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GNS Castor V/21 Headspace Gas Sampling 2014

P. L. Winston

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ABSTRACT

Prior to performing an internal visual inspection, samples of the headspace gas of the GNS Castor V/21 cask at the Idaho National Laboratory were taken on June 12, 2014. These samples were taken in support of the CREIPI/Japanese nuclear industry effort to validate fuel integrity without visual inspection by measuring the ^{85}Kr content of the cask headspace. This report provides the fission product gas data that resulted from sampling in 2014.program as part of the Dry Cask Storage Gas Analysis for Central Research Institute of Electric Power Industry WFO No. 15906.

CONTENTS

GNS Castor V/21 Headspace Gas Sampling 2014

1. BACKGROUND

Prior to performing an internal visual inspection, samples of the headspace gas of the GNS Castor V/21 cask were taken on June 12, 2014. These samples were taken in support of the CREIPI/Japanese nuclear industry effort to validate fuel integrity without visual inspection by measuring the ^{85}Kr content of the cask headspace. The samples would normally have been taken in 2015 according to the 5-year sampling schedule, but the US Department of Energy requested a demonstration of the technology for inspecting the cask using a borescope camera be done in 2014. The cask headspace sampling program will return to the 5-year schedule for future samples.

2. SAMPLE VOLUMES

Three-300 mL sample volumes were acquired, one sample being nitrogen that is used to purge the sample system, and two samples of the helium-headspace of the cask. One helium sample volume was sent to the Pacific Northwest National Laboratory (PNNL) analytical laboratory, and the nitrogen-filled system blank and the second helium-filled volume was sent to Southwest Research Institute (SWRI) analytical laboratory. The samples were sent to two different laboratories to provide a confirmation of the methods used. The sample volumes were baked out prior to use according to the method used historically, as in 2010.

3. CASK PRESSURE

At the time of sampling, the cask internal pressure was approximately 380 mbars (0.375 atm), and the cask surface temperature was approximately 85°F (29°C). Following sampling and borescope inspection, the cask was refilled with high performance liquid chromatography (HPLC)-grade helium to a pressure of approximately 600 mbars (1 atm).

4. SAMPLE ANALYSIS

Gamma ray spectrometry and mass spectrometry analysis of the samples was performed by each of the analytical laboratories. The analysis included measurement of ^{85}Kr, ^{133}Xe, and ^{137}Cs. ^{133}Xe is only relevant for fresh fuels, having a 5-day nominal half-life. It has historically been requested for analysis in the dry stored fuel at INL. Mass spectrometry analysis is used to determine the presence of unacceptably high concentrations of hydrogen, and the oxygen-nitrogen ratio for determination of air in leakage.

Analysis by PNNL was per PNNL procedure RPG-CMC-450, Rev. 2, Gamma Energy Analysis and Low Energy Photon Spectrometry, and the SWRI method requested was the same as that used in 2010. PNNL counted the gas sample in duplicate, using 96.9 mL polyethylene gas cylinders with a method reference blank for 4 days on a 100% relative efficiency germanium detector. SWRI counted 60 mL of the sample in duplicate using a 1.2-L Gas Marinelli Beaker for 1 hour.

The PNNL analysis states that, “No gamma emitters were detected above background following a counting time of nearly 4 days on the face of high efficiency HPGe detectors.” This count data yielded a minimum detectable activity of less than 3 nanoCuries per liter. (1.1E-1 Bq/mL).

The reported value for SWRI was less than the minimum detectable activity of 9.71E4 pCi/L, (3.59 Bq/mL).

The sample analysis for hydrogen, helium, nitrogen, oxygen, argon, and carbon dioxide indicated that there is effectively no detectable hydrogen, and therefore, no corrosion is caused by a reaction of retained water. Hydrogen was not detected by the gas chromatographic method used by SWRI. Hydrogen was detected at the 1E-3 mole percent concentration by the gas mass spectrometric method used by PNNL. No water was detected in the PNNL analysis.

The conclusion of these two analyses is that there was no detectable ^{85}Kr in the cask headspace samples. Based on the low value of the minimum detectable activity and the nondetection, it can be concluded that the fuel cladding is gas tight, not releasing any fission gases, and therefore, can be classified as intact fuel.

The final reports for both the PNNL and SWRI analyses are provided as separate attachments because of the challenge of importing Adobe .pdf documents into this Microsoft Word document.

5. INTERIM CASK EXTERNAL INSPECTIONS

Since the last sampling in 2010, visual inspections and manual data recording of pressure and temperature have been done every other week in accordance with form FRM-1708. With the exception of the inter-lid pressure of the TN-24P cask, all pressure values are of the internal pressure of the cask.

Sampling of the cask headspace is mandated by the safety analysis report SAR-112 to verify that the cask atmosphere does not accumulate flammable concentrations of hydrogen gas. Analysis for gaseous radionuclides is not mandated by safety analysis, and is performed to provide information on fuel integrity.

The sampling was performed using the same equipment as in previous years, using sample containers that were treated in the same manner as in previous years, and following the same procedure as in previous years with editorial changes reflecting 2014 personnel responsibilities.

The casks are not moved under normal circumstances, although in the 1999 inspection, the cask was moved from the TAN-791 pad, and an indication of rust was noted on the concrete under the Castor cask. Because of the thickness of the cask wall and the noncorrosive storage environment, there is no corrosion allowance for this cask.

6. FUEL DATA

Percent burnup is based on the amount of initial ^{235}U consumed by irradiation. Primary information is provided by the original shipper.

GNS Castor V/21 INL Stored Commercial Fuel Data

Pre-Irradiation							Irradiation Data						
FHU Unique ID Number	Unique ID Number (ANSI No.)		U kg	U-235 kg	U-238 kg		Burnup (MWd/MT HM)	Discharge Date		Power Level(MW th)	Years Decayed	Percent Burnup	Decay Heat (watts) as of 01/01/1990
T03	LM02JJ		457.1	14.2	442.9		35,722	11/6/81		2441	33.2	78.9	627
T07	LMO2JL		457.1	14.2	442.9		35,722	11/6/81		2441	33.2	78.9	627
T08	LM02JM		457.1	14.2	442.9		35,722	11/6/81		2441	33.2	78.9	627
T09	LM02JU		457.1	14.2	442.9		35,722	11/6/81		2441	33.2	78.9	627
T11	LM02JR		457.1	14.2	442.9		35,722	11/6/81		2441	33.2	78.9	627
T12	LM02JP		457.1	14.2	442.9		35,722	11/6/81		2441	33.2	78.9	627
T13	LM02JY		457.8	14.2	443.6		35,722	11/6/81		2441	33.2	78.93	627
T16	LM02JN		457.8	14.2	443.6		35,722	11/6/81		2441	33.2	78.93	627
V01	LM041 D		457.5	13.3	444.2		30,214	6/30/83		2441	31.5	73.4	585.3
V04	LM041 F		457.5	13.3	444.2		31,146	11/6/81		2441	33.2	74.5	537.1
V05	LM0425		457.5	13.3	444.2		31.511	11/6/81		2441	33.2	75.09	544.3
V08	LM0428		457.5	13.3	444.2		31,146	6/30/83		2441	31.5	74.57	537.1
V09	LM0423		457.5	13.3	444.2		30,214	6/30/83		2441	31.5	73.56	585.3
V11	LM042A		457.5	13.3	444.2		29,823	6/30/83		2441	31.5	73.26	575.5
V12	LM042C		457.5	13.3	444.2		31,146	6/30/83		2441	31.5	74.59	537.1
V13	LM0413		457.5	13.3	444.2		29,823	6/30/83		2441	31.5	72.64	575.5
V14	LM041 L		457.5	13.3	444.2		29,823	6/30/83		2441	31.5	72.93	575.5
V15	LM042D		457.5	13.3	438.9		29,823	6/30/83		2441	31.5	72.73	575.5
V24	LM042G		457.5	13.3	438.1		31,146	11/6/81		2441	33.2	74.57	537.1
V25	LM040H		457.5	13.3	438.7		30,214	6/30/83		2441	31.5	73.15	585.3
V27	LM0416		457.5	13.3	438.6		30.214	6/30/83		2441	31.5	73.46	585.3

7. CHANGES IN FUEL CONFIGURATION

Twelve centrally located rods were removed from Assembly T11 in 1999 for nondestructive and destructive evaluation. Results of the destructive analysis of three of the rods may be found in Examination of Spent PWR Fuel Rods After 15 Years in Dry Storage , R. E. Einziger, H. C. Tsai, M. C. Billone, and B. A. Hilton, Paper No. ICONE10-22456, pages 351–358. The nine remaining intact rods were placed in a basket that is presently stored in the REA-2023 cask on the CPP-2707 pad.

8. SURFACE DOSE RATE

The nominal surface dose measured in 2014 was 2 mR/hr beta-gamma and 3 mR/hr neutron at contact.

Appendix A
Cask Description

From SAR-112

1.3.1 Cask Body

The cask body is a one piece cylindrical structure composed of ductile cast iron in nodular graphite form. This material exhibits good strength and ductility, as well as providing effective gamma shielding. The overall external dimensions of the cask body are 4886 mm (16 ft) high and 2385 mm (8 ft) in diameter (Figure 1-1). The external surface has 73 heat transfer fins that run circumferentially around the cask and is coated with epoxy paint for corrosion protection and ease of decontamination.

The cask body wall, excluding fins, is 380 mm (15 in.) thick. Incorporated within the wall of the body are polyethylene moderator rods to provide neutron shielding. Two concentric rows of these 60-mm (2.3-in.) nominal diameter rods are distributed around the cask perimeter (Figure 1-2). Two lifting trunnions are bolted on each end of the cask body. The diameter of the inner cavity is 1527 mm (5 ft), and the overall inner cavity length is 4152 mm (163 in.). Precision-machined surfaces are provided at the open end of the cask cavity for positive gasket sealing, and bolt holes are included at these locations to secure the two cask lids. The interior cavity surfaces, including sealing surfaces, have a galvanic-applied nickel plating.

1.3.2 Spent Fuel Basket

The spent fuel basket (Figure 1-2) is a cylindrical structure of welded stainless steel plate and borated stainless steel plate, having a boron content of approximately 1% for criticality control. The basket comprises an array of 21 square fuel tubes/channels that provide structural support and positive positioning of the fuel assemblies. The basket overall height is 4110 mm (13.5 ft) including the four 130-mm-diameter (5-in.) pedestals that support the basket and fuel weight on the bottom of the cask cavity. The basket outside diameter of 1524 mm (5 ft) fits tightly in the cask cavity inner diameter of 1527 mm (5 ft). The depth of each fuel tube is 4050 mm (13.3 ft). A spacing of 74 mm (3 in.) is present between the top of the basket cavity and the underside of the primary lid, thus accommodating a fuel assembly length of 4124 mm (162 in.) and supporting convection heat transfer. The final assembly results in a clearance of approximately 60 mm (2.3 in.) between the top of the fuel assemblies and the bottom of the primary lid, for a reference fuel assembly of 4064 mm (160 in.). The basket layout results in inter-fuel tube spaces that act as flux traps for criticality control and channels to support free convection heat transfer. The basket design ensures a subcritical configuration under worst-case conditions, and the basket structure physically protects the fuel under normal and accident conditions.

A pipe with an inner diameter of 42 mm (1.6 in.) and a lead-in funnel at the top are welded to the side of a fuel tube near the outer circumference of the basket. The pipe location corresponds to a penetration in the primary lid and the low side of the slope in the cask cavity bottom. The pipe provides a path for a flanged pipe used to fill and drain the cask.

1.3.3 Primary Lid

A stainless steel primary lid, 1785 mm (6 ft) in diameter and 290 mm (12 in.) thick, is provided (Figure 1-3). Forty-four bolt holes are machined near the lid perimeter to secure the lid to the cask body. Two grooves machined around the lid underside, inside the bolt circle, are provided for O-ring seals (Figure 1-4). The inner groove accepts a metal “C” shaped O-ring, which serves as the first barrier between stored fuel and the environment. The outer grove accepts an elastomer O-ring. A 10-mm-diameter (0.4-in.) penetration through the lid provides access to the annulus between the two seals to perform post-assembly leak testing. This penetration is plugged when not in use. Three penetrations through the lid are provided for various cask operations. A 35-mm-diameter (1.4-in.) straight-through penetration is used for water fill/drain operations. This penetration is located near the perimeter of the lid

and is normally sealed with two flanges equipped with elastomer O-rings. This location corresponds to the pipe attached to the fuel basket. The other two penetrations, spaced next to each other and covered by a single flange, are also located near the lid perimeter, but 180 degrees from the fill/drain penetration. The through-lid penetration at this location is equipped with a quick-disconnect fitting used for vacuum drying and backfilling with gas. The second penetration at this location leads to the lower edge of the lid. Although not needed for the CASTOR-V/21, this penetration could be used for leak-testing an optional third lid gasket. This penetration is sealed by a gasketed seal plug in addition to the top cover flange. The primary lid used during 1985 testing was not a standard lid and has 10 additional penetrations for fuel assembly guide tube instrumentation (thermocouple [TC] lances). The pattern of the 10 fuel assembly instrumentation penetrations was selected to measure radial temperature profiles across the basket in the spent fuel assemblies.

1.3.4 Secondary Lid

The Secondary Lid, used in commercial application, was not used during the 1985 CASTOR V/21 cask performance test or the long term storage monitoring program conducted during 1994 through 1999, because of interference with fuel assembly instrument leads and the repeated removal and handling of the secondary lid for gas sampling activities. The following functional description of the Secondary Lid is provided for completeness. The stainless steel secondary lid is 2007 mm (79 in.) in diameter and 90 mm (3.5 in.) thick (Figure 1-4). Forty-eight bolt holes are machined near the lid perimeter to secure the lid to the cask body. Two concentric grooves located inside the bolt circle on the underside are provided for a metal O-ring/elastomer O-ring sealing system of the same design as that used on the primary lid. Three normally sealed penetrations are provided for various cask operations (Figure 1-4). A 10-mm-diameter (0.4-in.) penetration through the lid provides access to the annulus between the two seals for postassembly seal testing. A gasketed seal plug is used to close this penetration. A second penetration is equipped with a quick-disconnect fitting, which is used for vacuum drying and gas backfilling of the primary/secondary inter-lid space. A 130-mm-diameter (5-in.) cover plate and gasket secured by six 12-mm (0.5-in.) bolts is in place when this penetration is not used. The third penetration provides a pressure sensing port between the inner-lid space and a pressure switch mounted in the secondary lid. The pressure switch is the primary component of the cask seal monitoring system. Due to the secondary lid not being used dose rates discussed in Section 3 were obtained on the primary lid exterior surface. Addition of the secondary lid will greatly reduce measured gamma dose rate values.

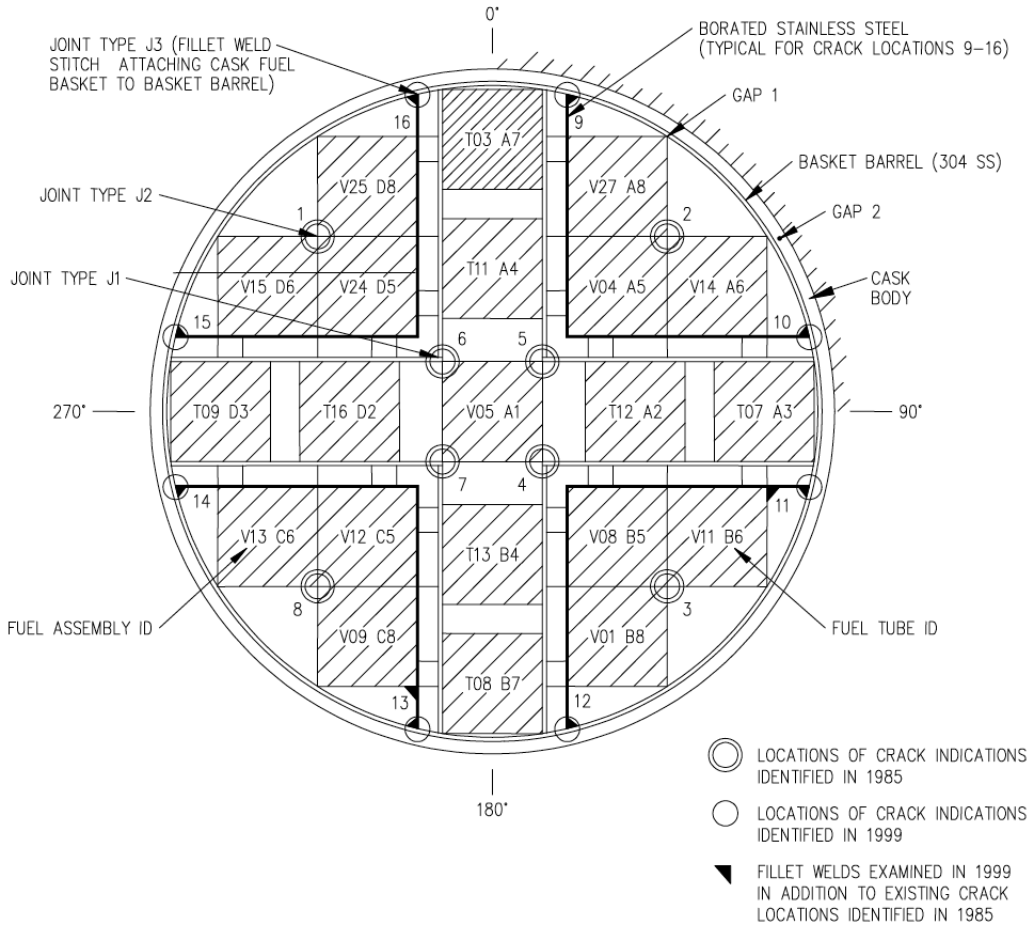
The fuel basket is a cylindrical barrel that is partitioned into an array of 21 square fuel tubes in a quadrant layout. The basket is fabricated from welded stainless steel and borated stainless steel plate for criticality control; the borated steel contains approximately 1% boron. Each fuel tube is separated from the adjacent tube by channels that act as flux traps for criticality control and as channels for convective heat transfer. The basket has an outer diameter of 1524 mm (5 ft) and a gross depth of 4110 mm (13.5 ft), including the four 130 mm (5 in.) diameter pedestals at the bottom of the basket. The basket barrel fits snugly within the cask with a clearance of only 3 mm (0.12 in.) total and 74 mm (3 in.) between the bottom of the primary lid and the top of the basket.

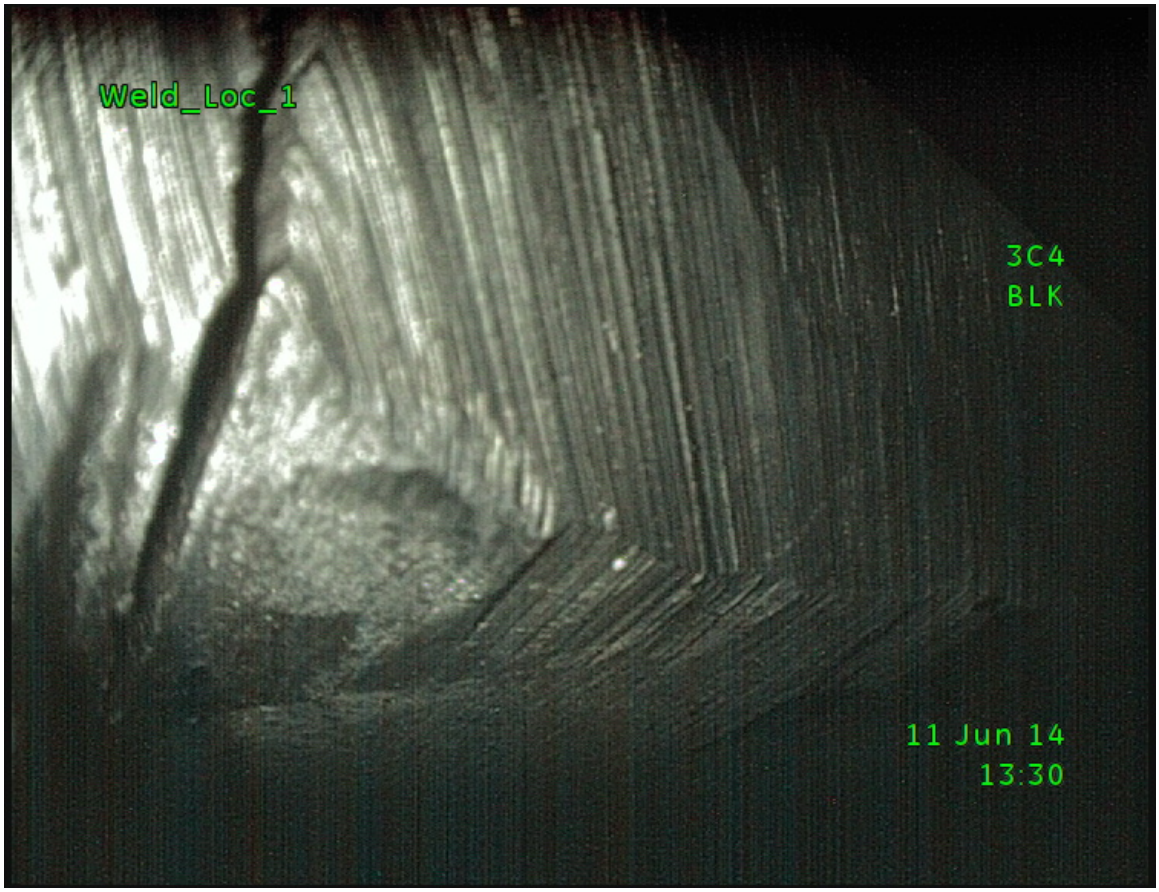
Castor V/21 Cask at the TAN-791 pad

Appendix B
Cask Inspection Images

A General Electric Mentor Visual iQ Video Borescope with 6.1 mm probe was used for the port inspection of the GNS Castor V/21 cask. Images from the inspection are shown below. A weld crack in the basket is visible in the first 4 images. The crack varies between 0.015 and 0.019 inches (0.38 to 0.48 mm)

Examples of basket weld cracks have been identified in lid-off inspections in 1985 and 1999 as shown in the graphic from Report INEEL/EXT-01-00183. No correlation has been made in this document between previously identified cracks and those inspected in 2014.





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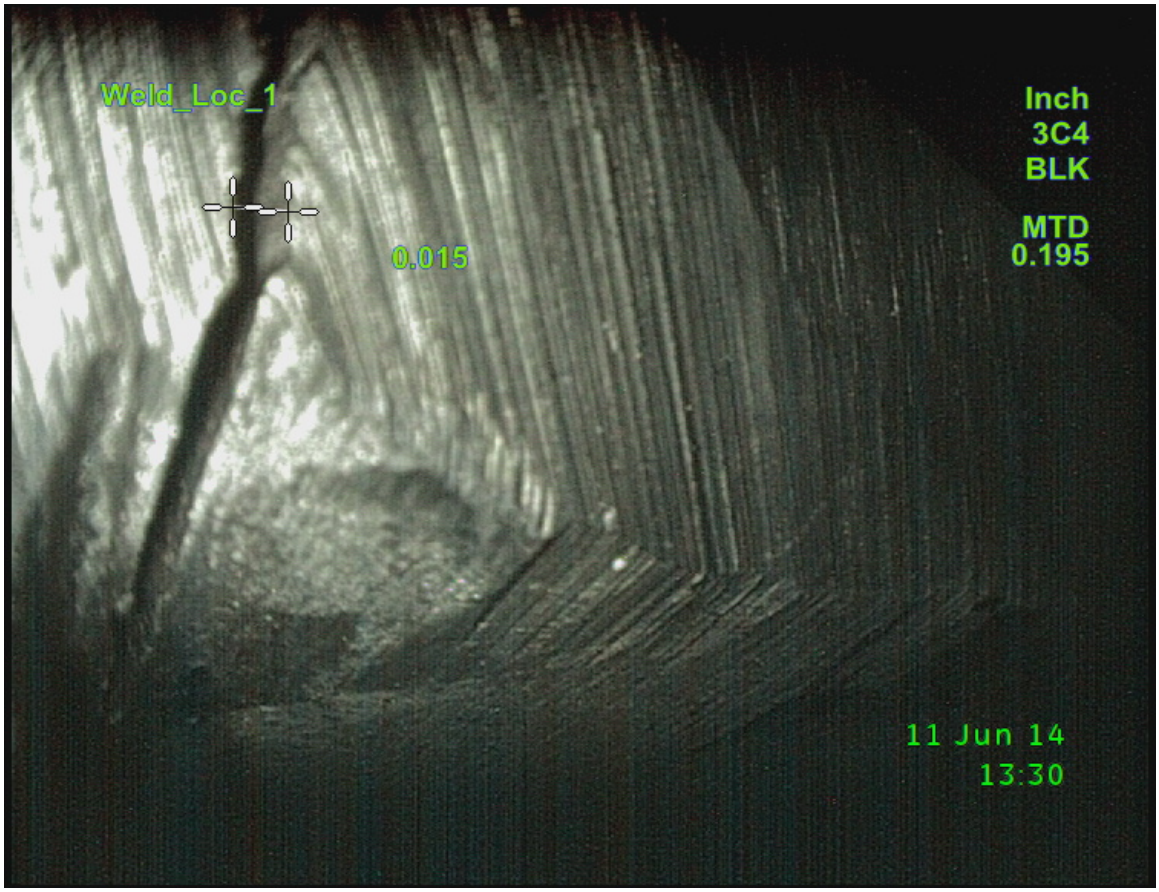

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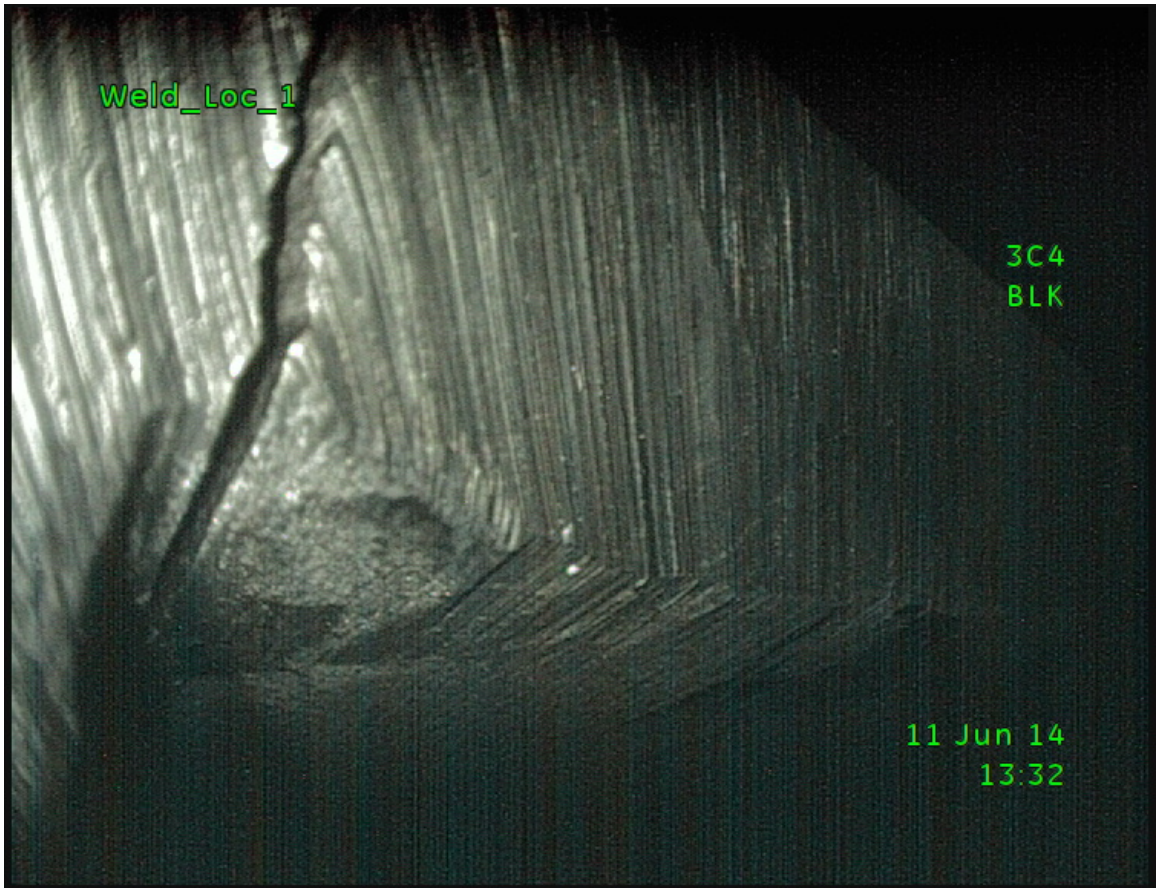

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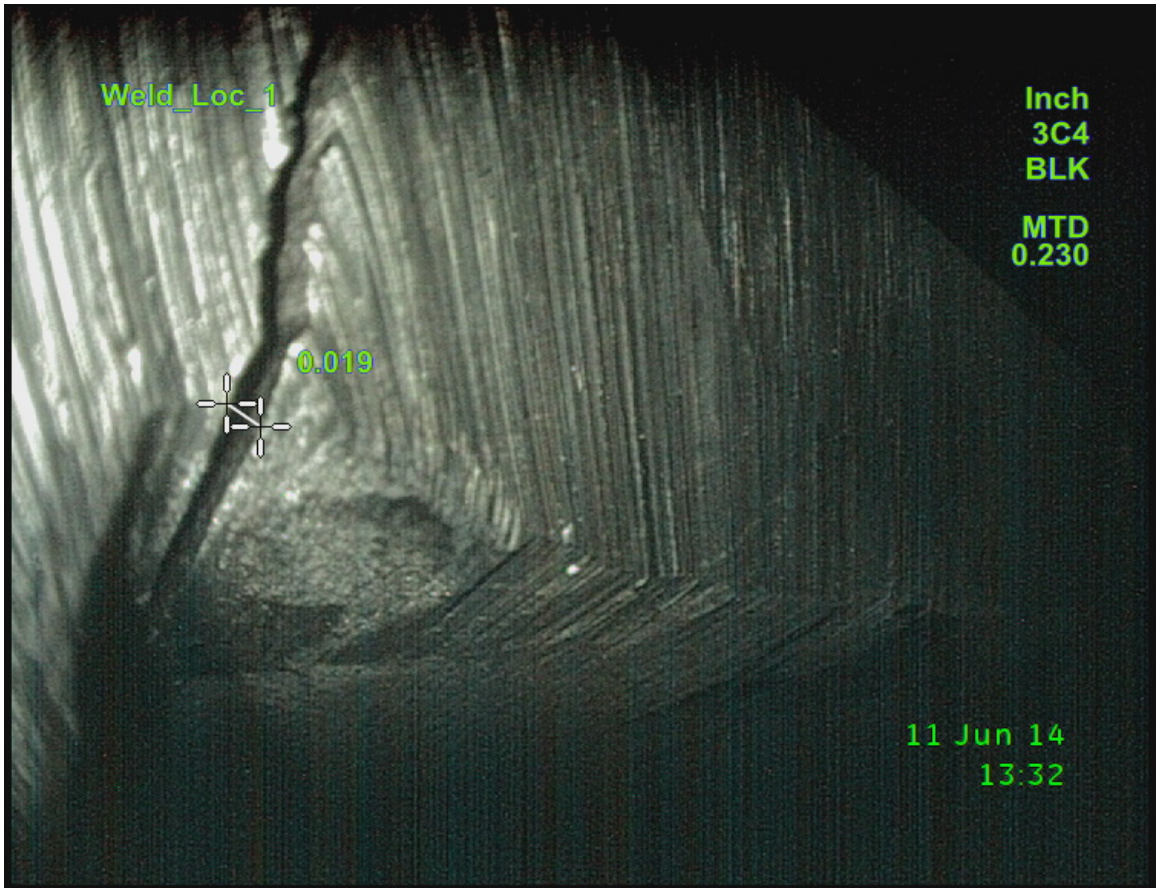

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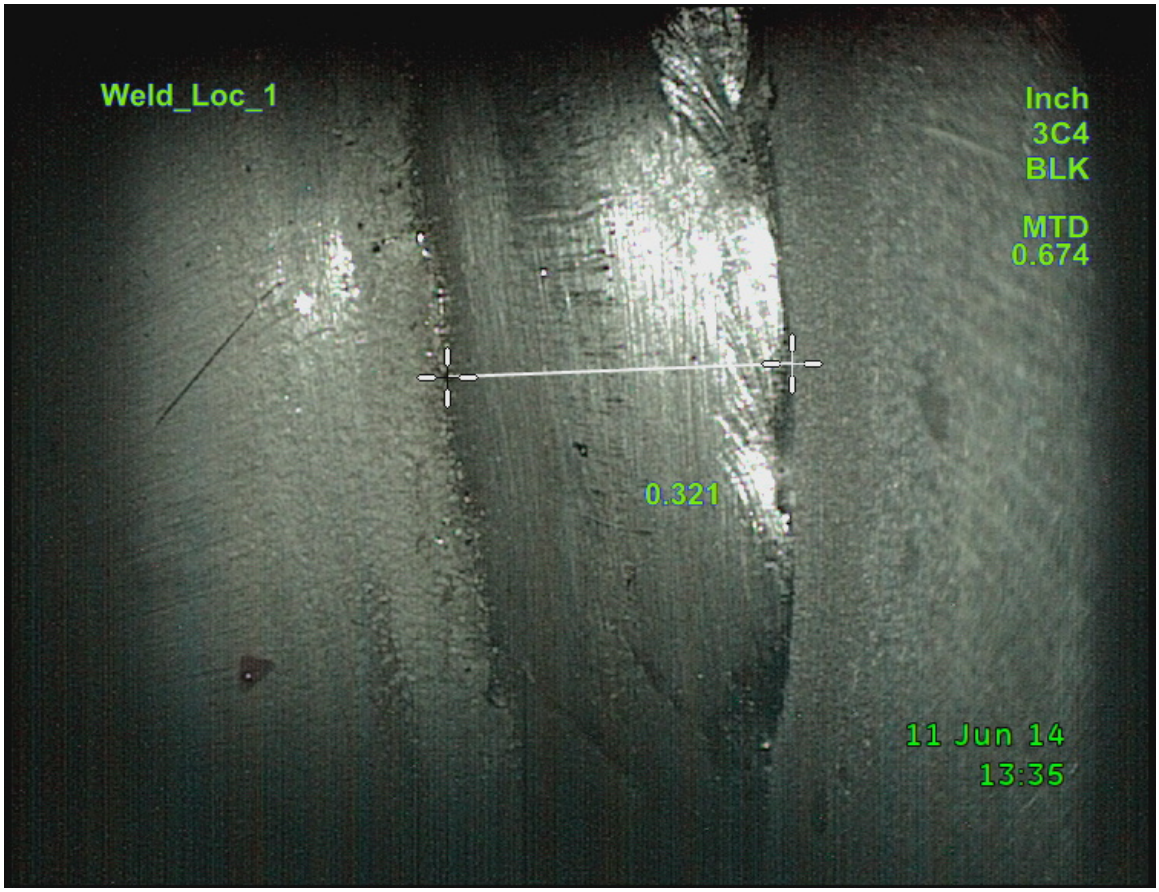

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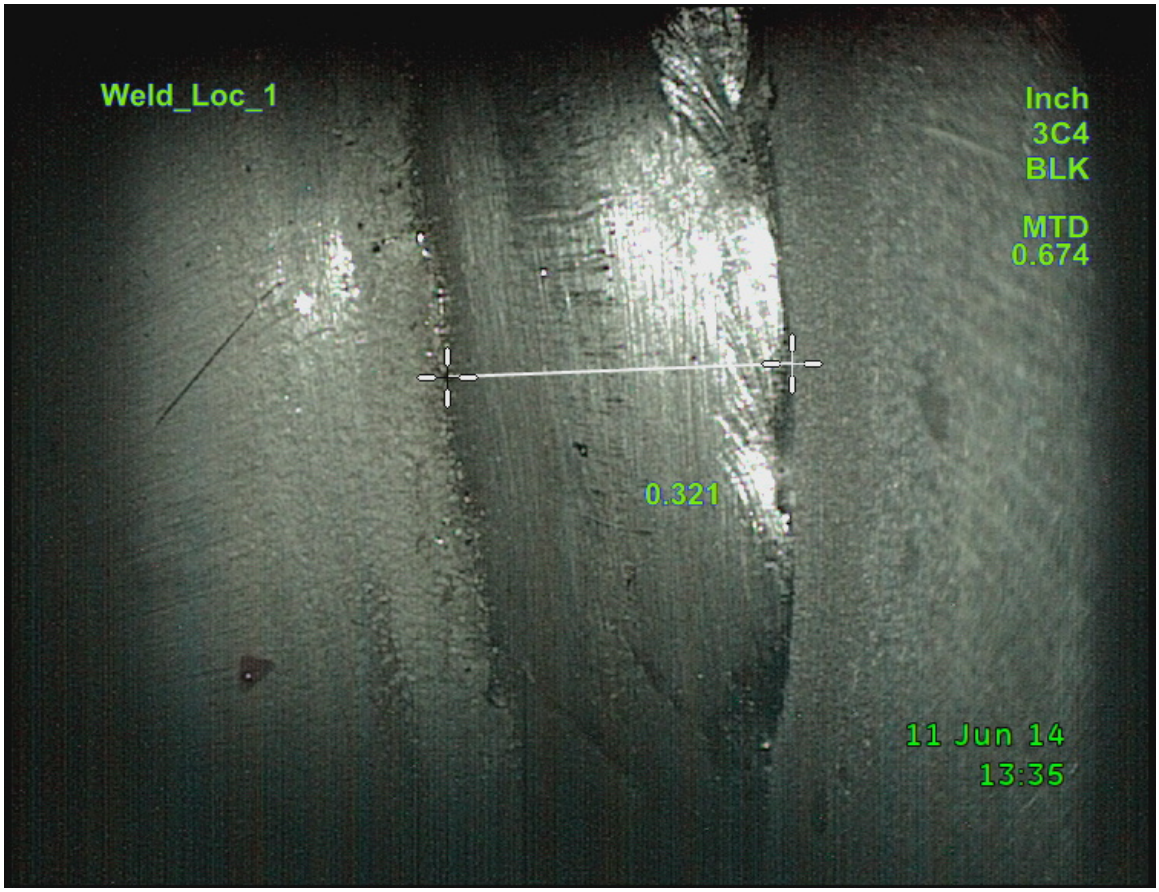

WELD LOC 1_03b

Appendix C
TPR-7544 Sampling Procedure

Cask Equipment ID # _____

1. INTRODUCTION

1.1 Purpose

To ensure the environment in the casks at CPP-2707, surrounding the fuel, remains stable.

1.2 Scope and Applicability

The casks contain spent nuclear fuel from various sites. This procedure includes instructions for performing the required surveillances on the casks stored in the Dry Cask Storage Area (DCSA), CPP-2707. This includes checking pressures, checking for gas formation in the cask internal atmosphere, venting the casks, and backfilling the casks.

2. PRECAUTIONS AND LIMITATIONS

2.1 Weather conditions (sustained wind greater than 25 mph for lifting activities, rain, lightning, and so forth) must be evaluated by supervision to determine whether or not procedure operations can continue or if a safe holding point needs to be identified and operations stopped at that point.

2.1.1 If operations must be halted, and normal configuration is desired, personnel may perform applicable steps of this procedure as directed by supervision.

2.2 Personnel must follow the applicable hazard mitigations detailed in Appendix B, Procedure Hazard Analysis.

2.3 If 110V electrical power is needed a ground fault circuit interrupter (GFCI) must be used on 110V equipment for personnel protection.

2.4 Aerial lifts must be operated in accordance with PRD-5107, “Aerial Lifts and Elevating Work Platforms.”

2.5 Hard hats must be worn when working near (within 25 ft) an operating mobile crane or suspended load. Hard hats must be worn when working within the roped off area of an operating scissor lift or man lift.

2.6 Hoisting and rigging must be performed in compliance with requirements established in PRD-650, “ICP Hoisting and Rigging Requirements.”

2.7 Lifting or moving fuel-loaded casks on the CPP-2707 pad is NOT an activity that is authorized. (SAR-112)

2.8 Pressure regulator HCV-DSW-3-1 or -2 must be adjusted periodically to correct drift in gas pressure during operation, as required.

2.9 Radiological Control Technician coverage must be used when breaking open transfer lines, piping and any line suspected to be internally contaminated.

3. PREREQUISITES

3.1 Planning and Coordination

3.1.1 Ensure arrangements have been made for personnel to be notified by cell phone or other communication device of any voice page announcements or alerts when in any areas without voice paging or telephone service.

3.1.2 Supervision: Ensure appropriate personnel coverage as needed:

A. **A minimum of at least one Certified Fuel Handler (CFH) (TSR-112)**

B. A minimum of one radiological control technician (RCT)

C. Equipment Operators (EO) — **one being a Qualified Crane Operator (if using a crane) (TSR-112)**

D. Safeguard and Security (SG) for tamper-indicating device (TID)

E. Aerial lift operator

F. Instrument Technician (IT) or Electrician (EL) for monitoring equipment (pressure or temperature wiring)

G. System Engineer or designated alternate as required for performing corrosion inspections.

3.2 Performance Documents

3.2.1 Ensure a pre-job briefing has been performed per MCP-3003, "Performing Pre-Job Briefing and Documenting Feedback."

3.2.1.1 IF a formal pre-job briefing has been performed, THEN ensure Form 434.14, "Pre-Job Briefing Checklist," has been completed.

3.2.2 Ensure an approved ICP Radiological Work Permit is in place, if needed.

3.3 Special Tools, Equipment, Parts, and Supplies

3.3.1 Ensure the following equipment and tools are available and staged, as required:

Cask Surveillance Tools and Equipment		
✔	Item	Comments
	Inert gas (Nitrogen /Helium)	Must have QA sticker or tag Helium will be used as the backfill gas for the Castor V-21 cask. Nitrogen will be used for all other casks.
	Sample cart CRT-DSW-1 or -2	Used to supply inert gas to the system only
	Cask Sampling Skid (CSS)	
	Vacuum Drying Skid (VDS)	
	Connecting hose from CSS to VDS	
	CSS inlet hose from CSS to the Gas Sample connector on cask	
	Purge fitting for CSS inlet hose	
	Gas sampling bottles	
	(8) ¼-in. male Swagelock plugs	Plug sample bottle valves
	Wrenches for ¼-in. Swagelock fittings	
	(1) Small HEPA filter to fit open end purge fitting	For purging sample skid. (QA accepted) _____ QA/PO Number
	Pressure gauge (on sample cart) PI-DSW-201 or -202	_____ _____ ID Number Calibration Due Date
	Pressure gauge (on sample skid) PI-DSW-124	_____ _____ ID Number Calibration Due Date
	"Dummy" sample cylinder	
	HEPA filtered jumper	With HEPA filter port
	Grease pencil	Labeling sample cylinders

Cask Surveillance Tools and Equipment		
✔	Item	Comments
	Never-Seize lubricant or equivalent	
	Nitrile gloves	For applying lubricant
	Safety glasses/goggles	For applying lubricant
	Wire or plastic ties	For attaching sample bottle labels
	Generator (large)	110/480 volts, GFCI protected
	Fall protection	Boom lift use
	Mobile crane	For removing weather cover
	Rigging equipment	For removing weather cover(s)
	Torque wrench(s)	VSC-17 cask weather cover bolts. Capable of torquing 75 ft • lb, 100 ft • lb and 150 ft • lb
	2-3/16 in. Socket	VSC-17 cask weather cover bolts

3.4 Training

3.4.1 Ensure training requirements of Appendix B are met.

4. INSTRUCTIONS

4.1 Ensure Section 3, Prerequisites has been completed.

NOTE 1: *Steps 4.6.4 through 4.6.5 or 4.7.4 through 4.7.5 may be performed at any time as directed by supervision to allow for the 30 minute warm up time on the vacuum pump.*

NOTE 2: *The pressure gauge PI-DSW-124 is turned on for all pressure measuring activities. The pressure gauge will time-out and shut-off after extended periods of time and may be turned back on as needed.*

4.2 IF the need exists to perform any task in the following routing table,
GO TO and complete the appropriate section for that task;
THEN RETURN TO this section to select another task.

Task	Procedure Section
Perform purge of cask sampling skid	Perform Section 4.3.
Remove weather cover from cask	Perform Section 4.4.
Remove port cover and obtain internal cask pressure	Perform Section 4.5.
Obtain “blank” sample	Perform Section 4.6.

Task	Procedure Section
Sample cask atmosphere	Perform Section 4.7.
Vent the cask	Perform Section 4.8.
Backfill cask with inert gas	Perform Section 4.9.
Reinstall port cover	Perform Section 4.10.
Install the weather cover on cask	Perform Section 4.11.
Perform post performance activities	Perform Section 4.12.

4.3 Performing Purge of Cask Sampling Skid

NOTE: *The designation "-X" is used to allow the component to be from sample cart CRT-DSW-1 or -2.*

4.3.1 Ensure the following are connected, per Appendix A, Figure 1, with the CSS inlet hose downwind of the work area.

A. Inert gas bottle to sample cart CRT-DSW-X

B. Sample cart CRT-DSW-X to Cask Sampling Skid (CSS)

C. CSS to Vacuum Drying System (VDS)

D. CSS inlet hose to CSS

E. Purge fitting with HEPA filter to end of CSS inlet hose.

4.3.2 Ensure the following valves are closed:

✔	✔	✔	Valve
			HCV-DSW-3-X (turn counter-clockwise to close)
			NHV-DSW-2-X
			NHV-DSW-1-X (on the sample cart)

4.3.3 Ensure inert gas bottle contains a minimum 200 psig.

4.3.3.1 IF the inert gas bottle contains less than 200 psig,
THEN change out the inert gas bottle and repeat Steps 4.3.1 through 4.3.3.

4.3.4 Ensure that the inert gas bottle has a quality acceptance label attached**.**

4.3.5 RCT: IF a sample cylinder or HEPA filtered jumper is installed on the CSS,
THEN monitor the removal of the sample cylinder.

4.3.6 Ensure a "Dummy" sample cylinder (with the inlet and outlet valves closed) is installed between the sample stub tubes, at valves VAV-DSW-23 and VAV-DSW-27.

4.3.7 Ensure the purge fitting with HEPA filter is installed on the end of the CSS inlet hose.

4.3.8 Ensure the following valves on the CSS are closed:

✔	✔	✔	Valve
			VAV-DSW-21
			VAV-DSW-24

4.3.9 Ensure VAV-DSW-22 valve handle is positioned to the inert gas supply label on the CSS.

4.3.10 Ensure the following valves on the CSS are open:

✔	✔	✔	Valve
			VAV-DSW-20
			VAV-DSW-23
			VAV-DSW-27
			VAV-DSW-28
			VAV-DSW-29
			Dummy sample inlet valve
			Dummy sample outlet valve

4.3.11 Open inlet shutoff valve NHV-DSW-1-X on the sample cart.

4.3.12 Ensure the inert gas bottle valve is fully open.

4.3.13 RCT: Monitor HEPA filter at the end of the CSS inlet hose.

4.3.14 Adjust inert gas regulator valve HCV-DSW-3-X (turn clockwise to open) until PI-DSW-201 or -202 indicates approximately 10 psig.

4.3.15 Purge line for approximately one minute.

4.3.16 Open valve VAV-DSW-24 on the CSS.

4.3.17 Ensure the following valves on the CSS are closed:

✔	✔	✔	Valve
			VAV-DSW-23
			VAV-DSW-27

4.3.18 Purge line for approximately one minute.

4.3.19 Close inert gas regulator valve HCV-DSW-3-X (turn counter-clockwise to close).

4.3.20 Close the inert gas bottle valve.

4.3.21 Ensure the following valves on the CSS are closed in listed order:

✔	✔	✔	Valve
			VAV-DSW-20
			VAV-DSW-24

4.3.22 Open valve VAV-DSW-27 on the CSS.

4.3.23 Close the following valves on the CSS:

✔	✔	✔	Valve
			VAV-DSW-27
			VAV-DSW-28
			VAV-DSW-29
			Dummy sample inlet valve
			Dummy sample outlet valve

4.3.24 RCT: Monitor the activities for the remainder of this section.

4.3.25 Remove HEPA filter from purge fitting from the end of the CSS inlet hose.

4.3.26 IF directed by supervision,
THEN change out the purge fitting HEPA filter as directed by RCT.

4.3.27 IF NOT proceeding to other cask activities,
THEN return the equipment to the original configuration or as directed by supervision.

4.4 Removing Weather Cover from Cask

4.4.1 SG: IF TID is installed on the weather cover,
THEN remove the TID.

4.4.2 RCT: Monitor as the bolts or tie down equipment are being removed.

4.4.3 IF bolts or tie down equipment are installed on the weather cover,
THEN remove the bolts or tie down equipment.

4.4.4 IT/EL: IF monitoring equipment (temperature or pressure wiring) is installed on the weather cover,
THEN remove the monitoring equipment.

NOTE: *Weather cover removal is an ordinary lift. The VSC-17 weather cover, COV-DSF-1, weighs 1,600 lb. The V-21 weather cover weighs 1,150 lb.*

4.4.5 EO: Rig the weather cover.

4.4.6 RCT: Monitor the weather cover as it is being removed.

4.4.7 EO: Raise the weather cover and place per supervision direction.

4.4.8 IF the weather cover has a gasket
AND the gasket remains with the cask,
THEN leave the gasket in place.

4.4.9 System Engineer or Designated Alternate: Perform a visual inspection of the top of the cask specifically looking for signs of corrosion degradation or moisture.

4.4.10 IF NOT proceeding to other cask activities,
THEN return the equipment to the original configuration or as directed by supervision.

4.5 Removing Port Cover and Obtaining Internal Cask Pressure

4.5.1 IF port cover is installed on the cask,
THEN remove port cover.

4.5.1.1 RCT: Perform contamination survey of newly exposed cask areas.

4.5.1.1.1 RCT: IF survey results are greater than 1,000 dpm/100 cm^2 beta-gamma
AND contamination area is NOT already established,
THEN establish a contamination area per the RWP.

4.5.1.1.2 IF directed by RCT,
THEN decon the newly exposed areas.

4.5.1.2 Store cover and components.

4.5.2 Ensure the following valves on the CSS are closed:

✔	✔	✔	Valve
			VAV-DSW-20
			VAV-DSW-21
			VAV-DSW-23
			VAV-DSW-24
			VAV-DSW-27
			VAV-DSW-28
			VAV-DSW-29

4.5.3 IF pressure transducer is installed on the cask,
THEN remove the pressure transducer.

4.5.4 Connect CSS inlet hose to the cask port connector.

4.5.5 Open valve VAV-DSW-29.

4.5.6 Ensure valve VAV-DSW-28 on the CSS is open.

4.5.7 Monitor PI-DSW-124.

4.5.8 Allow pressure on PI-DSW-124 to stabilize for a minimum of one minute.

4.5.9 Record internal cask pressure on PI-DSW-124.

PI-DSW-124 _____ psig

4.5.10 Close valve VAV-DSW-28 on the CSS.

4.5.11 IF directed by supervision,
THEN perform the following:

4.5.11.1 Close valve VAV-DSW-29.

4.5.11.2 Disconnect CSS inlet hose from the cask port connector.

4.5.11.3 Install cask pressure transducer.

4.5.12 RCT: IF fittings will be disconnected on the equipment,
THEN monitor the disconnecting of this equipment.

4.5.13 IF NOT proceeding to other cask activities,
THEN return the equipment to the original configuration or as directed by supervision.

4.6 Obtaining "Blank" Sample

4.6.1 RCT: Monitor installation of sample bottle onto CSS stub tubes.

4.6.2 Ensure a sample bottle is installed (with valves closed) onto CSS stub tubes.

4.6.3 Ensure CSS and the VDS are connected per Appendix A, Figure 1, with VDS exhaust HEPA filter directed downwind of the work area.

4.6.4 Ensure the following valves on the VDS are closed:

✔	✔	✔	Valve
			1-AV-H-0037
			1-AV-GA-0038
			1-AV-H-0039

NOTE: *The vacuum pump 1-H-001 needs to warm up a minimum of 30 minutes.*

4.6.5 IF vacuum pump 1-H-001 on the VDS is NOT already running, THEN perform the following:

4.6.5.1 Ensure the gas ballast valve on the vacuum pump is open (counter-clockwise to open).

4.6.5.2 Start vacuum pump 1-H-001 on the VDS.

Start time: _____

_____

_____

_____

_____

_____

4.6.6 Ensure VAV-DSW-22 valve handle is positioned to the VDS label on the CSS.

4.6.7 Ensure the following valves on the CSS are closed:

✔	✔	✔	Valve
			VAV-DSW-20
			VAV-DSW-21
			VAV-DSW-28

4.6.8 Ensure the following valves on CSS are open:

✔	✔	✔	Valve
			VAV-DSW-23
			VAV-DSW-24
			Sample outlet valve
			Sample inlet valve
			VAV-DSW-27

4.6.9 WHEN the vacuum pump has been running a minimum of 30 minutes, THEN close the gas ballast valve on the vacuum pump (clockwise).

4.6.10 Ensure the following valves on the VDS are open:

✔	✔	✔	Valve
			1-AV-H-0037
			1-AV-GA-0038

4.6.11 RCT: Monitor HEPA filters F-DSW-103 on the CSS and 1-AV-F-0040 on the VDS.

4.6.12 Open valve VAV-DSW-21 on CSS.

4.6.13 Monitor PI-DSW-124 on the CSS.

4.6.14 WHEN PI-DSW-124 on the CSS indicates a pressure of less than -11.5 psig,
THEN position the following valves as indicated:

✔	✔	✔	VALVE	POSITION
			VAV-DSW-21 on CSS	CLOSED
			1-AV-H-0037 on the VDS	CLOSED
			Gas ballast valve on the VDS (CCW)	OPEN

4.6.15 Record pressure on PI-DSW-124 on CSS.

PI-DSW-124 _____ psig
_____ psig
_____ psig
_____ psig

4.6.16 Monitor PI-DSW-124 on the CSS for a minimum of 10 minutes.

Start time: _____ End time: _____
_____ _____
_____ _____
_____ _____

4.6.17 Record pressure on PI-DSW-124 on CSS.

PI-DSW-124 _____ psig

_____ psig

_____ psig

_____ psig

4.6.18 IF pressure changes more than 0.4 psig
AND this is the first time the pressure was NOT able to be maintained,
THEN perform the following:

4.6.18.1 Ensure the following valves on the CSS are closed:

✔	✔	✔	VALVE
			VAV-DSW-23
			VAV-DSW-27
			Sample outlet valve
			Sample inlet valve

4.6.18.2 RCT: Monitor the sample bottle removal.

4.6.18.3 Remove the sample bottle from the CSS.

4.6.18.4 Repeat Steps 4.6.1 through 4.6.18.

4.6.19 IF the pressure changes more than 0.4 psig for a second time,
THEN STOP operations and notify facility engineer and fuel handling supervision.

4.6.20 Ensure the following valves on the VDS are closed:

✔	✔	✔	VALVE
			1-AV-H-0037
			1-AV-GA-0038
			1-AV-H-0039

4.6.21 Ensure the following valves on the CSS are closed:

✔	✔	✔	VALVE
			VAV-DSW-20
			VAV-DSW-21
			VAV-DSW-23
			VAV-DSW-24
			VAV-DSW-27
			VAV-DSW-28
			Sample outlet valve
			Sample inlet valve

4.6.22 Ensure inert gas bottle, sample cart CRT-DSW-X, CSS, and the VDS are connected per Appendix A, Figure 1, with the VDS HEPA filtered exhaust downwind of the work area.

NOTE: *The designation "-X" is used to allow the component to be from sample cart CRT-DSW-1 or -2.*

4.6.23 Ensure the following valves are closed:

✔	✔	✔	VALVE
			HCV-DSW-3-X (turn counter-clockwise to close)
			NHV-DSW-2-X
			NHV-DSW-1-X (on the sample cart)

4.6.24 Ensure inert gas bottle contains a minimum 200 psig.

4.6.24.1 IF the inert gas bottle contains less than 200 psig, THEN change out the inert gas bottle and repeat Steps 4.6.22 through 4.6.24.

4.6.25 Ensure that the inert gas bottle has a quality acceptance label attached.

4.6.26 Ensure the inlet shutoff valve NHV-DSW-1-X on the sample cart is open.

4.6.27 Ensure VAV-DSW-22 valve handle is positioned to the inert gas supply label on the CSS.

4.6.28 Ensure the inert gas bottle valve is fully open.

4.6.29 Ensure the following valves are open on the CSS:

✔	✔	✔	VALVE
			VAV-DSW-20
			VAV-DSW-23
			VAV-DSW-27
			Sample Inlet valve
			Sample Outlet valve

NOTE: *If inert gas regulator valve HCV-DSW-3-X is opened too quickly, the system will overpressure outside the desired range.*

4.6.30 Very slowly open inert gas regulator valve HCV-DSW-3-X (turn clockwise to open), avoiding overpressurization, until PI-DSW-124 on the CSS indicates approximately 0 psig, then close valve NHV-DSW-1-X on the sample cart.

4.6.31 Close the inert gas regulator valve HCV-DSW-3-X (counter-clockwise to close).

4.6.32 Close the gas ballast valve on the vacuum pump (clockwise).

4.6.33 Ensure VAV-DSW-22 valve handle is positioned to the VDS label on the CSS.

4.6.34 Ensure the following valves on the VDS are open:

✔	✔	✔	VALVE
			1-AV-H-0037
			1-AV-GA-0038

4.6.35 Open VAV-DSW-21 on the CSS.

4.6.36 Open NHV-DSW-1-X on the sample cart.

4.6.37 RCT: Monitor the outlet HEPA exhaust filter on the VDS.

4.6.38 WHEN PI-DSW-124 on the CSS stabilizes on the maximum vacuum achievable
AND indicates less than –11.5 psig,
THEN close valve VAV-DSW-21 on the CSS.

4.6.39 Allow pressure on PI-DSW-124 on the CSS to stabilize for a minimum of one minute.

4.6.40 Record pressure indication on PI-DSW-124 on the CSS.

PI-DSW-124 _____ psig

PI-DSW-124 _____ psig

4.6.41 Ensure VAV-DSW-22 valve handle is positioned to the inert gas supply label on the CSS.

4.6.42 Allow pressure on PI-DSW-124 on the CSS to stabilize for a minimum of one minute.

4.6.42.1 Record pressure indication on PI-DSW-124 on the CSS.

PI-DSW-124 _____ psig

PI-DSW-124 _____ psig

4.6.43 Open the gas ballast valve on the vacuum pump 1-H-001 on the VDS (counter-clockwise to open).

NOTE: *If inert gas regulator valve HCV-DSW-3-X is opened too quickly the system will overpressure outside the desired range. To prevent this condition ensure that HCV-DSW-3-X is opened very slowly until pressure increase rate is determined.*

4.6.44 Slowly open the inert gas regulator valve HCV-DSW-3-X (turn clockwise to open) until PI-DSW-124 on the CSS indicates approximately 0 psig, then close the valve NHV-DSW-1-X on the sample cart.

4.6.44.1 IF HCV-DSW-3-X was opened too quickly and the system was over pressurized,
THEN perform the following:

4.6.44.1.1 Slowly open bleed valve NHV-DSW-2-X until system pressure is normalized.

4.6.44.1.2 Repeat Step 4.6.44.

4.6.45 Close the inert gas regulator valve HCV-DSW-3-X (counter-clockwise to close).

4.6.46 Close the inert gas bottle valve.

4.6.47 Allow pressure on PI-DSW-124 on the CSS to stabilize for a minimum of one minute.

4.6.47.1 Record pressure indication on PI-DSW-124 on the CSS.

PI-DSW-124 _____ psig

PI-DSW-124 _____ psig

4.6.48 Ensure the following valves on the CSS are closed in the order listed:

✔	✔	✔	VALVE
			Sample cylinder outlet valve
			Sample cylinder inlet valve
			VAV-DSW-23
			VAV-DSW-27

4.6.49 IF directed by supervision
THEN shut down vacuum pump 1-H-001 on the VDS.

4.6.50 Ensure the following valves on the VDS are closed:

✔	✔	✔	VALVE
			1-AV-H-0037
			1-AV-GA-0038
			1-AV-H-0039

4.6.51 Ensure the following valves on the CSS are closed:

✔	✔	✔	VALVE
			VAV-DSW-20
			VAV-DSW-21
			VAV-DSW-24
			VAV-DSW-28

NOTE: *Steps 4.6.52 through 4.6.59 may be performed concurrently as directed by supervision.*

4.6.52 RCT: Perform radiation survey on "blank" sample bottle.

4.6.52.1 RCT: IF survey results are greater than 100 mR/hr at 30 cm, THEN perform the following.

4.6.52.1.1 STOP work and notify supervision and RadCon supervision for an evaluation.

4.6.52.1.2 DO NOT continue without RadCon supervision approval.

4.6.53 IF survey results are less than 100 mR/hr at 30 cm, THEN remove sample bottle.

4.6.54 RCT: Perform contamination survey on "blank" sample bottle.

4.6.54.1 IF survey results are greater than 1,000 dpm/100 cm^2 beta-gamma, THEN perform the following:

4.6.54.1.1 STOP work and notify supervision and RadCon supervision for an evaluation.

4.6.54.1.2 DO NOT continue without RadCon supervision approval.

4.6.55 Plug both "blank" sample bottle valves using Swagelock plugs.

4.6.56 RCT: Label "blank" sample bottle as having potential internal contamination.

4.6.57 Install ONE of the following on the CSS as directed by supervision:

A. A "dummy" sample bottle

B. A HEPA filtered jumper

C. The caps

D. Another sample bottle.

4.6.58 Fill out the provided sample bottle label using a grease pencil with the following information:

A. Operator

B. Date

C. Time

D. Cask #

E. Sample # "Blank Sample."

4.6.59 Attach the sample bottle label to the sample bottle.

4.6.60 Place "blank" sample bottle in a safe area to prevent damage to the sample bottle valves.

4.6.61 IF another "blank" sample is required to be taken,
GO TO Step 4.6.1
WITHOUT RETURNING TO this step.

4.6.62 RCT: IF fittings will be disconnected on the equipment,
THEN monitor the disconnecting of this equipment.

4.6.63 IF NOT proceeding to other cask activities,
THEN return the equipment to the original configuration or as directed by supervision.

4.7 Sampling Cask Atmosphere

4.7.1 RCT: Monitor installation of sample bottle onto CSS stub tubes.

4.7.2 Ensure a sample bottle is installed (with valves closed) onto CSS stub tubes.

4.7.3 Ensure CSS and the VDS are connected per Appendix A, Figure 1, with VDS exhaust HEPA filter directed downwind of the work area.

4.7.4 Ensure the following valves on the VDS are closed:

✔	✔	✔	Valve
			1-AV-H-0037
			1-AV-GA-0038
			1-AV-H-0039

NOTE: *The vacuum pump 1-H-001 needs to warm up a minimum of 30 minutes.*

4.7.5 IF vacuum pump 1-H-001 on the VDS is NOT already running, THEN perform the following:

4.7.5.1 Ensure the gas ballast valve on the vacuum pump is open (counter-clockwise to open).

4.7.5.2 Start vacuum pump 1-H-001 on the VDS.

Start time: _____

_____

_____

_____

4.7.6 Ensure VAV-DSW-22 valve handle is positioned to the VDS label on the CSS.

4.7.7 Ensure the following valves on the CSS are closed:

✔	✔	✔	Valve
			VAV-DSW-20
			VAV-DSW-21
			VAV-DSW-28

4.7.8 Ensure the following valves on CSS are open:

✔	✔	✔	Valve
			VAV-DSW-23
			VAV-DSW-24
			Sample outlet valve
			Sample inlet valve
			VAV-DSW-27

4.7.9 WHEN the vacuum pump has been running a minimum of 30 minutes, THEN close the gas ballast valve on the vacuum pump (clockwise).

4.7.10 Ensure the following valves on the VDS are open:

✔	✔	✔	Valve
			1-AV-H-0037
			1-AV-GA-0038

4.7.11 RCT: Monitor HEPA filters F-DSW-103 on the CSS and 1-AV-F-0040 on the VDS.

4.7.12 Open valve VAV-DSW-21 on CSS.

4.7.13 Monitor PI-DSW-124 on the CSS.

4.7.14 WHEN PI-DSW-124 on the CSS indicates a pressure of less than -11.5 psig,
THEN position the following valves as indicated:

✔	✔	✔	VALVE	POSITION
			VAV-DSW-21 on CSS	CLOSED
			1-AV-H-0037 on the VDS	CLOSED
			Gas ballast valve on the VDS (CCW)	OPEN

4.7.15 Record pressure on PI-DSW-124 on CSS.

PI-DSW-124 _____ psig
_____ psig
_____ psig
_____ psig

4.7.16 Monitor PI-DSW-124 on the CSS for a minimum of 10 minutes.

Start time: _____ End time: _____
_____ _____
_____ _____
_____ _____

4.7.17 Record pressure on PI-DSW-124 on CSS.

PI-DSW-124 _____ psig

_____ psig

_____ psig

_____ psig

4.7.18 IF pressure changes more than 0.4 psig
AND this is the first time the pressure was NOT able to be maintained,
THEN perform the following.

4.7.18.1 Ensure the following valves on the CSS are closed:

✔	✔	✔	VALVE
			VAV-DSW-23
			VAV-DSW-27
			Sample outlet valve
			Sample inlet valve

4.7.18.2 RCT: Monitor the sample bottle removal.

4.7.18.3 Remove the sample bottle from the CSS.

4.7.18.4 Repeat Steps 4.7.1 through 4.7.18.

4.7.19 IF the pressure changes more than 0.4 psig for a second time,
THEN STOP operations and notify facility engineer and fuel handling supervision.

4.7.20 Ensure the following valves on the VDS are closed:

✔	✔	✔	VALVE
			1-AV-H-0037
			1-AV-GA-0038
			1-AV-H-0039

4.7.21 Ensure the following valves on the CSS are closed:

✔	✔	✔	VALVE
			VAV-DSW-20
			VAV-DSW-21
			VAV-DSW-23
			VAV-DSW-24
			VAV-DSW-27
			VAV-DSW-28
			Sample outlet valve
			Sample inlet valve

4.7.22 IF port cover is installed on the cask,
THEN remove port cover.

4.7.22.1 RCT: Perform contamination survey of newly exposed areas.

4.7.22.1.1 RCT: IF survey results are greater than 1,000 dpm/100 cm^2 beta-gamma
AND contamination area is NOT already established,
THEN establish a contamination area per the RWP.

4.7.22.1.2 IF directed by RCT,
THEN decon as directed by RCT and supervision.

4.7.22.2 Store cover and components.

4.7.23 IF pressure transducer is installed on the cask,
THEN remove the pressure transducer.

4.7.24 Ensure the CSS inlet hose is connected to the cask port connector.

4.7.25 Ensure valve VAV-DSW-29 is open.

4.7.26 Ensure VAV-DSW-22 valve handle is positioned to the VDS label on the CSS.

4.7.27 Ensure the following valves on CSS are open:

✔	✔	✔	VALVE
			VAV-DSW-23
			Sample cylinder inlet valve
			Sample cylinder outlet valve
			VAV-DSW-27

4.7.28 Close the gas ballast valve on the vacuum pump (clockwise).

4.7.29 Ensure the following valves on the VDS are open:

✔	✔	✔	VALVE
			1-AV-H-0037
			1-AV-GA-0038

4.7.30 RCT: Monitor HEPA filters F-DSW-103 on the CSS and the outlet HEPA filter on the VDS during sampling activities.

4.7.31 Open valves VAV-DSW-28 and VAV-DSW-21 on the CSS.

4.7.32 IF a rise in radiation is detected,
THEN close VAV-DSW-21 on CSS and 1-AV-H-0037 on the VDS.

NOTE: *If the radiation level rises due to noble gases, the radiation level will dissipate after valves VAV-DSW-21 on the CSS and 1-AV-H-0037 on the VDS are CLOSED. It may take as long as 15 to 20 minutes for the radiation level to dissipate. If the radiation level rises due to particulate contamination, the radiation level will remain elevated after the inert gas supply is shut off.*

4.7.32.1 IF the source of the radiation is determined to be particulate,
THEN perform the following:

4.7.32.1.1 STOP the operation in progress.

4.7.32.1.2 Notify the system engineer or the facility manager.

4.7.32.2 IF the source of the radiation is determined to be a gas,
THEN ensure the following:

4.7.32.2.1 Valve VAV-DSW-21 on the CSS and 1-AV-H-0037 on the VDS are open.

4.7.32.2.2 The exhaust of vacuum pump 1-H-001 on the VDS is downwind of the work area.

4.7.33 Record pressure from PI-DSW-124 on the CSS.

Pressure: _____

Pressure: _____

NOTE: *To make sure a proper sample is taken in the following steps it is necessary to ensure a vacuum of at least -1 psi has been achieved from the starting value recorded in Step 4.7.33.*

4.7.34 Allow vacuum indicated on PI-DSW-124 to decrease by -1 psi as indicated on PI-DSW-124 and record the value below.

Pressure: _____

Pressure: _____

4.7.35 Close valve VAV-DSW-21 on the CSS.

4.7.36 Ensure the following valves are closed in the listed order on the CSS:

✔	✔	✔	VALVE
			Sample cylinder outlet valve
			Sample cylinder inlet valve
			VAV-DSW-23
			VAV-DSW-27

4.7.37 Ensure the following valves are closed on the VDS:

✔	✔	✔	VALVE
			1-AV-H-0037
			1-AV-GA-0038

4.7.38 Open gas ballast valve on the vacuum pump 1-H-001 on the VDS (counter-clockwise to open).

4.7.39 Allow pressure on PI-DSW-124 on the CSS to stabilize for a minimum of one minute.

4.7.40 Record pressure indication on PI-DSW-124 on the CSS.

PI-DSW-124 _____ psig

PI-DSW-124 _____ psig

4.7.41 Close valve VAV-DSW-28 on the CSS.

4.7.42 IF sampling is completed for the shift
OR directed by supervision to shut down the vacuum pump,
THEN perform the following:

4.7.42.1 Ensure the gas ballast valve on the vacuum pump 1-H-001 on the VDS is open (counter-clockwise to open).

4.7.42.2 Shut down vacuum pump 1-H-001 on the VDS.

4.7.43 Ensure the following valves on the VDS are closed:

✔	✔	✔	VALVE
			1-AV-H-0037
			1-AV-GA-0038
			1-AV-H-0039

NOTE: *Steps 4.7.44 through 4.7.51 may be performed concurrently as directed by supervision.*

4.7.44 RCT: Perform radiation survey on sample bottle.

4.7.44.1 IF survey results are greater than 100 mR/hr at contact,
THEN perform the following:

4.7.44.1.1 STOP work and notify supervision and RadCon supervision for an evaluation.

4.7.44.1.2 DO NOT continue without RadCon supervision approval.

4.7.45 IF survey results are less than 100 mR/hr at contact,
THEN remove sample bottle.

4.7.46 RCT: Perform contamination survey on sample bottle.

4.7.46.1 IF survey results are greater than 1,000 dpm/100 cm² beta-gamma, THEN perform the following:

4.7.46.1.1 STOP work and notify supervision and RadCon supervision for an evaluation.

4.7.46.1.2 DO NOT continue without RadCon supervision approval.

4.7.47 Plug both sample bottle valves using Swagelock plugs.

4.7.48 Install ONE of the following on the CSS as directed by supervision:

A. A "dummy" sample bottle

B. A HEPA filtered jumper

C. The caps

D. Another sample bottle.

4.7.49 RCT: Label sample bottle as having potential internal contamination.

4.7.50 Fill out the provided sample bottle label using a grease pencil with the following information:

A. Operator

B. Date

C. Time

D. Cask #

E. Sample #.

4.7.51 Attach the sample bottle label to the sample bottle.

4.7.52 Place sample bottle in a safe area to prevent damage to the sample bottle valves.

4.7.53 IF another sample is required to be taken,
GO TO Step 4.7.1
WITHOUT RETURNING TO this step.

4.7.54 Record time and date the cask sampling activities are completed.

_____ _____
Time Date

4.7.55 RCT: Perform final contamination survey on all equipment and cask sample area.

4.7.56 IF survey results are greater than 1,000 dpm/100 cm² beta-gamma, THEN perform the following:

4.7.56.1 STOP work and notify supervision and RadCon supervision for an evaluation.

4.7.56.2 DO NOT continue without RadCon supervision approval.

4.7.57 Close valve VAV-DSW-29.

4.7.58 RCT: Monitor the disconnecting of this equipment.

4.7.59 Disconnect CSS inlet hose from cask port connector.

4.7.60 Install cask pressure transducer.

4.7.61 RCT: IF fittings will be disconnected on the equipment, THEN monitor the disconnecting of this equipment.

4.7.62 IF NOT proceeding to other cask activities, THEN return the equipment to the original configuration or as directed by supervision.

4.8 Venting the Cask

4.8.1 Ensure the following valves on the CSS are closed:

✔	✔	✔	VALVE
			VAV-DSW-20
			VAV-DSW-21
			VAV-DSW-23
			VAV-DSW-24
			VAV-DSW-27
			VAV-DSW-28
			VAV-DSW-29

4.8.2 IF the HEPA filtered jumper will be installed,
THEN perform the following:

4.8.2.1 Request RCT to monitor the installation of the jumper.

4.8.2.2 Ensure HEPA filtered jumper is installed on the CSS and workers remain upwind.

4.8.3 IF port cover is installed on the cask,
THEN remove port cover.

4.8.3.1 RCT: Perform contamination survey of newly exposed areas.

4.8.3.1.1 RCT: IF survey results are greater than 1,000 dpm/100 cm^2 beta-gamma
AND contamination area is NOT already established,
THEN establish a contamination area per the RWP.

4.8.3.1.2 IF directed by RCT,
THEN decon as directed by RCT and supervision.

4.8.3.2 Store cover and components.

4.8.4 IF pressure transducer is installed on the cask,
THEN remove the pressure transducer.

4.8.5 Ensure the CSS inlet hose is connected to the cask port connector.

4.8.6 Ensure valve VAV-DSW-29 is open.

4.8.7 RCT: Monitor HEPA filters F-DSW-103 and HEPA filter on the jumper on the CSS during venting activities.

4.8.8 Open the following valves on the CSS in the order listed:

✔	✔	✔	VALVE
			VAV-DSW-27
			VAV-DSW-28

4.8.9 IF a rise in radiation is detected,
THEN close VAV-DSW-28 on CSS.

NOTE: *If the radiation level rises due to noble gases, the radiation level will dissipate after VAV-DSW-28 on the CSS is CLOSED. It may take as long as 15 to 20 minutes for the radiation level to dissipate. If the radiation level rises due to particulate contamination, the radiation level will remain elevated after the inert gas supply is shut off.*

4.8.9.1 IF the source of the radiation is determined to be particulate,
THEN STOP the operation in progress and notify the system engineer or the facility manager.

4.8.9.2 IF the source of the radiation is determined to be a noble gas,
THEN ensure the following:

4.8.9.2.1 Valve VAV-DSW-28 on the CSS is open.

4.8.9.2.2 The workers remain upwind of the exhaust from the HEPA on the jumper on the CSS.

4.8.10 Monitor PI-DSW-124 on the CSS.

4.8.11 WHEN PI-DSW-124 on the CSS indicates approximately 0 psig and NO airflow is audible through the HEPA filter,
THEN CLOSE the following valves in the listed order on the CSS:

✔	✔	✔	VALVE
			VAV-DSW-28
			VAV-DSW-27

4.8.12 RCT: Monitor the removal of the HEPA filtered jumper.

4.8.13 Remove the HEPA filtered jumper from the CSS.

4.8.14 IF directed by supervision,
THEN change out the HEPA filter as directed by RCT.

4.8.15 Install the "Dummy" sample cylinder on the CSS.

4.8.16 Close valve VAV-DSW-29.

4.8.17 RCT: Monitor the disconnecting of this equipment.

4.8.18 Disconnect CSS inlet hose from cask port connector.

4.8.19 Install the cask pressure transducer.

4.8.20 RCT: Perform final contamination survey on all equipment and cask venting area.

4.8.20.1 IF survey results are greater than 1,000 dpm/100 cm² beta-gamma, THEN perform the following:

4.8.20.1.1 STOP work and notify supervision and RadCon supervision for an evaluation.

4.8.20.1.2 DO NOT continue without RadCon supervision approval.

4.8.21 IF NOT proceeding to other cask activities, THEN return the equipment to the original configuration or as directed by supervision.

4.9 Back-Filling Cask with Inert gas

4.9.1 Ensure inert gas bottle, sample cart CRT-DSW-X, CSS, and the VDS are connected per Appendix A, Figure 1 with the VDS HEPA filtered exhaust downwind of the work area.

NOTE: *The designation "-X" is used to allow the component to be from sample cart CRT-DSW-1 or -2.*

4.9.2 Ensure the following valves are closed:

✔	✔	✔	VALVE
			HCV-DSW-3-X (turn counter-clockwise to close)
			NHV-DSW-2-X
			NHV-DSW-1-X (on the sample cart)

4.9.3 Ensure inert gas bottle contains a minimum 200 psig.

Bottle Initial Pressure: _____

4.9.3.1 IF the inert gas bottle contains less than 200 psig, THEN change out the inert gas bottle and repeat Steps 4.9.1 through 4.9.3.

4.9.4 Ensure that the inert gas bottle has a quality acceptance label attached.

4.9.5 IF port cover is installed on the cask,
THEN remove port cover.

4.9.5.1 RCT: Perform contamination survey of newly exposed areas.

4.9.5.1.1 RCT: IF survey results are greater than 1,000 dpm/100 cm^2 beta-gamma AND contamination area is NOT already established,
THEN establish a contamination area per the RWP.

4.9.5.1.2 IF directed by RCT,
THEN decon as directed by RCT and Supervision.

4.9.5.2 Store cover and components.

4.9.6 IF pressure transducer is installed on the cask,
THEN remove the pressure transducer.

4.9.7 Ensure the CSS inlet hose is connected to the cask port connector.

4.9.8 Ensure valve VAV-DSW-29 is open.

4.9.9 Ensure the following valves on the VDS are closed:

✔	✔	✔	VALVE
			1-AV-H-0037
			1-AV-GA-0038
			1-AV-H-0039

NOTE: *The vacuum pump 1-H-001 on the VDS needs to warm up a minimum of 30 minutes.*

4.9.10 IF vacuum pump 1-H-001 on the VDS is NOT already running,
THEN perform the following:

4.9.10.1 Ensure the gas ballast valve on the vacuum pump on the VDS is open (counter-clockwise to open).

4.9.10.2 Start vacuum pump 1-H-001 on the VDS.

Start time: _____

4.9.11 Ensure the following valves on CSS are closed:

✔	✔	✔	VALVE
			VAV-DSW-20
			VAV-DSW-21
			VAV-DSW-23
			VAV-DSW-24
			VAV-DSW-27
			VAV-DSW-28

4.9.12 Ensure the "Dummy" sample cylinder with both valves closed is installed onto the CSS.

4.9.13 Ensure the following valves on the CSS are open:

✔	✔	✔	VALVE
			VAV-DSW-24
			VAV-DSW-28

4.9.14 WHEN the vacuum pump has been running a minimum of 30 minutes, THEN close the gas ballast valve on the vacuum pump (clockwise).

4.9.15 Ensure VAV-DSW-22 valve handle is positioned to the VDS label on the CSS.

4.9.16 Ensure following valves on the VDS are open:

✔	✔	✔	VALVE
			1-AV-H-0037
			1-AV-GA-0038

4.9.17 RCT: Monitor HEPA filters F-DSW-103 on the CSS and the exhaust HEPA filter on the VDS during back filling activities.

4.9.18 Open valve VAV-DSW-21 on the CSS.

4.9.19 IF a rise in radiation is detected,
THEN close VAV-DSW-21 on CSS and 1-AV-H-0037 on the VDS.

NOTE: *If the radiation level rises due to noble gases, the radiation level will dissipate after valves VAV-DSW-21 on the CSS and 1-AV-H-0037 on the VDS are CLOSED. If the radiation level rises due to particulate contamination, the radiation level will remain.*

4.9.19.1 IF the source of the radiation is determined to be particulate,
THEN perform the following:

4.9.19.1.1 STOP the operation in progress.

4.9.19.1.2 Notify the system engineer or the facility manager.

4.9.19.2 IF the source of the radiation is determined to be a noble gas,
THEN ensure the following:

4.9.19.2.1 VAV-DSW-21 on the CSS and 1-AV-H-0037 on the VDS are open.

4.9.19.2.2 The exhaust of vacuum pump 1-H-001 on the VDS is downwind of the work area.

4.9.20 Monitor PI-DSW-124 on the CSS.

4.9.21 WHEN PI-DSW-124 on the CSS indicates less than -11.5 psig,
THEN CLOSE valve VAV-DSW-21 on the CSS and 1-AV-H-0037 on the VDS.

4.9.22 Open the gas ballast valve on the vacuum pump 1-H-001 on the VDS (counter-clockwise to open).

4.9.23 IF directed by supervision to shut down the vacuum pump,
THEN shut down vacuum pump 1-H-001 on the VDS.

4.9.24 Ensure the following valves on the VDS are closed:

✔	✔	✔	VALVE
			1-AV-GA-0038
			1-AV-H-0039

4.9.25 Ensure VAV-DSW-22 valve handle is positioned to inert gas supply label on the CSS.

4.9.26 Ensure the following valves are closed:

✔	✔	✔	VALVE
			Inert gas bottle valve
			HCV-DSW-3-X (turn counter-clockwise to close)
			NHV-DSW-2-X

4.9.27 Ensure the inlet shutoff valve NHV-DSW-1-X on the sample cart is open.

4.9.28 Open inert gas bottle valve.

4.9.29 Ensure valve VAV-DSW-20 is open on the CSS.

NOTE 1: *Steps 4.9.30 and 4.9.31 are performed concurrently.*

NOTE 2: *If inert gas regulator valve HCV-DSW-3-X is opened too quickly the system will overpressure outside the desired range.*

4.9.30 Without exceeding 10 to 11 psi on PI-DSW-X on the sample cart, open the inert gas regulator valve HCV-DSW-3-X (turn clockwise to open).

4.9.30.1 Ensure that HCV-DSW-3-X is opened very slowly, to prevent system from over pressurizing, until pressure increase rate is determined.

4.9.30.2 IF the inert gas bottle reaches approximately 50 psig, THEN repeat Step 4.9.26.

4.9.30.2.1 Record the final pressure of the inert gas bottle.

Bottle Final Pressure: _____

Bottle Final Pressure: _____

Bottle Final Pressure: _____

4.9.30.2.2 Replace the inert gas bottle, and record the initial pressure of the bottle.

Bottle Final Pressure: _____

Bottle Final Pressure: _____

Bottle Initial Pressure: _____

4.9.30.2.3 Ensure that the inert gas bottle has a quality acceptance label attached.

4.9.30.2.4 Repeat Steps 4.9.27 through 4.9.30.

4.9.31 WHEN PI-DSW-124 on the CSS indicates approximately -1 psig OR as directed by the supervision or facility engineer, THEN close valve VAV-DSW-20 and VAV-DSW-24.

4.9.31.1 Record time and pressure from PI-DSW-124 on the CSS.

Time: _____ Pressure (psig): _____

4.9.31.2 Record the final pressure of the inert gas bottle.

Bottle Final Pressure: _____

4.9.32 Ensure the following valves are closed:

✔	✔	✔	VALVE
			Inert gas bottle valve
			HCV-DSW-3-X (turn counter clockwise to close)
			NHV-DSW-1-X (on the sample cart)

4.9.33 Close valve VAV-DSW-28 on the CSS:

4.9.34 IF directed by supervision, THEN remove CSS inlet hose from the cask port connector.

4.9.34.1 IF directed by supervision, THEN install cask pressure transducer.

4.9.35 RCT: IF fittings will be disconnected on the equipment, THEN monitor the disconnecting of this equipment.

4.9.36 IF NOT proceeding to other cask activities, THEN return the equipment to the original configuration or as directed by supervision.

4.10 Reinstalling Port Cover

4.10.1 Reinstall cover over port and align bolt holes.

4.10.2 Install cover bolts hand tight.

4.10.3 IF NOT proceeding to other cask activities, THEN return the equipment to the original configuration or as directed by supervision.

4.11 Installing Weather Cover on Cask

4.11.1 IF there is a gasket installed,
THEN clean and remove debris from the gasket seal surface of the weather cover and cask.

4.11.2 IF this is the VSC-17 cask
AND the gasket is NOT installed on the cask,
THEN install the gasket to the cask using Loctite adhesive (part number 401) wearing nitrile gloves and safety glasses/goggles.

NOTE: *Weather cover installation is an ordinary lift. The VSC-17 weather cover, COV-DSF-1, weighs 1,600 lb. The V-21 weather cover weighs 1,150 lb.*

4.11.3 EO: Rig the weather cover.

NOTE 1: *Steps 4.11.4 and 4.11.5 may be worked concurrently.*

NOTE 2: *Personnel are not allowed to reach hands, arms or other body parts under suspended load. If it is necessary to reach under to attach instruments or instrument cabling, a long reach tool needs to be used.*

WARNING

Working under a suspended load is NOT authorized and may cause injury to personnel.

4.11.4 IT/EL: IF monitoring equipment (temperature or pressure wiring) is installed on the weather cover,
THEN replace the monitoring equipment using a reach tool as necessary to prevent any body parts from coming under the suspended load.

4.11.5 EO: Raise the weather cover and place per supervision direction.

4.11.6 IF bolts or tie down equipment needs installed on the weather cover,
THEN install the bolts or tie down equipment.

4.11.7 IF installing the weather cover on the VSC-17 cask,
THEN perform the following steps:

4.11.7.1 Obtain calibrated torque wrench(s) capable of torquing 75 ft • lb, 100 ft-lb, and 150 ft • lb.

4.11.7.2 Record the information required in the following table:

Torque Wrench ID Number			
Calibration Due Date			
Torque Wrench Range			

NOTE: *Steps 4.11.7.3 through 4.11.7.6 are to allow for equal pressure to be applied to the weather cover gasket as it is being tightened. Only approximate torque values are required for these steps.*

4.11.7.3 Appendix Set torque wrench to 75 ft • lb.

4.11.7.4 Torque each bolt in a star pattern as designated in A, Figure 2.

4.11.7.5 Set torque wrench to 100 ft • lb.

4.11.7.6 Torque each bolt in a star pattern as designated in Appendix A, Figure 2.

4.11.7.7 Set torque wrench to 150 ft • lb.

4.11.7.8 Torque weather cover bolts to 150 ft • lb in a star pattern as designated in Appendix A, Figure 2.

4.11.8 SG: IF TID is to be installed on the weather cover, THEN install the TID.

4.11.9 IF NOT proceeding to other cask activities, THEN return the equipment to the original configuration or as directed by supervision.

4.12 Performing Post Performance Activities

4.12.1 Clean work area.

4.12.2 Store all equipment and tools in designated area and bag out waste.

4.12.3 Supervision: perform a post-job review per MCP-3003.

5. RECORDS

Consumable copies of this procedure

Form 434.14, "Pre-Job Briefing Checklist"

Form 434.15, "Pre-job Briefing Attendance Record"

NOTE: *MCP-557, "Records Management," the INL Records Schedule Matrix, and associated record types list(s) provide current information on the storage, turnover, and retention requirements for these records.*

6. REFERENCES

LST-372, "Criticality Safety Controls List for SAR-112"

MCP-1390, "Waste Generator Services Waste Management"

MCP-2692, "Ergonomics Program"

MCP-2704, "Heat and Cold Stress"

MCP-2750, "Preventing Disease from Rodents, Birds and Bats"

MCP-3003, "Performing Pre-job Briefings and Documenting Feedback"

PRD-650, "ICP Hoisting and Rigging Requirements"

PRD-5107, "Aerial Lifts and Elevating Work Platforms"

SAR-112, "Safety Analysis Report for the Underground Fuel Storage Facility"

TSR-112, "Technical Safety Requirements for the Underground Fuel Storage Facility"

7. APPENDIXES

Appendix A, Figures

Appendix B, Procedure Hazard Analysis

Appendix C, Procedure Basis

Appendix A

Figures

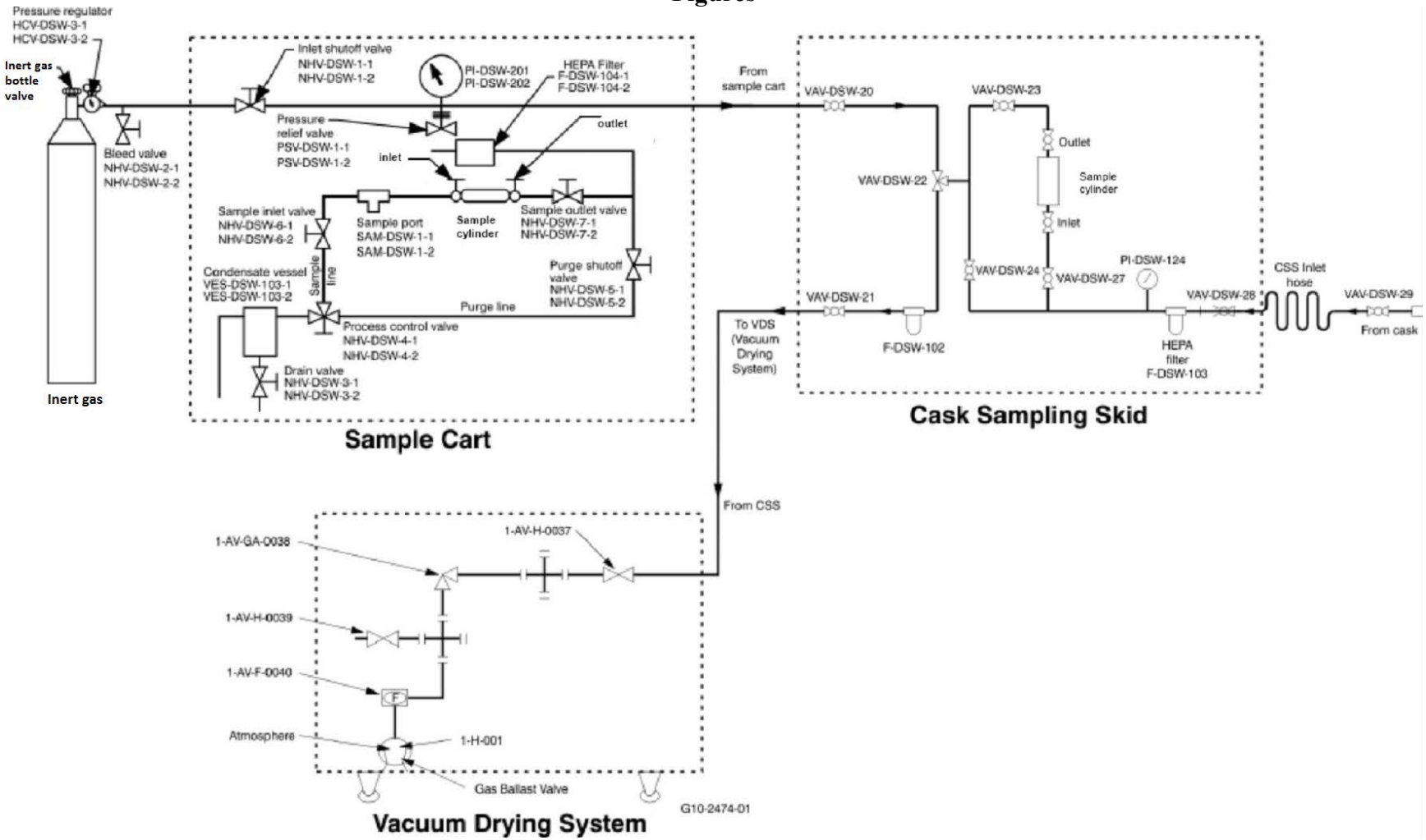

Figure 1. Sample cart CRT-DSW-X, cask sampling skid, and vacuum drying system.

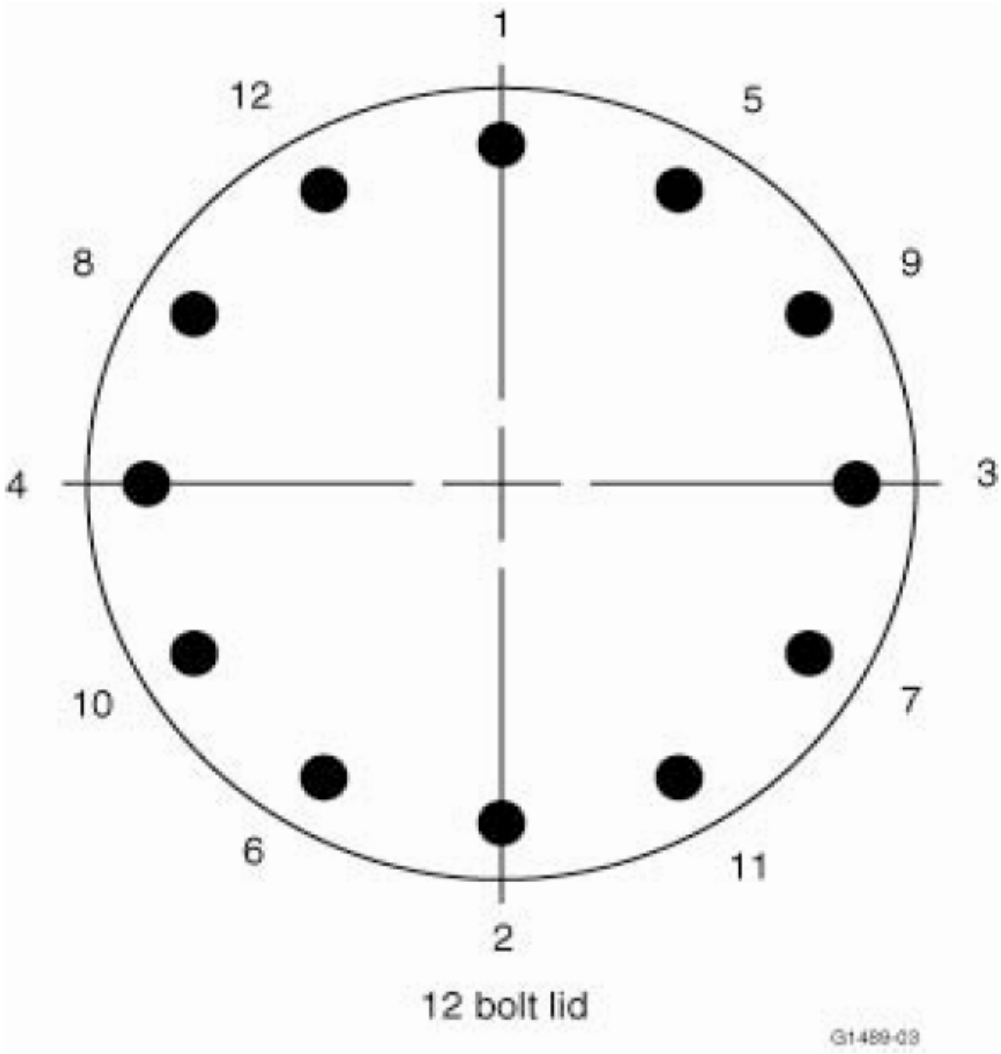

Figure 2. VSC-17 weather cover torque pattern.

Appendix B

Procedure Hazard Analysis

Highly Hazardous Activity? ☐ Yes ☒ No	HPSC No.: JSA-1655

Disciplines (SMEs) involved in hazard analysis: (Checking the box indicates discipline is/was involved in the hazard analysis for this procedure.)

	Discipline		Discipline		Discipline
☒	Industrial Safety	☒	RCT/RAD Eng.	☒	Engineering
☒	Industrial Hygiene	☒	Env. Protection	☒	Operations
☒	Fire Protection	☒	Quality Assurance	☐	Other:

Required Job Training/Required Personal Protective Equipment

Training	PPE
Radiological worker II	Hand Protection
Certified Fuel Handler	Safety glasses or goggles
Heat/Cold Stress	Hearing protection (if in close proximity)
Ladder Safety	Substantial footwear with protective toe caps
Aerial Lift (as required)	Nitrile gloves
Compressed Gas	
Fall Protection	

Sequence of Basic Job Steps	Potential Hazards	Hazard Control/PPE
1. General requirements (hazards applicable to the whole procedure)	1a. Weather conditions	1a. Technical Lead (TL) must evaluate weather conditions for the tasks to be performed.
	1b. Manual lifting	1b. Proper lifting techniques must be used per MCP-2692, "Ergonomics Program."
	1c. Body positioning	1c. Body positioning during bolt tightening and loosening activities must be used per MCP-2692.
	1d. Aerial lifts	1d. Aerial lift operator training is required to run the lift. Others in the lift will require fall protection training.
	1e. Heat/cold stress	1e. Heat/cold stress stay times must be followed per MCP-2704, "Heat and Cold Stress."
	1f. Waste generation	1f. All waste will be approved and disposed per MCP-1390, "Waste Generator Services Waste Management."
2. Performing purge of cask sampling skid	2a. Tripping hazard/uneven walking working surface, dropped/ falling object	2a. Operator to be briefed on the tripping hazards around the casks. Substantial footwear with protective toe caps required for work in areas where dropped/falling objects, tripping hazards, or uneven surfaces exist.
	2b. Radiological	2b. RWP, briefed on radiological/contamination levels, Radiological postings and training.
	2c. Pinching	2c. Leather gloves must be worn when manipulating valves and connecting equipment.

Sequence of Basic Job Steps	Potential Hazards	Hazard Control/PPE
(2. continued)	2d. Hantavirus	2d. Request cleanup per MCP-2750, "Preventing Disease from Rodents, Birds, and Bats," of any rodent feces, urine, and other biological materials found.
	2e. Compressed gas	2e. Safety glasses with side shields must be worn when installing the regulator. Regulator must be secured when in transit. The gas cylinder must be secured to a cylinder cart while in transit and in use. The bottle cap must be installed when the gas cylinder is not in use.
3. Removing weather cover from cask	3a. Tripping hazard/uneven walking working surface, dropped/ falling object	3a. Operator to be briefed on the tripping hazards around the casks. Substantial footwear with protective toe caps required for work in areas where dropped/falling objects, tripping hazards, or uneven surfaces exist.
	3b. Radiological	3b. RWP, briefed on radiological/contamination levels, Radiological postings and training.
	3c. Pinching	3c. Leather gloves must be worn when handling the weather cover and connecting rigging.
	3d. Hantavirus	3d. Request cleanup per MCP-2750 of any rodent feces, urine, and other biological materials found.
	3e. Fall	3e. Workers are to maintain 3-point contact while climbing ladders. Fall protection training required for aerial lifts.
	3f. Burn	3f. Leather gloves must be worn when working around thermally hot equipment.
	3g. Head Protection	3g. Hard hats are to be worn in the close proximity of all lifts.
4. Removing port cover and obtain internal cask pressure	4a. Tripping hazard/uneven walking working surface, dropped/ falling object	4a. Operator to be briefed on the tripping hazards around the casks. Substantial footwear with protective toe caps required for work in areas where dropped/falling objects, tripping hazards, or uneven surfaces exist.
	4b. Radiological	4b. RWP, briefed on radiological/contamination levels, Radiological postings and training.
	4c. Pinching	4c. Leather gloves must be worn when manipulating valves and connecting equipment.
	4d. Hantavirus	4d. Request cleanup per MCP-2750 of any rodent feces, urine, and other biological materials found.
	4e. Fall	4e. Workers are to maintain 3-point contact while climbing ladders. Fall protection training required for aerial lifts.
	4f. Burn	4f. Leather gloves must be worn when working around thermally hot equipment.
5. Obtaining "blank" sample	5a. Tripping hazard/uneven walking working surface, dropped/ falling object	5a. Operator to be briefed on the tripping hazards around the casks. Substantial footwear with protective toe caps required for work in areas where dropped/falling objects, tripping hazards, or uneven surfaces exist.
	5b. Radiological	5b. RWP, briefed on radiological/contamination levels, Radiological postings and training.
	5c. Pinching	5c. Leather gloves must be worn when manipulating valves and connecting equipment.

Sequence of Basic Job Steps	Potential Hazards	Hazard Control/PPE
(5. continued)	5d. Hantavirus	5d. Request cleanup per MCP-2750 of any rodent feces, urine, and other biological materials found.
	5e. Burn	5e. Leather gloves must be worn when working around thermally hot equipment.
	5f. Electrical	5f. GFCI must be used with electrical equipment.
	5g. Noise	5g. Hearing protection must be utilized in close proximity to generator and VDS.
	5h. Compressed gas	5h. Safety glasses with side shields must be worn when installing the regulator. Regulator must be secured when in transit. The gas cylinder must be secured to a cylinder cart while in transit and in use. The bottle cap must be installed when the gas cylinder is not in use.
6. Venting the cask	6a. Tripping hazard/uneven walking working surface, dropped/ falling object	6a. Operator to be briefed on the tripping hazards around the casks. Substantial footwear with protective toe caps required for work in areas where dropped/falling objects, tripping hazards, or uneven surfaces exist.
	6b. Radiological	6b. RWP, briefed on radiological/contamination levels, Radiological postings and training.
	6c. Pinching	6c. Leather gloves must be worn when manipulating valves and connecting equipment.
	6d. Hantavirus	6d. Request cleanup per MCP-2750 of any rodent feces, urine, and other biological materials found.
	6e. Burn	6e. Leather gloves must be worn when working around thermally hot equipment.
	6f. Environmental Releases	6f. If particulate radiological air emissions are discovered, all work will be stopped and evaluated.
	6g. Fall	6g. Workers are to maintain 3-point contact while climbing ladders. Fall protection training required for aerial lifts.
7. Backfilling cask with inert gas	7a. Tripping hazard/uneven walking working surface, dropped/ falling object	10a. Operator to be briefed on the tripping hazards around the casks. Substantial footwear with protective toe caps required for work in areas where dropped/falling objects, tripping hazards or uneven surfaces exist.
	7b. Radiological	7b. RWP, briefed on radiological/contamination levels, Radiological postings and training.
	7c. Pinching	7c. Leather gloves must be worn when manipulating valves and connecting equipment.
	7d. Hantavirus	7d. Request cleanup per MCP-2750 of any rodent feces, urine, and other biological materials found.
	7e. Burn	7e. Leather gloves must be worn when working around thermally hot equipment.
	7f. Electrical	7f. GFCI must be used with electrical equipment.
	7g. Noise	7g. Hearing protection must be utilized in close proximity to generator and VDS.
	7h. Compressed gas	7h. Safety glasses with side shields must be worn when installing the regulator. Regulator must be secured when in transit. The gas cylinder must be secured to a cylinder cart while in transit and in use. The bottle cap must be installed when the gas cylinder is not in use.

Sequence of Basic Job Steps	Potential Hazards	Hazard Control/PPE
(7. continued)	7i. Environmental releases	7i. If particulate radiological air emissions are discovered, all work will be stopped and evaluated.
	7j. Fall	7j. Workers are to maintain 3-point contact while climbing ladders. Fall protection training required for aerial lifts.
8. Reinstalling port cover	8a. Tripping hazard/uneven walking working surface, dropped/ falling object	8a. Operator to be briefed on the tripping hazards around the casks. Substantial footwear with protective toe caps required for work in areas where dropped/falling objects, tripping hazards, or uneven surfaces exist.
	8b. Radiological	8b. RWP, briefed on radiological/contamination levels, Radiological postings and training.
	8c. Pinching	8c. Leather gloves must be worn when manipulating valves and connecting equipment.
	8d. Hantavirus	8d. Request cleanup per MCP-2750 of any rodent feces, urine, and other biological materials found.
	8e. Burn	8e. Leather gloves must be worn when working around thermally hot equipment.
	8f. Chemical	8f. Nitrile gloves and safety glasses or goggles must be worn when using Never-Seize or Loctite Adhesive.
	8g. Fall	8g. Workers are to maintain 3-point contact while climbing ladders. Fall protection training required for aerial lifts.
9. Installing the weather cover on cask	9a. Tripping hazard/uneven walking working surface, dropped/ falling object	9a. Operator to be briefed on the tripping hazards around the casks. Substantial footwear with protective toe caps required for work in areas where dropped/falling objects, tripping hazards, or uneven surfaces exist.
	9b. Radiological	9b. RWP, briefed on radiological/contamination levels, Radiological postings and training.
	9c. Pinching	9c. Leather gloves must be worn when handling the weather cover and connecting rigging.
	9d. Hantavirus	9d. Request cleanup per MCP-2750 of any rodent feces, urine, and other biological materials found.
	9e. Fall	9e. Workers are to maintain 3-point contact while climbing ladders. Fall protection training required for aerial lifts.
	9f. Burn	9f. Leather gloves must be worn when working around thermally hot equipment.
	9g. Head Protection	9g. Hard hats are to be worn in the close proximity of all lifts.
	9h. Chemical	9h. Nitrile gloves and safety glasses or goggles must be worn when using Never-Seize or Loctite Adhesive.

Appendix C

Procedure Basis

Procedure Review Table							
Review Discipline	Rev.	DFC Intent[b] Change	DFC Nonintent[c] Change	Review Discipline	Rev.	DFC Intent[b] Change	DFC Nonintent[c] Change
Operations Management	X[a]	X	X	Industrial Safety			
Qualified Operator	X	X	X	Engineering	X	X	*
Radiological Engineering	X	X	*	Industrial Hygiene			
Environmental	X	X	*	Other: S&H	X	X	*
Quality	X	X	*	CSO	X	X	*
Nuclear Facility Manager	X	X	X				

a. X = review required.
b. Reviews for intent DFCs require the same discipline reviews required for a revision.
c. Reviews for nonintent DFCs can be performed with only Operations management and a qualified operator's review and then implemented for immediate use. However, the remaining discipline reviews, as indicated by an asterisk (*), must be obtained within two (2) weeks. See MCP-2985, "Chapter XVI – Operations Procedures," for definitions of intent and nonintent changes.

Step	Basis	Source	Citation
2.1	Weather conditions (sustained wind greater than 25 mph for lifting activities, rain, lightning, and so forth) must be evaluated by supervision to determine whether or not procedure operations can continue or if a safe holding point needs to be identified and operations stopped at that point.	Best Operational Practice	
2.2	Personnel must follow the applicable hazard mitigations detailed in Appendix B, Procedure Hazard Analysis.	Procedure hazards analysis	
2.3	If 110V electrical power is needed a ground fault circuit interrupter (GFCI) must be used on 110V	Procedure hazards analysis	

Step	Basis	Source	Citation
	equipment for personnel protection.		
2.4	Aerial lifts must be operated in accordance with PRD-5107.	Procedure hazards analysis	
2.5	Hard hats must be worn when working near (within 25 ft) an operating mobile crane or suspended load. Hard hats must be worn when working within the roped off area of an operating scissor lift or man lift.	Procedure hazards analysis	
2.6	Hoisting and rigging must be performed in compliance with requirements established in PRD-650.	PRD-650	
2.7	Lifting or moving fuel-loaded casks on the CPP-2707 pad is not an activity that is authorized.	SAR-112	Chapter 3
2.8	Pressure regulator HCV-DSW-3-1 or -2 must be adjusted periodically to correct drift in gas pressure during operation, as required.	Best Operational Practice	
2.9	Radiological Control Technician coverage must be used when breaking open transfer lines, piping and any line suspected to be internally contaminated.	Radiological requirement	
3.1.2 A	A minimum of at least one certified fuel handler at the UGFSF shall be present and responsible when performing the following operations: Removal of fuel-loaded fuel storage vault lid or shield plug Removal of the fuel-loaded cask lid or cask lid shield plug Operations including: fuel-loaded storage vault inspections, installation of lift rods or support plates, and fuel handling that are performed without the vault lid, vault shield plug, cask lid, or cask shield plug in place Operations involving loading or unloading fuel per the CAFL or CACL also require the presence of a second person certified in fuel handling to perform verifications.	TSR-112	LCO 3.112.2 AC 5.112.1A LST-372

Step	Basis	Source	Citation
3.1.2 C	A minimum of at least one qualified crane operator shall be present and responsible during the following fuel handling operations: 1. Crane operation 2. Fuel-loaded cask handling operations.	TSR-112	LCO 3.112.2 AC 5.112.1B LST-372
3.4.1	Ensure personnel performing this procedure have completed the following training, as applicable: A. Certified Fuel Handler B. Radiological Worker II C. Heat/Cold Stress D. Hantavirus Awareness E. Ladder Safety (as required) F. Aerial Lift (as required) G. Compressed Gas (if handling, transporting, changing, or using) H. Fall Protection (as required) I. Torque wrench.	Procedure hazards analysis	
4.7.36 4.7.54	Cask atmosphere sampling (hydrogen, volatile organic vapors, air components) flammable gas generation causes seal failure. Periodic sampling is necessary in specified casks where flammable gas generation has been demonstrated due to the presence of water or previous monitoring. REA-2023: 6 mo, VSC-17: 3 yr, NuPac 125B-2: 1 yr or when opened, TN-24P, V/21 and MC-10: 5 year	PLN-1720	Appendix B