5

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 637056

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [] Direct Revision [] Change ECN [X] Temporary [] Standby [] Supersedure [] Cancel/Void []	H.R. Risenmay, PFP Process Engineering, T5-55, 373-3503	[X] Yes [] No	August 26, 1998
	6. Project Title/No./Work Order No.	7. Bldg./Sys./Fac. No.	8. Approval Designator
	Thermal Stabilization	PFP/73T/234-5Z	Q, S
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.)	10. Related ECN No(s).	11. Related PO No.
	HNF-2780, Rev. 0	N/A	N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Complete	12d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 12b) [X] No (NA Blks. 12b, 12c, 12d)	2Z-98-1108	N/A Design Authority/Cog. Engineer Signature & Date	N/A Design Authority/Cog. Engineer Signature & Date

13a. Description of Change — 13b. Design Baseline Document? [X] Yes [] No

There is a potential hazard of opening metal items that have been stored at PFP for greater than 20 years. The potential for plutonium hydride exsists and was demonstrated when a metal item was opened that was in a food pack can that was paneled (sucked in by vacuum condition). An inert atmosphere is required to safely open the metal item packaging can and transfer the material to a furnace boat for stabilization in a muffle furnace at 1000 degrees C. This change to the OTP covers the modification to the IAC that installed an airlock making it possible to maintain the inert atmosphere while making transfers of items, boats, etc. in and out of the IAC.

14a. Justification (mark one)

Criteria Change	[X]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

14b. Justification Details

The need to be able to maintain the inert atmosphere of the IAC.

For USQ see ECN 647438

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

See Distribution Sheet

RELEASE STAMP

SEP 17 1998

DATE:

STA: 5

HANFORD RELEASE

ID: 12

A-7900-013-2 (05/96) GEF095

HR 9-11-96

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 637056

16. Design Verification Required	17. Cost Impact				18. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[ ] Yes	Additional	[ ] $	Additional	[ ] $	Improvement	[ ]
[X] No	Savings	[ ] $ N/A	Savings	[ ] $ N/A	Delay	[ ] N/A

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

SDD/DD	[ ]	Seismic/Stress Analysis	[ ]	Tank Calibration Manual	[ ]
Functional Design Criteria	[ ]	Stress/Design Report	[ ]	Health Physics Procedure	[ ]
Operating Specification	[ ]	Interface Control Drawing	[ ]	Spares Multiple Unit Listing	[ ]
Criticality Specification	[ ]	Calibration Procedure	[ ]	Test Procedures/Specification	[ ]
Conceptual Design Report	[ ]	Installation Procedure	[ ]	Component Index	[ ]
Equipment Spec.	[ ]	Maintenance Procedure	[ ]	ASME Coded Item	[ ]
Const. Spec.	[ ]	Engineering Procedure	[ ]	Human Factor Consideration	[ ]
Procurement Spec.	[ ]	Operating Instruction	[ ]	Computer Software	[ ]
Vendor Information	[ ]	Operating Procedure	[ ]	Electric Circuit Schedule	[ ]
OM Manual	[ ]	Operational Safety Requirement	[ ]	ICRS Procedure	[ ]
FSAR/SAR	[ ]	IEFD Drawing	[ ]	Process Control Manual/Plan	[ ]
Safety Equipment List	[ ]	Cell Arrangement Drawing	[ ]	Process Flow Chart	[ ]
Radiation Work Permit	[ ]	Essential Material Specification	[ ]	Purchase Requisition	[ ]
Environmental Impact Statement	[ ]	Fac. Proc. Samp. Schedule	[ ]	Tickler File	[ ]
Environmental Report	[ ]	Inspection Plan	[ ]	None	[ ]
Environmental Permit	[ ]	Inventory Adjustment Request	[ ]		[ ]

20. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision

21. Approvals

	Signature	Date		Signature	Date
Design Authority	H. Rees Risenmay	9-11-98	Design Agent		
Cog. Eng. H. R. Risenmay	H. Rees Risenmay	8-26-98	PE		
Cog. Mgr. M.W. Gibson	M.W. Gibson	9-4-98	QA		
QA D. R. Groth	D.R. Groth	9-08-98	Safety		
Safety S. E. Nunn	S. E. Nunn	9-09-98	Design		
Environ.			Environ.		
Other			Other		
			DEPARTMENT OF ENERGY		
			Signature or a Control Number that tracks the Approval Signature		
			ADDITIONAL		

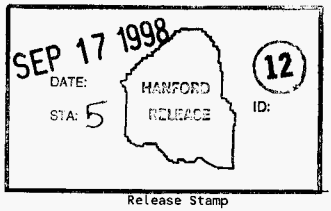
INERT ATMOSPHERE CONFINEMENT OPERABILITY TEST PROCEDURE

H. Rees Risenmay
B&W Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 637056 UC: UC-506
Org Code: 15530 Charge Code: E23182
B&R Code: EW70030000 Total Pages: ~~19~~ 20 pgs for HRR 9/14/98

Key Words: Plutonium, Metal, Oxidation, Inert Atmosphere, Argon, and Operability Test

Abstract: This document provides instruction for the operability testing of the inert atmosphere confinement (IAC) and associated airlock in Glovebox HC-21C.



Release Approval 9/11/98 Date

Release Stamp

Approved for Public Release

RECORD OF REVISION

(1) Document Number: HNF-2780

(2) Title: INERT ATMOSPHERE CONFINEMENT OPERABILITY TEST PROCEDURE

Change Control Record

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog. Engr.	(6) Cog. Mgr. Date
0	(7) EDT-612485 released 07/01/1998		
1 RS	This change covers the modification to the IAC that installed an airlock making it possible to	HR Risenmay 8-14-98	MW Gibson 9/14/98
	maintain the inert atmosphere while making transfers of items, boats, etc. in and out of the		
	IAC per ECN-637056.		

TABLE OF CONTENTS

			Page
1.	TEST PLAN		3
	1.1	Purpose	3
	1.2	Scope	3
	1.3	System Description	3
	1.4	Objective	3
	1.5	Responsibilities	4
2.	SAFETY		5
3.	TOOLS, EQUIPMENT, AND SUPPLIES		5
4.	REFERENCES		5
5.	PREREQUISITES		5
6.	PROCEDURE		6
	6.1	Start Up Process	6
	6.2	Record Data While Filling Airlock and IAC With Argon	7
	6.3	Filling IAC Chamber with Argon	8
	6.4	IAC Leak Test	8
	6.5	Airlock Doors and Can Opener Interlock Tests	9
	6.6	Non-Fissile Can Opening Test	11
	6.7	Shut Down Process	15
7.	TEST EXCEPTION LIST		16
8.	TEST ACCEPTANCE SHEET		17

LIST OF TABLES

1.	INERT ATMOSPHERE CONFINEMENT OTP DATA SHEET	18
2.	FURNACE SIMULATED METAL (MgO sand) CHARGE AND CYCLE DATA SHEET	19

1.0 TEST PLAN

1.1 Purpose

This Operability Test Procedure (OTP) provides instructions for testing operability of the Inert Atmosphere Confinement (IAC). The Inert Atmosphere Confinement was designed and built for opening cans of metal items that might have hydrided surfaces. Unreviewed Safety Question (USQ) PFP-97-005 addresses the discovery of suspected plutonium hydride forming on plutonium metal currently stored in the Plutonium Finishing Plant vaults. Plutonium hydride reacts quickly with air, liberating energy. The Inert Atmosphere Confinement was designed to prevent this sudden liberation of energy by opening the material in an inert argon atmosphere instead of the normal glovebox atmosphere. The IAC is located in glovebox HC-21A, room 230B of the 234-5Z Building at the Plutonium Finishing Plant (PFP) in the 200-West Area of the Hanford Site.

1.2 Scope

This OTP provides instructions for testing the operability of the IAC in HC-21A at the Plutonium Finishing Plant (PFP). The test will confirm that the IAC will provide the required inert atmosphere and that intended operation will not result in upset conditions. Cans containing MgO sand will be used to simulate metal items while performing this test. This OTP will be performed as part of Hanford Job Control System work package 2Z-98-1108.

1.3 System Description

Pressurized or suspect items were traditionally opened using ZO-200-033, "Handle Pressurized or Suspect Containers." Suspect items and all metal items will now be opened in the IAC argon inerted atmosphere to prevent the sudden release of energy. Argon will flow into the IAC to displace the normal glovebox atmosphere. Argon has been used in the past at the PFP to displace normal glovebox air from plutonium containers before part, but not all, of the plutonium metal was packaged.

The IAC consists of two sheet metal walls attached to the south and west walls of glovebox HC-21A. An airlock will provide access between the port in area (main part) of the glovebox and the IAC. Argon is added to the IAC and airlock from a bottle station located in 2734-ZF. The outer and inner doors of the airlock are interlocked with each other to prevent both doors being opened at the same time and causing a loss of the IAC argon atmosphere. The inner airlock door has interlocks from oxygen sensors that monitor the IAC and airlock spaces for oxygen content. When either of the spaces are above safe oxygen concentration levels the door cannot be opened.

Both doors of the airlock are kept locked by pins that prevent movement of the latch mechanism. When the interlocks are cleared the pins are retracted by solenoids that are powered from push buttons located on a junction box outside of the glovebox.

One oxygen monitor will be used to monitor the IAC to ensure oxygen concentrations reach safe levels for opening plutonium metal items. Another oxygen monitor will be used to ensure that the airlock atmosphere is inerted before opening the inner door leading into the IAC. Gas samples are removed continuously from the IAC chamber at 18 inches above the glovebox floor and from the roof of the airlock. The gas samples pass through double filters before passing into the oxygen sensors for analysis. The gases leaving the oxygen sensors are returned directly to glovebox HC-21A through another filter.

1.4 Objectives

The test objectives are to:

- Confirm that the oxygen concentration inside the IAC chamber and the airlock gets below the alarm set point of 1.2% (volume);

- Confirm that the can opener will only operate when the oxygen in the IAC chamber is below the alarm set point;
- Confirm that the airlock inner door will only open when the airlock and IAC atmospheres are below the alarm set point;
- Determine the times required to dilute/displace the glovebox air to an oxygen concentration below the alarm set point at varying argon flow rates;
- Confirm that normal manual operations in the gloves do not remix enough air into the IAC chamber to raise the oxygen concentration back above the alarm set point; and
- Determine approximate argon leakage rates from the chamber with and without activity in the gloves.

The can opener must not operate at oxygen concentrations above the alarm set point to ensure minimal reaction of hydride when cans are opened. The airlock inner door must not open at oxygen concentrations above the alarm set point in both the IAC and airlock spaces to prevent introduction of air into the IAC which could cause an untoward reaction of exposed hydride powder. The inner door must not open and allow an item to be introduced into the IAC until the IAC atmosphere has been inerted to prevent puncturing a pressurized can in the IAC in air. If the can was pressurized with hydrogen gas there could be an explosion that could blow the window out of the glovebox, injure workers and spread contamination.

Data will be collected in order to provide profiles of the oxygen concentrations over time and the (in)ability to operate the can opener or open the airlock inner door as the oxygen concentration changes. These data will be recorded with the oxygen concentration increasing and decreasing.

The door to door interlocks will be tested to ensure that both doors cannot be opened simultaneously during operations that would result in a rapid loss of the inert atmosphere with resultant untoward reactions of exposed hydride powder.

Results of the tests will be summarized in an Operability Test Report.

1.5 Responsibilities

Test Director

The Test Director shall be designated by the Cognizant Engineer from PFP Process Engineering and has overall responsibility and authority over the OTP performance. The Test Director shall:

- Coordinate and direct operability testing.
- Confirm that all pre-start requirements have been met before allowing the test to begin.
- If needed, alter the test sequence after verifying that there is no adverse impact.
- Ensure that the system is left in a safe mode if the test is to be suspended for a period of time.
- Re-verify test prerequisites before restarting a suspended test.
- Initial each step in the test procedure as it is performed.
- Evaluate the need to make changes to the test and initiate ECNs to document those changes.
- Review and approve test data sheets and exceptions.
- Approve resolution to test exceptions.

Cognizant Engineer (or delegate):

- Approve resolution to test exceptions.
- Approve change resolution to test exceptions.

Witnesses

A test witness shall be provided by Quality Assurance. Test witnesses shall:

- Witness initial performance of each test. Additional iterations do not require a witness to be present.
- Review and approve test data sheets and exceptions for the sections of the test that they witness.
- Approve resolution to test exceptions for the sections of the test that they witness.

Test Performer

Transition Operations manager will provide operators to perform this test. The performer shall:

- Perform the test under the direction of the test director.
- Record required information on the test data sheets as well as initial and date the form.

2.0 SAFETY

Applicable Safety Documents - Provisions of the Hanford Site Radiological Control Manual, HSRCM-1; applicable Industrial Safety and Industrial Hygiene procedures; and Radiation Work Permits or others as specified in the Job Control System (JCS) work package; apply to all work performed under this OTP.

A pre-job safety meeting shall be conducted and documented by the Test Director on a work package pre-job safety meeting form prior to starting work. The meeting will discuss the scope of work and the safety issues. This OTP shall be read and discussed in detail by all personnel involved with its performance.

3.0 TOOLS, EQUIPMENT, AND SUPPLIES

Leather Gloves	Electric Can Opener
Furnace Boats/Boathouse	Hand Can Punch
Powder Boat	Stopwatch
Powder Accumulation Can	Powder Scoop
Hot Plate	Hot Plate Guard
Scale In IAC	Scale in Port In Area
Argon Gas or Liquid Bottles	MgO Sand in food pack cans to simulate an item from vault

4.0 REFERENCES

HNF-PRO-446, Testing Requirements
HNF-PRO-233, Review and Approval of Documents
HSRCM-1, Hanford Site Radiation Control Manual

5.0 PREREQUISITES

Before starting this OTP, the following must be completed:

- Oxygen monitors are set up (electrolyte in sample cell, sample flowrate, and alarm set points input per vendor information).
- Argon gas or liquid bottles are installed at the bottle station in 2734-ZF.
- Record Liquid argon bottles level here: _____ % _____ %
- Record argon gas bottles' pressures here: _____ psig _____ psig

Items completed; tests ready to begin: _____ / _____ Test Director
Print Signature
_____ Date

6.0 PROCEDURE

Discrepancies will be noted on the Exceptions List provided (Section 7.0) and according to provisions in HNF-PRO-446, Rev. 1, Testing Requirements. Resolutions will be accepted by the Cognizant Engineer and indicated by initial and date.

If a problem is encountered, the OTP will be discontinued until the Cognizant Engineer is notified and the problem is resolved.

Adjustments to the OTP may be necessary in the field as the test run progresses. Therefore, the Test Director is permitted to authorize test site personnel to ink in minor changes to the OTP with the concurrence of the Cognizant Engineer and Transition Operations Shift Manager.

a. The Cognizant Engineer and the Transition Operations Shift Manager must sign each change. The Cognizant Engineer will specify additional signatures as required by HNF-PRO-233. Change authorizations obtained by telephone shall be noted as such.

b. The Cognizant Engineer or his designee shall ensure that the job site changes remain within the scope of the OTP and any limits specified therein. The Cognizant Engineer may authorize the continuation of the OTP prior to obtaining Exception or Pen and Ink signatures if determined to have a non-safety, non-quality, and non-radiological impact.

The following sections are presented in the order that the first test should be performed. The Cognizant Engineer or his designee must approve deviation from the testing order. The test section(s) may be re-performed, as needed.

Existing data sheets or applicable test sections may be copied and added to this test plan, if needed, to re-perform a section of the test. The page number of the page added will be appended with an alphabetical (a-z) suffix.

6.1 Start Up Process

NOTE

This section may be performed, as directed by Test Director, to complete required variables in Test Sections 6.2 through 6.7.

_____ 6.1.1 Verify the following:

- glovebox negative pressure relative to room pressure is between 0.5 and 2.0 in.WG and the calibration sticker is current; and
- glovebox exhaust DP is less than 4 in. WG and the calibration sticker is current.

_____ 6.1.2 Position the following valves for O_2 monitors AI-21A-1 and AI-21A-2:

Valve	Position	Description
V-21A-4	SAMPLE	AI-21A-1 Inlet 3-way Sample/Calibration (glovebox) Valve
V-21A-6	OPEN	AI-21A-1 Discharge Isolation
V-21A-7	SAMPLE	AI-21A-2 Inlet 3-way Sample/Calibration (glovebox) Valve
V-21A-9	OPEN	AI-21A-2 Discharge Isolation

_____ 6.1.3 Open valve V-21A-10 to provide argon supply to the glovebox HC-21A.

_____ 6.1.4 Turn on master power to IAC equipment with switch HS-21A-1 on TBX-1.

6.2 Record Data While Filling Airlock and IAC Chambers with Argon

NOTES:

USE THIS SECTION OF OTP FOR TESTING OF IAC FILL RATE ETC.

IF LEAVING THE ROOM UNATTENDED, SHUTDOWN PROCESS PER TEST SECTION 6.7.

THE TEST DIRECTOR MAY DIRECT ANY OF THE FOLLOWING:
- Repeating or altering the sequence of steps.
- Simulating normal work in the IAC chamber by moving arms and objects around during these steps.

_____ 6.2.1 Record a time of 0 minutes and all other requested data on the IAC data sheet.

_____ 6.2.2 Record a time of 0 minutes and all other requested data on the airlock data sheet.

_____ 6.2.3 Start the argon flow into the IAC and airlock by opening V-21A-5. Adjust the flow rate, as needed, to 50 cfh on FI-21A-2 (a different flow rate may be directed by the Test Director).

Flow Rate_____ft^3/hr

_____ 6.2.4 Turn on power to oxygen sensor AI-21A-1 with switch HS-21A-3 on TBX-1.

_____ 6.2.5 Acknowledge (silence) alarm on oxygen sensor AI-21A-1 from front control panel.

_____ 6.2.6 From oxygen sensor AI-21A-1 front control panel ensure that the sensor cell is turned on and the sampling pump is operating.

_____ 6.2.7 Turn on power to oxygen sensor AI-21A-2 with switch HS-21A-4 on TBX-1.

_____ 6.2.8 Acknowledge (silence) alarm on oxygen sensor AI-21A-2 from front control panel.

_____ 6.2.9 From oxygen sensor AI-21A-2 front control panel ensure that the sensor cell is turned on and the sampling pump is operating.

_____ 6.2.10 Record the requested data on data sheet (Table 1) every five minutes or other time interval directed by the Test Director until the oxygen concentration is constant.

_____ 6.2.11 Continue the argon flow for another thirty minutes after AI-21A-1 indicator shows constant reading. Data need not be recorded on the data sheet during this time.

6.3 Filling Airlock and IAC Chambers with Argon

NOTES

USE THIS SECTION WHEN FILLING IAC WITHOUT RECORDING DATA

IF LEAVING THE ROOM UNATTENDED, SHUTDOWN PROCESS PER TEST SECTION 6.7.

THE TEST DIRECTOR MAY DIRECT ANY OF THE FOLLOWING:
- Repeating or altering the sequence of steps.
- Simulating normal work in the IAC chamber by moving arms and objects around during these steps.

_____ 6.3.1 Start the argon flow into the IAC and airlock by opening V-21A-5. Adjust the flow rate, as needed, to 50 cfh on FI-21A-2 (a different flow rate may be directed by the Test Director).

Flow Rate_____ft^3/hr

6.3.2 After 15 minutes:

_____ a. Turn on power to oxygen sensor AI-21A-1 with switch HS-21A-3 on TBX-1.

_____ b. Turn on power to oxygen sensor AI-21A-2 with switch HS-21A-4 on TBX-1.

_____ 6.3.3 Acknowledge (silence) alarm on oxygen sensor AI-21A-1 from front control panel.

_____ 6.3.4 From oxygen sensor AI-21A-1 front control panel ensure that the sensor cell is turned on and the sampling pump is operating.

_____ 6.3.5 Acknowledge (silence) alarm on oxygen sensor AI-21A-2 from front control panel.

_____ 6.3.6 From oxygen sensor AI-21A-2 front control panel ensure that the sensor cell is turned on and the sampling pump is operating.

_____ 6.3.7 Continue the argon flow for another thirty minutes after AI-21A-1 indicator shows constant reading.

6.4 IAC Leak Test

NOTE

IF LEAVING THE ROOM UNATTENDED, SHUTDOWN PROCESS PER TEST SECTION 6.7.

THE TEST DIRECTOR MAY DIRECT ANY OF THE FOLLOWING:
- Repeating or altering the sequence of steps.
- Simulating normal work in the IAC chamber by moving arms and objects around during these steps.

_____ 6.4.1 Refill the IAC chamber with argon per Section 6.3, if not already filled.

_____ 6.4.2 Shut-off flow of argon to IAC by closing valve V-21A-5.

_____ 6.4.3 Record the oxygen concentration on the data sheet at specified time intervals until the oxygen

content is above 10% on both oxygen monitors.

_____ 6.4.4 Record at the bottom of the data sheet the times and oxygen concentrations of the IAC and airlock atmosphere when the high oxygen alarms are activated at approximately 1.2 % oxygen for AI-21A-1 and AI-21A-2.

6.5 Airlock Doors and Can Opener Interlock Tests

NOTE

IF LEAVING THE ROOM UNATTENDED, SHUTDOWN PROCESS PER TEST SECTION 6.7.

THE TEST DIRECTOR MAY DIRECT ANY OF THE FOLLOWING:
- Repeating or altering the sequence of steps.
- Simulating normal work in the IAC chamber by moving arms and objects around during these steps.

_____ 6.5.1 Start the argon flow into the IAC and airlock by opening V-21A-5. Adjust the flow rate, as needed, to 50 cfh on FI-21A-2 (a different flow rate may be directed by the Test Director).

Flow Rate_____ft^3/hr

_____ 6.5.2 Turn on power to oxygen sensor AI-21A-1 with switch HS-21A-3 on TBX-1.

_____ 6.5.3 Acknowledge (silence) alarm on oxygen sensor AI-21A-1 from front control panel.

_____ 6.5.4 From oxygen sensor AI-21A-1 front control panel ensure that the sensor cell is turned on and the sampling pump is operating.

_____ 6.5.5 Turn on power to oxygen sensor AI-21A-2 with switch HS-21A-4 on TBX-1.

_____ 6.5.6 Acknowledge (silence) alarm on oxygen sensor AI-21A-2 from front control panel.

_____ 6.5.7 From oxygen sensor AI-21A-2 front control panel ensure that the sensor cell is turned on and the sampling pump is operating.

_____ 6.5.8 While oxygen sensor AI-21A-1 is in alarm condition verify can opener is NOT operable.

Can Opener Operated? _____ yes _____ NO

_____ 6.5.9 When:
- oxygen sensor AI-21A-1 is in alarm condition
- oxygen sensor AI-21A-2 is in alarm condition
- outer airlock door is closed and latched

verify inner airlock door will NOT open by:

a. One operator attempt to move inner door latch while second operator presses push button PB-21A-2

Inner Door Opened? _____ yes _____ NO

_____ 6.5.10 When oxygen sensor AI-21A-1 alarm clears verify can opener IS operable.

Can Opener Operated? _____ YES _____ no

_____ 6.5.11 Have electrician install jumper in TBX-1 to relay K2 to simulate oxygen sensor AI-21A-2 being in alarm.

_____ 6.5.12 When:

- oxygen sensor AI-21A-1 alarm is cleared
- oxygen sensor AI-21A-2 is simulated as being in alarm with installed jumper in TBX-1
- outer airlock door is closed and latched

verify inner airlock door will NOT open by:

a. One operator attempt to move inner door latch while second operator presses push button PB-21A-2

Inner Door Opened? _____ yes _____ NO

_____ 6.5.14 Have electrician remove jumper on relay K2 to restore oxygen sensor AI-21A-2 to operation.

_____ 6.5.12 Have electrician install jumper in TBX-1 to relay K1 to simulate oxygen sensor AI-21A-1 being in alarm.

_____ 6.5.13 When:

- oxygen sensor AI-21A-2 alarm clears
- oxygen sensor AI-21A-1 is simulated as being in alarm with installed jumper in TBX-1
- outer airlock door is closed and latched

verify inner airlock door will NOT open by:

a. One operator attempt to move inner door latch while second operator presses push button PB-21A-2

Inner Door Opened? _____ yes _____ NO

_____ 6.5.14 Have electrician remove jumper on relay K1 to restore oxygen sensor AI-21A-1 to operation.

_____ 6.5.15 When:

- oxygen sensor AI-21A-1 alarm is cleared
- oxygen sensor AI-21A-2 alarm is cleared
- outer airlock door is closed and latched

verify inner airlock door WILL open by:

a. One operator attempt to move inner door latch while second operator presses push button PB-21A-2

Inner Door Opened? _____ YES _____ no

_____ 6.5.16 When:
- Airlock inner door is open

a. Verify that airlock outer door will NOT open by one operator attempting to turn latch lever while second operator presses push button PB-21A-1.

Outer Door Opened? _____ yes _____ NO

_____ 6.5.17 Close and latch airlock inner door.

_____ 6.5.18 Have electrician lift lead 28-3 in TBX-1 to bypass oxygen sensor AI-21A-2 alarm.

_____ 6.5.19 Open airlock outer door by:

a. One operator moves outer door latch to open while second operator presses push button PB-21-1.
b. Allow door counterweight to swing outer door to open position.

_____ 6.5.20 When:
- oxygen sensor AI-21A-1 alarm is cleared
- oxygen sensor AI-21A-2 alarm is bypassed
- outer airlock door is open

Verify that inner airlock door will NOT open by:

a. One operator attempt to move inner door latch while second operator presses push button PB-21A-2

Inner Door Opened? _____ yes _____ NO

_____ 6.5.21 Close and latch airlock outer door.

_____ 6.5.22 Have electrician reinstall lead 28-3 in TBX-1 junction box to reactivate oxygen sensor AI-21A-2 alarm.

6.6 Non-Fissile Can Opening Test

NOTE

IF LEAVING THE ROOM UNATTENDED, SHUTDOWN PROCESS PER TEST SECTION 6.7

THE TEST DIRECTOR MAY DIRECT ANY OF THE FOLLOWING:
- Repeating or altering the sequence of steps.
- Simulating normal work in the IAC chamber by moving arms and objects around during these steps

CRITICALITY

FISSILE MATERIAL IS NOT ALLOWED INSIDE THE IAC CHAMBER DURING THIS OTP. USE ONLY SUPPLIED CAN CONFIGURATIONS THAT CONTAIN MgO SAND OR ARE EMPTY.

_____ 6.6.1 If IAC equipment is not in place:

a. Use switch HS-21A-2 to BYPASS interlocks.
b. OPEN both inner and outer airlock doors of IAC.
c. Pass the following equipment into IAC chamber:
   - Electric can opener
   - Hand can punch
   - IAC electronic scale and power supply
   - Powder scoop
   - Powder accumulation can
   - Button/powder separation funnel
d. CLOSE both inner and outer airlock doors of IAC.
e. Restore interlocks using bypass switch HS-21A-2.

_____ 6.6.2 Refill the IAC chamber with argon per Section 6.3.

_____ 6.6.3 ASSIGN next consecutive boat number to furnace charge AND RECORD boat number on Furnace Simulated Metal Charge and Cycle Data Sheet (*BOAT NUMBER*).

_____ 6.6.4 RECORD the following data for simulated metal (MgO sand) material to be added to boat on Furnace Simulated Metal Charge and Cycle Data Sheet:
- *Item ID Number*
- *Element Weight*

_____ 6.6.5 WEIGH item AND RECORD gross weight on Furnace Simulated Metal Charge and Cycle Data Sheet (*ITEM GROSS WEIGHT*)

_____ 6.6.6 WEIGH empty furnace boat in boathouse AND RECORD weight on Furnace Simulated Metal Charge and Cycle Data Sheet (*EMPTY BOAT & BOATHOUSE WEIGHT)*

_____ 6.6.7 Open airlock outer door:

a. One operator moves outer door latch to open while second operator presses push button PB-21-1.
b. Allow door counterweight to swing outer door to open position.
c. Place simulated item and powder boat into airlock.

_____ 6.6.8 Close and latch airlock outer door

_____ 6.6.9 When both the airlock and IAC oxygen sensor alarms clear:
- Open airlock inner door
- Move simulated item into IAC
- Move powder boat into IAC
- Close airlock inner door

_____ 6.6.10 Open airlock outer door.

_____ 6.6.11 Place furnace boat inside boathouse and insert into airlock.

_____ 6.6.12 Close and latch airlock outer door.

_____ 6.6.13 Use electric can opener to:
- Open food pack can
- Make can into non-container
- If applicable remove plastic from item
- Repeat until last can is opened and item (simulation MgO sand) is exposed

_____ 6.6.14 Place separation funnel in powder accumulation can so that it holds open the self-closing lid.

_____ 6.6.15 Simulate separation of button and powder by pouring a small pile of MgO sand into funnel. Set can with balance of sand aside for now.

_____ 6.6.16 Remove funnel from accumulation can and allow self closing lid to close.

_____ 6.6.17 When airlock oxygen sensor alarm clears:
- Open airlock inner door
- Bring furnace boathouse into doorway and remove furnace boat from boathouse
- Simulate placing brushed button into furnace boat by dumping separation funnel into furnace boat
- Pour balance of MgO sand from item can into furnace boat
- Make item can a non-container
- Put furnace boat back into boathouse
- Push boathouse/boat into airlock
- Close and latch airlock inner door

_____ 6.6.18 Open airlock outer door:
- Allow boathouse/boat to set in opened airlock to simulate allowing any plutonium hydride to react.
- If burning button were to set off glovebox temperature alarm then close airlock door to extinguish burning button
- Move furnace boat out of airlock and place out of way of operations around hot plate.
- Close and latch airlock outer door.

_____ 6.6.19 Place powder boat on scale:
- Open lid and ensure boat is empty
- Record tare weight of powder boat on data sheet (*Empty Powder Boat*)

_____ 6.6.20 Place powder boat near powder accumulation can.

_____ 6.6.21 Hold open lid of powder accumulation can and use scoop to take batch of MgO sand.

_____ 6.6.22 Allow lid of accumulation can to close.

_____ 6.6.23 Open lid of powder boat and pour batch of MgO sand into powder boat.

_____ 6.6.24 Allow powder boat lid to close and gently shake powder boat side to side to distribute sand across surface.

_____ 6.6.25 Place powder boat on scale:
- Record weight on data sheet (*Full Powder Boat*)
- Subtract tare weight and record net weight on data sheet (*MgO Sand Net Weight*)
- Ensure that net weight of batch is less than 25 grams.

_____ 6.6.26 Open inner door of airlock by:

a. One operator moves inner door latch while second operator presses push button PB-21A-2.

_____ 6.6.27 Place powder boat in airlock and close and latch inner door.

_____ 6.6.28 Open outer airlock door by:

a. One operator turns outer door latch while second operator presses push button PB-21A-1.
b. Allow counterweight to swing door open.

_____ 6.6.29 Use boat retrieval tool to move powder boat out of airlock.

_____ 6.6.30 Insert thermometer in base of powder boat.

_____ 6.6.31 Hot plate operations:
- Ensure hot plate is turned to maximum setting
- Place powder boat on hot plate
- Ensure that hot plate screen is in place to prevent gloves from touching hot surfaces.

_____ 6.6.32 Pull gloves out of main area of glovebox (not IAC) and fasten with bungee.

_____ 6.6.33 Turn on hot plate using external switch.

_____ 6.6.34 Ensure that powder boat temperature is 300 degrees Celsius or higher for one hour. (It takes about a half hour to heat to 300)

_____ 6.6.35 Turn off hot plate using external switch and allow powder boat to cool to less than 100 degrees Celsius.

_____ 6.6.36 Remove furnace boat from boathouse.

_____ 6.6.37 Remove powder boat from hot plate:
- Dump MgO sand into furnace boat
- Brush sand remnants from powder boat into furnace boat
- Push furnace boat back into boathouse

_____ 6.6.40 IF powder accumulation can in IAC is not empty THEN:
- Place powder boat in airlock.
- Close and latch airlock outer door.
- Open inner door of airlock by one operator moving inner door latch while second operator presses push button PB-21A-2.
- Move powder boat into IAC and close and latch airlock inner door.
- Repeat steps 6.6.19 through 6.6.37 until the powder accumulation can in IAC is empty.

_____ 6.6.41 Open inner door of airlock by:

b. One operator moves inner door latch while second operator presses push button PB-21A-2.

_____ 6.6.42 Place all waste from above operation into airlock and close and latch airlock inner door.

_____ 6.6.43 Open airlock outer door by:
- One operator turns outer door latch while second operator presses push button PB-21A-1.
- Allow counterweight to swing door open.
- Remove packaging material and waste from airlock.

_____ 6.6.44 Place packaging material removed from item on scale:
- Record weight on data sheet (*PACKAGING MATERIAL WEIGHT*)
- Calculate net weight and Record on data Sheet (*NET WEIGHT*)

_____ 6.6.45 Place loaded furnace boat/boathouse on scale:
- Record weight on data sheet (*TOTAL BOAT/BOATHOUSE/CHARGE WEIGHT*)
- Calculate Charge Weight and Record on data sheet (*CHARGE WEIGHT*)

_____ 6.6.46 Second Operator check all calculations and initial and date data sheet.

6.7 Shut Down Process

_____ 6.7.1 Remove all combustibles from inside the IAC chamber.

_____ 6.7.2 Position the following valves CLOSED for O_2 monitors AI-21A-1 and AI-21A-2.

Valve	Position	Description
V-21A-4	CLOSE	AI-21A-1 Inlet Isolation
V-21A-6	CLOSE	AI-21A-1 discharge Isolation
V-21A-7	CLOSE	AI-21A-2 Inlet Isolation
V-21A-9	CLOSE	AI-21A-2 Discharge Isolation

_____ 6.7.3 Shut-OFF flow of argon to IAC by closing valve V-21A-5.

_____ 6.7.4 CLOSE argon supply valve V-21A-10.

_____ 6.7.5 Pull gloves out of IAC area of glovebox and bungee.

_____ 6.7.6 Turn OFF power to oxygen sensor AI-21A-1 with switch HS-21A-3 on TBX-1.

_____ 6.7.7 Turn OFF power to oxygen sensor AI-21A-2 with switch HS-21A-4 on TBX-1.

_____ 6.7.8 Turn OFF power to IAC equipment with switch HS-21A-1 located on TBX-1.

7. EXCEPTION LIST

Inert Atmosphere Confinement OTP Exceptions List

STEP	EXCEPTION	RESOLUTION	INITIALS

8. TEST ACCEPTANCE SHEET

8.1 Any equipment non-conformance or anomalies will be listed on the Exceptions List.

8.2 Upon test completion and acceptance, the Cognizant Engineer will prepare an Operational Test Report (OTR) from the original OTP with field entries and transmit it to Central Files via Engineering Data Transmittal (EDT).

8.3 The undersigned concur that the OTP was completed successfully.

Quality Assurance_____/_____/Date_____
Print Signature

Cognizant Engineer_____/_____/Date_____
Print Signature

Cognizant Engineer_____/_____/Date_____
Group Manager Print Signature

Operations Manager _____/_____/Date_____
Print Signature

PFP Plant Manager _____/_____/Date_____
Print Signature

TABLE 1

INERT ATMOSPHERE CONFINEMENT OTP DATA SHEET 1

Test #:_____ **Sheet #** _____ **of** _____ **Date:** _____

Starting pressure on argon bottle in use: _____ psig

Starting level on liquid argon bottle in use: _____ %

TIME (Min)	Oxygen Monitor Reading (percent O_2)		Argon Flow Indicator (ft^3/hr)	Comments
	AI-21A-1	AI-21A-2	FI-21A-2	

HIGH ALARM AI-21A-1 : Time_____ %O_2_____ (from step 6.4.4)
(1.2 % O_2)

HIGH ALARM AI-21A-2: Time _____ %O_2_____ (from step 6.4.4)
(1.2 % O_2)

TABLE 2

FURNACE SIMULATED METAL (MgO sand) CHARGE AND CYCLE DATA SHEET

HC-21A DATA TABLE			BOAT NUMBER: (6.6.3):		
ITEM ID NUMBER (6.6.4)	MATERIAL TYPE	ELEMENT WEIGHT (6.6.4)	GROSS WEIGHT BEFORE CHARGE (6.6.5)	PACKAGING MATERIAL WEIGHT (6.6.44)	NET WEIGHT (6.6.44)
	MgO sand	NA			
TOTAL BOAT/BOATHOUSE/CHARGE WEIGHT (6.6.45)					
EMPTY BOAT & BOATHOUSE WEIGHT (6.6.6)					
CHARGE WEIGHT (6.6.45)					
2nd Operator Initials/Date (6.6.46)					

Full Powder Boat (6.6.21)		Full Powder Boat (6.6.21)		Full Powder Boat (6.6.21)	
Empty Powder Boat (6.6.15)		Empty Powder Boat (6.6.15)		Empty Powder Boat (6.6.15)	
MgO Sand Net Weight (6.6.21)		MgO Sand Net Weight (6.6.21)		MgO Sand Net Weight (6.6.21)	
Full Powder Boat (6.6.21)		Full Powder Boat (6.6.21)		Full Powder Boat (6.6.21)	
Empty Powder Boat (6.6.15)		Empty Powder Boat (6.6.15)		Empty Powder Boat (6.6.15)	
MgO Sand Net Weight (6.6.21)		MgO Sand Net Weight (6.6.21)		MgO Sand Net Weight (6.6.21)	

ARGON GAS BOTTLE PRESSURE (5.0)	(psig)	psig
ARGON LIQUID BOTTLE LEVEL (5.0)	%	%

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	PFP Process Engineering	Date September 11, 1998
Project Title/Work Order Inert Atmosphere Confinement Operability Test Procedure		EDT No. N/A ECN No. 637056

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
T. A. Brown	T5-09	X			
M. W. Gibson	T5-55	X			
D. R. Groth	T4-15	X			
D. R. Hirzel	T5-55	X			
S. E. Nunn	T5-11	X			
R. D. Pickett	T4-20	X			
A. L. Ramble	T5-53	X			
H. R. Risenmay	T5-55	X			
R. D. Redekopp	T5-15	X			
A. M. Stubbs	T5-55	X			
R. W. Szempruch	T5-55	X			
Central Files	B1-07	X			