Requirements".
- C. Federal Specification PPP-C-96E, Cans, Metal, 28 Gage and Lighter, 31-Dec-1992, Defense Supply Center.
- D. RHO-HS-SA-59P, *The Effectiveness of Corrective Actions Taken to Preclude Events Involving Tin Cans and Plutonium*, R. W. Szempruch, May 1984.
- E. WHC-SD-CD-TRP-068, Rev 0, *Plutonium Inventory Characterization Report 2*, G. R. Wittman and E. P. Bonadie, September, 1996.
- F. HNF-SD-TP-TRP-002, Rev. 0, *Test Report for Hanford Convenience Can*, S. R. Crow, January, 1997.
- G. ARH-CD-635, *Evaluation of Food Pack Cans as Plutonium Storage Containers*, J.E. Hammond, March, 1976.