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CRYSTAL RIVER UNIT 3

PLANT OPERATING MANUAL

CH-631

Post Accident Sampling and Analysis of Reactor Building Vent, Auxiliary Building Vent, and Reactor Building Atmosphere

TABLE OF CONTENTS

1.0 PURPOSE

This procedure provides instructions for sampling the RB Vent, AB Vent, and RB atmosphere during accident conditions using PASS.

2.0 REFERENCES

2.1 Developmental References

2.1.1 Radiological Emergency Response Plan

2.1.2 Regulatory Guide 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors. July 2000.

2.1.3 NUREG 0737, Post-TMI Requirements

2.1.4 Regulatory Guide 1.97, Instrumentation For Light-Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident

2.1.5 RSP-600, ALARA Program

2.1.6 Applied Physical Technology, Volumes A through C (Crystal River Installation PASS manuals)

2.1.7 Drawing M.D. 0211033.003

2.1.8 EOP-14, Enclosure 2, PPO Post Event Actions

2.1.9 EM-104, Operation of the Operational Support Center

2.1.10 CH-234, Post Accident Sampling System Gamma Spectroscopy System

2.1.11 FD-302-693, Containment Monitoring System

2.1.12 FD-302-694, PASS Containment Monitoring AIM Detection System

2.1.13 FD-302-695, Noble Gas Effluent Monitoring System

2.1.14 FD-302-766, Auxiliary Building Post Accident

2.2 Equipment Database References

WSV-3	WSV-63	WSP-1	RMP-A1	RM-A2-MG-2A	MEEL-2
WSV-4	WSV-64	RMV-11	RM-A1-MG-2A	RM-A2-FI	DPDP-5A
WSV-5	WSV-67	RMV-13	RM-A1-FI	RM-A2-RE4	DPDP-5B
WSV-6	WSV-70	RMV-14	RM-A1-RE4	RM-A2-RE5	DPDP-8A
WSV-32	WSV-71	RMV-15	RM-A1-RE5	RM-A2-RI4	DPDP-8B
WSV-33	WSV-72	RMV-16	RM-A1-RI4	RM-A2-RI5	ACDP-59
WSV-34	RMV-1	RMV-17	RM-A1-RI5	RM-A2-RY4	
WSV-35	RMV-2	RMV-18	RM-A1-RY4	RM-A2-RC	
WSV-36	RMV-3	RMV-20	RM-A1-RC	RMSB-2A	
WSV-37	RMV-4	RMV-21	RMP-A1	RMSB-2B	
WSV-53	RMV-5	RMV-23	RM-A1-MG-2A	WSSB-2	
WSV-54	RMV-6	RMV-25	WS-14-FI	WS-13-CE	
WSV-57	WSV-70	RMV-26	RMSB-1A	WS-13-CX	
WSV-59	RMV-8	RMV-27	RMSB-1B	WS-13-LT	
WSV-60	RMV-9	WS-14-FI	RM-A2	CMP	
WSV-61	RMV-34	RM-A1	RMP-A2	AHF-67	

3.0 PERSONNEL INDOCTRINATION

3.1 Description

3.1.1 PASS is an on-line system designed to sample various liquid and gaseous sample streams during accident conditions. The RANGE system samples the RB atmosphere and gaseous effluents from both the RB and AB Vents.

3.1.2 The RANGE system consists of an AIMS detector to perform gamma isotopic analysis of the sample streams.

3.1.3 The RANGE system provides the ability to obtain gaseous and radioiodine grab samples to be shipped off-site for analysis.

3.1.4 The RANGE system has the ability to continuously monitor gaseous effluents from the RB and AB vents via the mid- and high-range noble gas monitors. The RB and AB each have a LMH valve controller that automatically aligns the mid- and high-range noble gas monitors based on sample stream activity. The LMH valve controllers may be operated manually.

3.1.5 When estimating total activity for gaseous grab sample shipment, the following assumptions were made:

- Core Nuclide Mix and Half-lives from RADTRAD Code Library
- 8 hours since reactor shutdown
- Microshield software was used to determine conversion factors for calculating total µCi from dose rate. Sample assumed to be small enough at a distance of 7 inches to represent point source. Pig is 17.75 inches tall with a radius of 7 inches. Weight is 725 pounds. This results in effective density of 7.4 g/cc.
- Release fractions from Regulatory Guide 1.183 for gap and early in-vessel melt
- No removal of iodines and particulates from RB air

3.1.6 When estimating total activity for particulate and iodine grab sample shipment the following assumptions are made:

- Core Nuclide Mix and Half-lives from RADTRAD Code Library
- 8 hours since reactor shutdown
- Microshield software was used to determine conversion factors for calculating total μCi from dose rate. Pig is 5.625 inches tall with diameter of 5.5 inches. The pig is composed of 0.5" lead and .375" of iron. The RMSB filter canister is 1.375" tall with a diameter of 2.25". The measurement distance is 3.0 " from the center of the pig.
- Release fractions from Regulatory Guide 1.183 for gap and early in-vessel melt
- No removal of iodines and particulates from RB or AB air
- The RB or AB atmospheric mix is on the particulate and iodine filter. The particulate and iodine is filtered by the HEPA and charcoal banks, but the isotopic mix remains unchanged. Some of the Xe and Kr gas is retained in the iodine cartridge. The RB or AB particulate and iodine is reduced by ~ 99% through the filters, and approximately 1% of gas is retained in the cartridge.

3.2 **Definitions**

3.2.1	AIMS	Automated Isotopic Measurement System
3.2.2	CFM	Cubic feet per minute
3.2.3	EC	Emergency Coordinator
3.2.4	IRP	Instrument Relay Panel
3.2.5	LMH	RB or AB Low, Mid and High Range valve controller
3.2.6	PASS	Post Accident Sampling System
3.2.7	RANGE	Reactor and Auxiliary Noble Gas Effluent monitoring system
3.2.8	RE-ENTRY	Return of personnel to an area evacuated by an emergency condition
3.2.9	RMT	Radiation Monitoring Team
3.2.10	TMI	Three Mile Island nuclear plant

3.3 **Responsibilities**

3.3.1 EC or designee shall authorize re-entry.

3.3.2 OSC Chemistry Coordinator or designee

- ensures EC approval for re-entry has been obtained
- determines which sections of procedure are to be performed during re-entry
- ensures re-entry prerequisites are complete

3.3.3 This procedure is performed by a qualified Emergency Sample Team member.

3.4 **Limits and Precautions**

3.4.1 Any or all of this procedure is done by direction of the EC or designee.

3.4.2 Re-entry must have RMT preplanning, concurrence, and coverage as outlined in EM-104, Operation of the Operational Support Center. Controlled access areas will be defined by the RMT personnel.

3.4.3 Extremely high radiation dose rates may be present during post-accident sampling. These high dose rates could result in high radiation exposure. Performing this procedure requires ALARA pre-planning.

3.4.4 Emergency Sample Team will STOP and go to a low dose area (i.e. primary chemistry laboratory) if dose rates at re-entry work area exceeds limits specified in pre-job briefing.

3.4.5 All sampling actions are performed from the Main Control Board by Operations or from the Count Room unless specifically noted.

3.4.6 WS-13-CE (RANGE AIMS) can measure 1.0E-6 μCi/cc to 1.0E+5 μCi/cc.

3.4.7 WSP-1 is a positive displacement pump and may be damaged if operated without complete or proper valve line-up.

3.4.8 WSV-70 is interlocked with the following valves and will not open if any of these valves are open.

- WSV-33
- WSV-35
- WSV-36
- WSV-37

3.4.9 RMV-25 does not have a separate operator. It is interlocked with RMV-8. When RMV-8 is closed, RMV-25 will open. When RMV-8 is opened, RMV-25 will close.

3.4.10 RMV-26 does not have a separate operator. It is interlocked with RMV-20. When RMV-20 is closed, RMV-26 will open. When RMV-20 is opened, RMV-26 will close.

3.4.11 RMV-6 is a 3-way valve. OPEN indicates RMV-6 is aligned from RM-A1-RE4 (RM-A1 gaseous mid-range detector) outlet to RB Exhaust Duct. CLOSED indicates RMV-6 is aligned from RM-A1-RE4 (RM-A1 gaseous mid-range detector) outlet to RMP-A1 (RM-A1 sample pump) inlet.

3.4.12 RMV-18 is a 3-way valve. OPEN indicates RMV-18 is aligned from RM-A2-RE4 (RM-A2 gaseous mid-range detector) outlet to AB Exhaust Duct. CLOSED indicates RMV-18 is aligned from RM-A2-RE4 (RM-A2 gaseous mid-range detector) outlet to RMP-A2 (RM-A2 sample pump) inlet.

3.4.13 RM-A1-FI and RM-A2-FI readings are multiplied by 0.1 to obtain flow in cfm.

3.4.14 A maximum filter loading of 3 Ci total activity is recommended for particulate and iodine filter grab samples.

3.4.15 RB dome sampling via WSV-34 and WSV-35 is the preferred sample point for sampling the RB atmosphere.

3.4.16 RB emergency recirculation discharge duct sampling via WSV-32 and WSV-33 is the preferred alternate sample point for sampling the RB atmosphere.

3.4.17 RB normal recirculation duct sampling via WSV-3 and WSV-4 is the least preferred sample point for sampling the RB atmosphere because this ventilation duct is normally secured during accident conditions.

3.4.18 ES must be bypassed or reset by Operations before WSV-3, 4, 5 or 6 can be opened from the Control Room.

3.4.19 Sampling described in Section 4.0 of this procedure CANNOT be performed concurrently due to shared piping in the different sample streams.

3.5 Prerequisites

NOTE
Prerequisites steps may be performed in any order.

3.5.1 ASSEMBLE sample team.

Sample Team Leader _____

Sample Team Members _____

_____

_____

_____ Initials

3.5.2 DETERMINE sampling to be performed.

Section Number	Description
_____	_____
_____	_____
_____	_____
_____	_____

_____ Initials

3.5.3 REVIEW procedures.

___ EM-104, Operation of the Operational Support Center

___ Emergency Team Member duties per Section 4.0

___ Team Briefing/Re-entry checklist

___ Sections of this procedure being performed

_____ Initials

3.5.4 IF gas grab sampling via WSSB-2,
THEN ENSURE the following:

[ ] Grab sampler currently installed

___ MEEL-2, AB elevator, is operable to transport sampler

OR

[ ] Grab sampler NOT currently installed

___ MEEL-2, AB elevator operable to transport sampler

___ New break-away type device available to attach transit cover and transit cover bolts to sampler

___ Replacement sample bomb and pig (Catalog ID 1400513) available to install on grab sampler transit cart

_____
Initials

3.5.5 IF particulate and iodine sampling via RMSB-1A/1B or RMSB-2A/2B,
THEN PERFORM the following:

___ ESTIMATE sample stream activity

Estimated sample stream activity _____ µCi/cc

___ DETERMINE where filters will be stored

Filter storage location _____

___ ENSURE timing device available.

_____
Initials

3.5.6 IF sampling RB atmosphere,
THEN ENSURE electrical breakers are closed.

[ ] Operations has performed EOP-14 Enclosure 2, PPO Post Event Actions

OR

[ ] Operations has NOT performed EOP-14 Enclosure 2, PPO Post Event Actions

1. ___ REQUEST operations CLOSE the following breakers
   - DPDP-5A, Breaker 2 (WSV-35)
   - DPDP-8A, Breaker 14 (WSV-34)
   - DPDP-5B, Breaker 27 (WSV-33)
   - DPDP-8B, Breaker 21 (WSV-32)
2. ___ Operations REPORTS breakers closed

_____
Initials

3.5.7 PERFORM pre-job brief.

___ ENSURE RMT member is present for briefing

DISCUSS the following

___ access route

___ exit route

___ Communications

Radio channel to be used _____

phone number(s) _____

_____

_____

_____

Initials

3.5.8 VERIFY ALL steps of this section are completed before sample team leaves OSC.

_____

Initials

_____

Section 3.5 complete Initials/Date

4.0 INSTRUCTIONS

NOTE

The sampling described in Section 4.0 of this procedure CANNOT be performed concurrently due to shared piping in the different sample streams.

4.1 Reactor Building Atmosphere Gamma Isotopic Analysis Using Aims

4.1.1 WHEN sample team exits OSC,
THEN VERIFY radio communication with OSC Chemistry Coordinator or designee.

_____
Initials

4.1.2 ALIGN system for sample.

1. NOTIFY operations to perform the following:
   a. ___ ENSURE ES actuations are reset or bypassed
   b. ___ OPEN WSV-5
   c. ___ OPEN WSV-6
   d. OPEN RB sample isolation valves

      [ ] RB dome (preferred sample)
      ___ WSV-34
      ___ WSV-35

      OR

      [ ] emergency recirculation ventilation discharge duct (alternate sample)
      ___ WSV-32
      ___ WSV-33

      OR

      [ ] normal recirculation ventilation duct sampling (not representative)
      ___ WSV-3
      ___ WSV-4

2. ___ Operations reports valve line-up complete
3. OPEN the following valves:

   [ ] RB dome or emergency recirculation ventilation discharge duct sample
   ___ WSV-61
   ___ WSV-37

   OR

   [ ] normal recirculation ventilation duct sample
   ___ WSV-36
   ___ WSV-61
   ___ WSV-37

_____
Initials

CAUTION

WSP-1 may be damaged if operated without complete line-up.

NOTE

Procedure may continue while purging sample.

4.1.3 PURGE sample line.

1. ___ START WSP-1
2. ___ VERIFY flow at WS-14-FI
3. ___ PURGE at least 10 minutes

_____
Initials

4.1.4 ENSURE RANGE AIMS detector WS-13-CE ready for use.

___ REFER to Enclosure 4 for guidance

- [ ] Liquid nitrogen dewar > 50 pounds
- [ ] Detector voltage adjusted
- [ ] QC requirements met

_____
Initials

NOTE

This step may be repeated for multiple gamma analyses.

NOTE

Enclosure 2 may be used to evaluate % core damage.

4.1.5 PERFORM Gamma Isotopic Analysis

1. ___ ENSURE sample line purge is complete
2. ___ REFER to Enclosure 5 for gamma spectroscopy guidance
   [ ] SELECT Containment Building Sample
   [ ] ATTACH gamma scan(s) to this procedure
3. ___ NOTIFY OSC Chemistry Coordinator or designee of results

Gamma Scan ID number(s)

_____

_____

_____

_____
Initials

4.1.6 ALIGN for instrument air purge

1. ___ OPEN WSV-53
2. ENSURE the following valves are closed:
   ___ WSV-3
   ___ WSV-4
   ___ WSV-32
   ___ WSV-33
   ___ WSV-34
   ___ WSV-35
3. ___ Operations reports valves are closed

_____
Initials

4.1.7 ENSURE adequate system purge.

1. ___ ENSURE logged onto PASS computer
2. ___ ENSURE PASS Menu selected
3. ___ SELECT Flush Sample Lines
4. ___ SELECT RANGE Air Purge
5. ___ PURGE at least 10 minutes
6. ___ PRESS Return
7. ___ SELECT QUIT to exit
8. ___ ENTER LO to log off PASS

_____
Initials

4.1.8 SECURE line-up.

1. ___ STOP WSP-1

2. ENSURE CLOSED the following valves:
   - ___ WSV-53
   - ___ WSV-61
   - ___ WSV-37
   - ___ WSV-36

3. NOTIFY Operations to CLOSE the following valves:
   - ___ WSV-5
   - ___ WSV-6

4. ___ Operations reports valves closed

_____
Initials

_____
Section 4.1 completed Initials/Date

4.2 **Reactor Building Atmosphere Gas Grab Sample Via WSSB-2 Gas Grab Sampler**

4.2.1 WHEN sample team exits OSC,
THEN VERIFY radio communication with OSC Chemistry Coordinator or designee

_____
Initials

NOTE

AHF-67 switch is located on wall left of AHF-67.

4.2.2 ESTABLISH ventilation for gas grab sampling.

___ POSITION AHF-67 switch to ON

_____
Initials

4.2.3 ENSURE gas grab sampler, WSSB-2, installed.

[ ] *Gas grab sampler already installed*

OR

[ ] REFER to Enclosure 6 for gas grab sampler installation instructions

_____
Initials

4.2.4 ALIGN system for gas grab sample.

1. NOTIFY operations to perform the following:
   a. ___ ENSURE ES actuations are reset or bypassed
   b. ___ OPEN WSV-5
   c. ___ OPEN WSV-6
   d. OPEN RB sample isolation valves

   [ ] RB dome (preferred sample)
   ___ WSV-34
   ___ WSV-35

   OR

   [ ] emergency recirculation ventilation discharge duct (alternate sample)
   ___ WSV-32
   ___ WSV-33

   OR

   [ ] normal recirculation ventilation duct sampling (not representative)
   ___ WSV-3
   ___ WSV-4

2. ___ Operations reports valve line-up complete

3. OPEN the following valves:

   [ ] RB dome or emergency recirculation ventilation discharge duct sample
   ___ WSV-59
   ___ WSV-60
   ___ WSV-37

   OR

   [ ] normal recirculation ventilation duct sample
   ___ WSV-36
   ___ WSV-59
   ___ WSV-60
   ___ WSV-37

_____
Initials

CAUTION

WSP-1 may be damaged if operated without complete line-up.

4.2.5 ALIGN for RB atmosphere gas grab sample.

1. ___ START WSP-1
2. ___ VERIFY flow at WS-14-FI
3. ___ PURGE at least 10 minutes

_____
Initials

4.2.6 ENSURE RANGE AIMS detector WS-13-CE ready for use.

___ REFER to Enclosure 4 for guidance

[ ] Liquid nitrogen dewar > 50 pounds

[ ] Detector voltage adjusted

[ ] QC requirements met

_____
Initials

NOTE

This step may be repeated for multiple gamma analyses.

4.2.7 PERFORM Gamma Isotopic Analysis.

1. ___ ENSURE sample line purge is complete
2. ___ REFER to Enclosure 5 for gamma spectroscopy guidance
   [ ] SELECT Containment Building Sample
   [ ] ATTACH gamma scan(s) to this procedure
3. ___ NOTIFY OSC Chemistry Coordinator or designee of results

Gamma Scan ID number(s)

_____

_____

_____

_____
Initials

4.2.8 ISOLATE grab sample.

1. ___ CLOSE WSV-72
2. ___ CLOSE WSV-71
3. ___ RECORD sample time

_____
Grab sample Date/Time

_____
Initials

4.2.9 ALIGN for Instrument Air purge.

1. ___ OPEN WSV-53
2. NOTIFY Operations to ENSURE the following valves are closed:
   - ___ WSV-3
   - ___ WSV-4
   - ___ WSV-32
   - ___ WSV-33
   - ___ WSV-34
   - ___ WSV-35
3. ___ Operations reports valves are closed

_____
Initials

4.2.10 PURGE WS-13-CE, RANGE AIMS.

1. ___ ENSURE logged onto PASS computer
2. ___ ENSURE PASS Menu selected
3. ___ SELECT Flush Sample Lines
4. ___ SELECT RANGE Air Purge
5. ___ PURGE at least 10 minutes
6. ___ PRESS Return
7. ___ SELECT QUIT to exit
8. ___ ENTER LO to log off PASS

_____
Initials

4.2.11 RESTORE system line-up.

1. ___ OPEN WSV-61
2. ___ CLOSE WSV-59
3. ___ CLOSE WSV-60
4. ___ PURGE at least 1 minute
5. ___ STOP WSP-1
6. ENSURE CLOSED the following valves:
   - ___ WSV-53
   - ___ WSV-61
   - ___ WSV-37
   - ___ WSV-36
7. NOTIFY Operations to CLOSE the following valves:
   - ___ WSV-5
   - ___ WSV-6

_____
Initials

4.2.12 REMOVE Gas Grab Sampler, WSSB-2.

1. ___ REMOVE gas grab sampler from sample station, REFER to Enclosure 6
2. ___ TRANSPORT gas grab sampler to 95' TB Crane Well
3. ___ UNBOLT grab sampler from cart using ¾" wrench or equivalent as determined by Chemistry Technician
4. ___ INSTALL transit cover over quick connects
5. ___ MEASURE dose rates from grab sampler

Contact dose rate (side of pig) _____ mR/hr

Dose rate @ 3 feet _____ mR/hr

_____
Initials

4.2.13 PREPARE for grab sample shipment.

___ REFER to Enclosure 7 for off-site shipment and notifications

_____
Initials

_____
Section 4.2 completed Initials/Date

4.3 Reactor Building Ventilation Duct Gamma Isotopic Analysis

NOTE

RM-A1 must be operating to perform this section.

4.3.1 ENSURE RM-A1 is in service. Remote indications may be used to accomplish this task.

_____
Initials

4.3.2 WHEN sample team exits OSC,
THEN VERIFY radio communication with OSC Chemistry Coordinator or designee

_____
Initials

4.3.3 VERIFY RM-A1 LMH valve controller alignment.

[ ] MAN/AUTO toggle switch selected to AUTO

OR

[ ] MAN/AUTO toggle switch selected to MAN

___ ALIGN RM-A1 LMH valve controller for current plant conditions per Section 5.3 of this procedure.

_____
Initials

CAUTION

WSP-1 may be damaged if operated without complete line-up.

4.3.4 PURGE sample line.

1. OPEN the following valves
   - ___ RMV-011
   - ___ WSV-61
   - ___ WSV-70
2. ___ START WSP-1
3. ___ VERIFY flow at WS-14-FI
4. ___ PURGE at least 1 minute

_____
Initials

4.3.5 ENSURE RANGE AIMS detector WS-13-CE ready for use.

___ REFER to Enclosure 4 for guidance

[ ] Liquid nitrogen dewar > 50 pounds

[ ] Detector voltage adjusted

[ ] QC requirements met

_____
Initials

NOTE

This step may be repeated for multiple gamma analyses.

4.3.6 PERFORM Gamma Isotopic Analysis

1. ___ ENSURE sample line purge is complete
2. ___ REFER to Enclosure 5 for gamma spectroscopy guidance
   [ ] SELECT Reactor Building Vent Sample
   [ ] ATTACH gamma scan(s) to this procedure
3. ___ NOTIFY OSC Chemistry Coordinator or designee of results

Gamma Scan ID number(s)

_____

_____

_____

_____
Initials

4.3.7 ALIGN for instrument air purge

1. ___ OPEN WSV-63
2. ___ CLOSE RMV-011

_____
Initials

4.3.8 ENSURE adequate system purge.

1. ___ ENSURE logged onto PASS computer
2. ___ ENSURE PASS Menu selected
3. ___ SELECT Flush Sample Lines
4. ___ SELECT VENT Air Purge
5. ___ PURGE at least 10 minutes
6. ___ PRESS Return
7. ___ SELECT QUIT to exit
8. ___ ENTER LO to log off PASS

_____
Initials

4.3.9 SECURE line-up.

1. ___ STOP WSP-1
2. CLOSE the following valves
   - ___ WSV-63
   - ___ WSV-61
   - ___ WSV-70

_____
Initials

_____
Section 4.3 completed Initials/Date

4.4 Auxiliary Building Ventilation Duct Gamma Isotopic Analysis

NOTE

RM-A2 must be operating to perform this section.

4.4.1 ENSURE RM-A2 is in service. Remote indications may be used to accomplish this task.

_____
Initials

4.4.2 WHEN sample team exits OSC,
THEN VERIFY radio communication with OSC Chemistry Coordinator or designee

_____
Initials

4.4.3 VERIFY RM-A2 LMH valve controller alignment.

[ ] MAN/AUTO toggle switch selected to AUTO

OR

[ ] MAN/AUTO toggle switch selected to MAN

___ ALIGN RM-A2 LMH valve controller for current plant conditions per Section 5.4 of this procedure.

_____
Initials

CAUTION

WSP-1 may be damaged if operated without complete line-up.

4.4.4 PURGE sample line.

1. OPEN the following valves
   - ___ RMV-23
   - ___ WSV-61
   - ___ WSV-70
2. ___ START WSP-1
3. ___ VERIFY flow at WS-14-FI
4. ___ PURGE at least 1 minute

_____
Initials

4.4.5 ENSURE RANGE AIMS detector WS-13-CE ready for use.

___ REFER to Enclosure 4 for guidance

[ ] Liquid nitrogen dewar > 50 pounds

[ ] Detector voltage adjusted

[ ] QC requirements met

_____
Initials

NOTE

This step may be repeated for multiple gamma analyses.

4.4.6 PERFORM Gamma Isotopic Analysis

1. ___ ENSURE sample line purge is complete
2. ___ REFER to Enclosure 5 for gamma spectroscopy guidance
   [ ] SELECT Auxiliary Building Vent Sample
   [ ] ATTACH gamma scan(s) to this procedure
3. ___ NOTIFY OSC Chemistry Coordinator or designee of results

Gamma Scan ID number(s)

_____

_____

_____

_____
Initials

4.4.7 ALIGN for instrument air purge

1. ___ OPEN WSV-63
2. ___ CLOSE RMV-23

_____
Initials

4.4.8 ENSURE adequate system purge.

1. ___ ENSURE logged onto PASS computer
2. ___ ENSURE PASS Menu selected
3. ___ SELECT Flush Sample Lines
4. ___ SELECT VENT Air Purge
5. ___ PURGE at least 10 minutes
6. ___ PRESS Return
7. ___ SELECT QUIT to exit
8. ___ ENTER LO to log off PASS

_____
Initials

4.4.9 SECURE line-up.

1. ___ STOP WSP-1

2. CLOSE the following valves
   - ___ WSV-63
   - ___ WSV-61
   - ___ WSV-70

_____
Initials

_____
Section 4.4 completed Initials/Date

4.5 Reactor Building Vent Particulate and Iodine Grab Sample

NOTE

Flow must be established through RM-A1 mid-range or high-range gaseous monitors to perform this section.

4.5.1 ENSURE RM-A1 is in service. Remote indications may be used to accomplish this task.

_____
Initials

4.5.2 WHEN sample team exits OSC,
THEN VERIFY radio communication with OSC Chemistry Coordinator or designee.

_____
Initials

4.5.3 VERIFY RM-A1 LMH valve controller alignment.

[ ] MAN/AUTO toggle switch selected to AUTO

OR

[ ] MAN/AUTO toggle switch selected to MAN

___ ALIGN RM-A1 LMH valve controller for current plant conditions per Section 5.3 of this procedure.

_____
Initials

NOTE

Total activity loaded on filters is limited to ≤ 3 curies.

4.5.4 DETERMINE sample collection time.

1. ___ DETERMINE RM-A1-FI actual flow rate

RM-A1-FI actual flow rate = [RM-A1-FI indicated flow rate] x 0.1

RM-A1-FI actual flow rate _____ cfm

2. ___ CALCULATE maximum sample collection time

$$\text{sample collection time (minutes)} = \frac{3E6 \ \mu Ci}{(\text{RM-A1-FI flow rate (cfm)})\left(\text{Estimated sample stream activity}\left(\frac{\mu Ci}{cc}\right)\right)\left(2.832E4\ \frac{cc}{cf}\right)}$$

maximum sample collection time _____ minutes

3. ___ REPORT maximum sample purge time to OSC Chemistry Coordinator or designee

_____
Initials

4.5.5 OBTAIN equipment from Post Accident Sampling Kit. Kit is located 143' AB west side of SF Pool wall.

___ RMSB Filter Canister Operating Handle
___ RMSB Filter Canister Removal Tong
___ (1) RMSB Filter Canister with filters installed
___ (1) plastic bag
___ RMSB Filter Canister Shielded Container

_____
Initials

4.5.6 INSTALL RMSB filter canister in RMSB-1B.

1. VERIFY the following valve operating handles in VERTICAL position
   ___ RMV-1
   ___ RMV-2
2. ___ OPEN RMSB-1B shield door
3. ___ INSTALL RMSB Filter Canister with particulate filter UP
4. ___ ENGAGE filter holder
5. ___ CLOSE RMSB-1B shield door

_____
Initials

4.5.7 START sample collection.

1. ALIGN valve operating handles to HORIZONTAL position
   ___ RMV-1
   ___ RMV-2
2. ___ RECORD start time

sample start time _____

_____
Initials

CAUTION

Exceeding maximum sample collection time may result in higher than expected filter dose rates.

4.5.8 STOP sample collection.

1. ALIGN valve operating handles to VERTICAL position
   ___ RMV-1
   ___ RMV-2
2. ___ RECORD sample stop time

sample stop time _____

_____
Initials

4.5.9 PURGE RMSB-1B with instrument air.

1. ___ OPEN RMV-27
2. ___ PURGE at least 5 minutes
3. ___ CLOSE RMV-27

_____
Initials

CAUTION

Filters are removed and transferred to RMSB Filter Shielded Container as quickly as possible using long handled tools due to high dose rates on filters.

4.5.10 REMOVE filters.

1. ___ OPEN RMSB-1B shield door
2. ___ RELEASE filter holder
3. ___ TRANSFER filter canister to plastic bag in RMSB Filter Canister Shielded Container
4. ___ CLOSE RMSB-1B shield door

_____
Initials

4.5.11 STORE RMSB Filter Canister Shielded Container.

1. ___ TRANSPORT RMSB Filter Canister Shielded Container to pre-determined storage location
2. ___ MEASURE dose rates from RMSB Filter Canister Shielded Container

Contact dose rate _____ mR/hr

Dose rate @ 3 feet _____ mR/hr

_____
Initials

4.5.12 PERFORM Reactor Building Ventilation Duct gamma isotopic analysis per Section 4.3.

_____
Initials

4.5.13 PREPARE for grab sample shipment.

___ REFER to Enclosure 7 for off-site shipment and notifications

_____
Initials

_____
Section 4.5 completed Initials/Date

4.6 Auxiliary Building Vent Particulate and Iodine Grab Sample

NOTE

Flow must be established through RM-A2 mid-range or high-range gaseous monitors to perform this section.

4.6.1 ENSURE RM-A2 is in service. Remote indications may be used to accomplish this task.

_____
Initials

4.6.2 WHEN sample team exits OSC,
THEN VERIFY radio communication with OSC Chemistry Coordinator or designee.

_____
Initials

4.6.3 VERIFY RM-A2 LMH valve controller alignment.

[ ] MAN/AUTO toggle switch selected to AUTO

OR

[ ] MAN/AUTO toggle switch selected to MAN

___ ALIGN RM-A2 LMH valve controller for current plant conditions per Section 5.4 of this procedure.

_____
Initials

NOTE

Total activity loaded on filters is limited to ≤ 3 curies.

4.6.4 DETERMINE sample collection time.

1. ___ DETERMINE RM-A2-FI actual flow rate

RM-A2-FI actual flow rate = [RM-A2-FI indicated flow rate] x 0.1

RM-A2-FI actual flow rate _____ cfm

2. ___ CALCULATE maximum sample collection time

$$\text{sample collection time (minutes)} = \frac{3E6 \ \mu Ci}{(\text{RM-A2-FI flow rate (cfm)})\left(\text{Estimated sample stream activity}\left(\frac{\mu Ci}{cc}\right)\right)\left(2.832E4\ \frac{cc}{cf}\right)}$$

maximum sample collection time _____ minutes

3. ___ REPORT maximum sample purge time to OSC Chemistry Coordinator or designee

_____
Initials

4.6.5 OBTAIN equipment from Post Accident Sampling Kit. Kit is located 143' AB west side of SF Pool wall.

___ RMSB Filter Canister Operating Handle
___ RMSB Filter Canister Removal Tong
___ (1) RMSB Filter Canister with filters installed
___ (1) plastic bag
___ RMSB Filter Canister Shielded Container

_____
Initials

4.6.6 INSTALL filter canister in RMSB-2B.

1. VERIFY the following valve operating handles in VERTICAL position
   ___ RMV-13
   ___ RMV-14
2. ___ OPEN RMSB-2B shield door
3. ___ INSTALL Filter Canister with particulate filter UP
4. ___ ENGAGE filter holder
5. ___ CLOSE RMSB-2B shield door

_____
Initials

4.6.7 START sample collection.

1. ALIGN valve operating handles to HORIZONTAL position
   ___ RMV-13
   ___ RMV-14
2. ___ RECORD start time

sample start time _____

_____
Initials

CAUTION

Exceeding maximum sample collection time may result in higher than expected filter dose rates.

4.6.8 STOP sample collection.

1. ALIGN valve operating handles to VERTICAL position
   ___ RMV-13
   ___ RMV-14
2. ___ RECORD sample stop time

sample stop time _____

_____
Initials

4.6.9 PURGE RMSB-2B with instrument air.

1. ___ OPEN RMV-34
2. ___ PURGE at least 5 minutes
3. ___ CLOSE RMV-34

_____
Initials

CAUTION

Filters are removed and transferred to RMSB Filter Shielded Container as quickly as possible using long handled tools due to high dose rates on filters.

4.6.10 REMOVE filters.

1. ___ OPEN RMSB-2B shield door
2. ___ RELEASE filter holder
3. ___ TRANSFER filter canister to plastic bag in RMSB Filter Canister Shielded Container
4. ___ CLOSE RMSB-2B shield door

_____
Initials

4.6.11 STORE RMSB Filter Canister Shielded Container.

1. ___ TRANSPORT RMSB Filter Canister Shielded Container to pre-determined storage location
2. ___ MEASURE dose rates from RMSB Filter Canister Shielded Container

Contact dose rate _____ mR/hr

Dose rate @ 3 feet _____ mR/hr

_____
Initials

4.6.12 PERFORM Auxiliary Building Ventilation Duct gamma isotopic analysis per Section 4.4.

_____
Initials

4.6.13 PREPARE for grab sample shipment.

___ REFER to Enclosure 7 for off-site shipment and notifications.

_____
Initials

_____
Section 4.6 completed Initials/Date

4.7 **Reactor Building Ventilation Duct Gas Grab Sample Via WSSB-2 Gas Grab Sampler**

4.7.1 ENSURE RM-A1 is in service. Remote indications may be used to accomplish this task.

_____
Initials

4.7.2 WHEN sample team exits OSC,
THEN VERIFY radio communication with OSC Chemistry Coordinator or designee.

_____
Initials

4.7.3 VERIFY RM-A1 LMH valve controller alignment.

[ ] MAN/AUTO toggle switch selected to AUTO

OR

[ ] MAN/AUTO toggle switch selected to MAN

___ ALIGN RM-A1 LMH valve controller for current plant conditions per Section 5.3 of this procedure.

_____
Initials

NOTE

AHF-67 switch is located on wall left of AHF-67.

4.7.4 ESTABLISH ventilation for gas grab sampling.

___ POSITION AHF-67 switch to ON

_____
Initials

4.7.5 ENSURE gas grab sampler, WSSB-2, installed.

[ ] Gas grab sampler already installed

OR

[ ] REFER to Enclosure 6 for gas grab sampler installation instructions

_____
Initials

CAUTION

WSP-1 may be damaged if operated without complete line-up.

4.7.6 ALIGN system for gas grab sample.

1. OPEN the following valves:
   ___ RMV-011
   ___ WSV-59
   ___ WSV-60
   ___ WSV-70
2. ___ START WSP-1
3. ___ VERIFY flow at WS-14-FI
4. ___ PURGE at least 5 minutes

_____
Initials

4.7.7 ENSURE RANGE AIMS detector WS-13-CE ready for use.

___ REFER to Enclosure 4 for guidance
   [ ] Liquid nitrogen dewar > 50 pounds
   [ ] Detector voltage adjusted
   [ ] QC requirements met

_____
Initials

NOTE

This step may be repeated for multiple gamma analyses.

4.7.8 PERFORM Gamma Isotopic Analysis.

1. ___ ENSURE sample line purge is complete
2. ___ REFER to Enclosure 5 for gamma spectroscopy guidance
   - [ ] SELECT Reactor Building Vent Sample
   - [ ] ATTACH gamma scan(s) to this procedure
3. ___ NOTIFY OSC Chemistry Coordinator or designee of results

Gamma Scan ID number(s)

_____

_____

_____

_____
Initials

4.7.9 ISOLATE grab sample.

1. ___ CLOSE WSV-72
2. ___ CLOSE WSV-71
3. ___ RECORD sample time

_____
Grab sample Date/Time

_____
Initials

4.7.10 ALIGN for Instrument Air purge.

1. ___ OPEN WSV-63
2. ___ CLOSE RMV-011

_____
Initials

4.7.11 PURGE WS-13-CE, RANGE AIMS.

1. ___ ENSURE logged onto PASS computer
2. ___ ENSURE PASS Menu selected
3. ___ SELECT Flush Sample Lines
4. ___ SELECT VENT Air Purge
5. ___ PURGE at least 10 minutes
6. ___ PRESS Return
7. ___ SELECT QUIT to exit
8. ___ ENTER LO to log off PASS

_____
Initials

4.7.12 RESTORE system line-up.

1. ___ OPEN WSV-61
2. ___ CLOSE WSV-59
3. ___ CLOSE WSV-60
4. ___ PURGE at least 1 minute
5. ___ STOP WSP-1
6. CLOSE the following valves:
   - ___ WSV-63
   - ___ WSV-61
   - ___ WSV-70

_____
Initials

4.7.13 REMOVE Gas Grab Sampler, WSSB-2.

1. ___ REMOVE gas grab sampler from sample station, REFER to Enclosure 6
2. ___ TRANSPORT gas grab sampler to 95' TB Crane Well
3. ___ UNBOLT grab sampler from cart using ¾" wrench or equivalent as determined by Chemistry Technician
4. ___ INSTALL transit cover over quick connects
5. ___ MEASURE dose rates from grab sampler

Contact dose rate (side of pig) _____ mR/hr

Dose rate @ 3 feet _____ mR/hr

_____
Initials

4.7.14 PREPARE for grab sample shipment.

___ REFER to Enclosure 7 for off-site shipment and notifications

_____
Initials

_____
Section 4.7 completed Initials/Date

4.8 **Auxiliary Building Ventilation Duct Gas Grab Sample Via WSSB-2 Gas Grab Sampler**

4.8.1 ENSURE RM-A2 is in service. Remote indications may be used to accomplish this task.

_____
Initials

4.8.2 WHEN sample team exits OSC,
THEN VERIFY radio communication with OSC Chemistry Coordinator or designee.

_____
Initials

4.8.3 VERIFY RM-A2 LMH valve controller alignment.

[ ] MAN/AUTO toggle switch selected to AUTO

OR

[ ] MAN/AUTO toggle switch selected to MAN

___ ALIGN RM-A2 LMH valve controller for current plant conditions per Section 5.4 of this procedure.

_____
Initials

NOTE

AHF-67 switch is located on wall left of AHF-67.

4.8.4 ESTABLISH ventilation for gas grab sampling.

___ POSITION AHF-67 switch to ON

_____
Initials

4.8.5 ENSURE gas grab sampler, WSSB-2, installed.

[ ] Gas grab sampler already installed

OR

[ ] REFER to Enclosure 6 for gas grab sampler installation instructions

_____
Initials

CAUTION

WSP-1 may be damaged if operated without complete line-up.

4.8.6 ALIGN system for gas grab sample.

1. OPEN the following valves:
   ___ RMV-23
   ___ WSV-59
   ___ WSV-60
   ___ WSV-70

2. ___ START WSP-1
3. ___ VERIFY flow at WS-14-FI
4. ___ PURGE at least 5 minutes

_____
Initials

4.8.7 ENSURE RANGE AIMS detector WS-13-CE ready for use.

___ REFER to Enclosure 4 for guidance
   [ ] Liquid nitrogen dewar > 50 pounds
   [ ] Detector voltage adjusted
   [ ] QC requirements met

_____
Initials

NOTE

This step may be repeated for multiple gamma analyses.

4.8.8 PERFORM Gamma Isotopic Analysis.

1. ___ ENSURE sample line purge is complete
2. ___ REFER to Enclosure 5 for gamma spectroscopy guidance
   - [ ] SELECT Auxiliary Building Vent Sample
   - [ ] ATTACH gamma scan(s) to this procedure
3. ___ NOTIFY OSC Chemistry Coordinator or designee of results

Gamma Scan ID number(s)

_____

_____

_____

_____
Initials

4.8.9 ISOLATE grab sample.

1. ___ CLOSE WSV-72
2. ___ CLOSE WSV-71
3. ___ RECORD sample time

_____
Grab sample Date/Time

_____
Initials

4.8.10 ALIGN for Instrument Air purge.

1. ___ OPEN WSV-63
2. ___ CLOSE RMV-23

_____
Initials

4.8.11 PURGE WS-13-CE, RANGE AIMS.

1. ___ ENSURE logged onto PASS computer
2. ___ SELECT PASS Menu
3. ___ SELECT Flush Sample Lines
4. ___ SELECT VENT Air Purge
5. ___ PURGE at least 10 minutes
6. ___ PRESS Return
7. ___ SELECT QUIT to exit
8. ___ ENTER LO to log off PASS

_____
Initials

4.8.12 RESTORE system line-up.

1. ___ OPEN WSV-61
2. ___ CLOSE WSV-59
3. ___ CLOSE WSV-60
4. ___ PURGE at least 1 minute
5. ___ STOP WSP-1
6. CLOSE the following valves:
   - ___ WSV-63
   - ___ WSV-61
   - ___ WSV-70

_____
Initials

4.8.13 REMOVE Gas Grab Sampler, WSSB-2.

1. ___ REMOVE gas grab sampler from sample station, REFER to Enclosure 6
2. ___ TRANSPORT gas grab sampler to 95' TB Crane Well
3. ___ UNBOLT grab sampler from cart using ¾" wrench or equivalent as determined by E&C Technician
4. ___ INSTALL transit cover over quick connects
5. ___ MEASURE dose rates from grab sampler

Contact dose rate (side of pig) _____ mR/hr

Dose rate @ 3 feet _____ mR/hr

_____
Initials

4.8.14 PREPARE for grab sample shipment.

___ REFER to Enclosure 7 for off-site shipment and notifications

_____
Initials

_____
Section 4.8 completed Initials/Date

5.0 CONTINGENCIES

5.1 Estimating Grab Sample Shipment Curie Content When Gamma Spectroscopy System is Unavailable

5.1.1 ESTIMATE curie content of grab sample.

___ REFER to Enclosure 8

_____
Initials

_____
Section 5.1 completed Initials/Date

5.2 Manual Collimator Positioning and Manual Gamma Isotopic Analysis

5.2.1 PURGE sample line.

___ ENSURE sample line purge complete per applicable gamma spectroscopy section of this procedure

_____
Initials

5.2.2 PERFORM gamma isotopic analysis.

1. ___ POSITION collimator and near line valves manually per Enclosure 9.
2. ___ PERFORM gamma isotopic analysis manually per Enclosure 9.
3. ___ RECORD gamma ID number in applicable gamma isotopic analysis section and CONTINUE procedure at that point.

_____
Initials

_____
Section 5.2 completed Initials/Date

5.3 RM-A1 LMH Valve Controller Manual Operation

NOTE

Valve position indication is determined by the red indication light. Red light ON indicates OPEN. Red light OFF indicates CLOSED.

5.3.1 ALIGN RM-A1 LMH valve controller for manual operation.

[ ] RM-A1 LMH valve controller selected to AUTO

1. ___ PLACE control switches for any open valves to ON position
2. ___ SELECT MAN/AUTO toggle switch MAN
3. ___ DETERMINE current mode of operation based on current valve positions and rate meter indications. REFER to Enclosure 10.

OR

[ ] RM-A1 LMH valve controller selected to MAN

___ DETERMINE current mode of operation based on current valve positions and rate meter indications. REFER to Enclosure 10

OR

[ ] Mode of operation cannot be determined

___ ALIGN for low range operation per Enclosure 10

_____
Initials

5.3.2 MONITOR rate meter responses and ALIGN system per Enclosure 10 based on plant conditions and RM-A1 rate meter responses.

_____
Initials

5.3.3 EXIT this section when one of the following conditions exists.

[ ] RM-A1 LMH valve controller returned to AUTOMATIC operation

OR

[ ] Operation of mid- and high-range monitors no longer needed to monitor RB ventilation exhaust duct

_____
Initials

_____
Section 5.3 completed Initials/Date

5.4 RM-A2 LMH Valve Controller Manual Operation

NOTE

Valve position indication is determined by the red indication light. Red light ON indicates OPEN. Red light OFF indicates CLOSED.

5.4.1 ALIGN RM-A2 LMH valve controller for manual operation.

[ ] RM-A2 LMH valve controller selected to AUTO

1. ___ PLACE control switches for any open valves to ON position
2. ___ SELECT MAN/AUTO toggle switch to MAN
3. ___ DETERMINE current mode of automatic operation based on current valve positions and rate meter indications. REFER to Enclosure 11.

OR

[ ] RM-A2 LMH valve controller selected to MAN

___ DETERMINE mode of operation based on current valve positions and rate meter indications. REFER to Enclosure 11

OR

[ ] Mode of operation cannot be determined

___ ALIGN for low range operation per Enclosure 11

_____
Initials

5.4.2 MONITOR rate meter responses and ALIGN system per Enclosure 11 based on plant conditions and RM-A2 rate meter responses.

_____
Initials

5.4.3 EXIT this section when one of the following conditions exists.

[ ] RM-A2 LMH valve controller returned to AUTOMATIC operation

OR

[ ] Operation of mid- and high-range monitors no longer needed to monitor AB ventilation exhaust duct

_____
Initials

_____
Section 5.4 completed Initials/Date

OPERATIONAL SUPPORT CENTER DATA SHEET

Sample Point

[ ] RB Atmosphere
[ ] RB Vent Duct
[ ] AB Vent Duct

Gamma Isotopic

Total Activity _____ µCi/cc

Major Contributing Isotopes

ISOTOPE	ACTIVITY
_____	_____ µCi/cc
_____	_____ µCi/cc
_____	_____ µCi/cc
_____	_____ µCi/cc
_____	_____ µCi/cc
_____	_____ µCi/cc
_____	_____ µCi/cc
_____	_____ µCi/cc
_____	_____ µCi/cc
_____	_____ µCi/cc
_____	_____ µCi/cc
_____	_____ µCi/cc

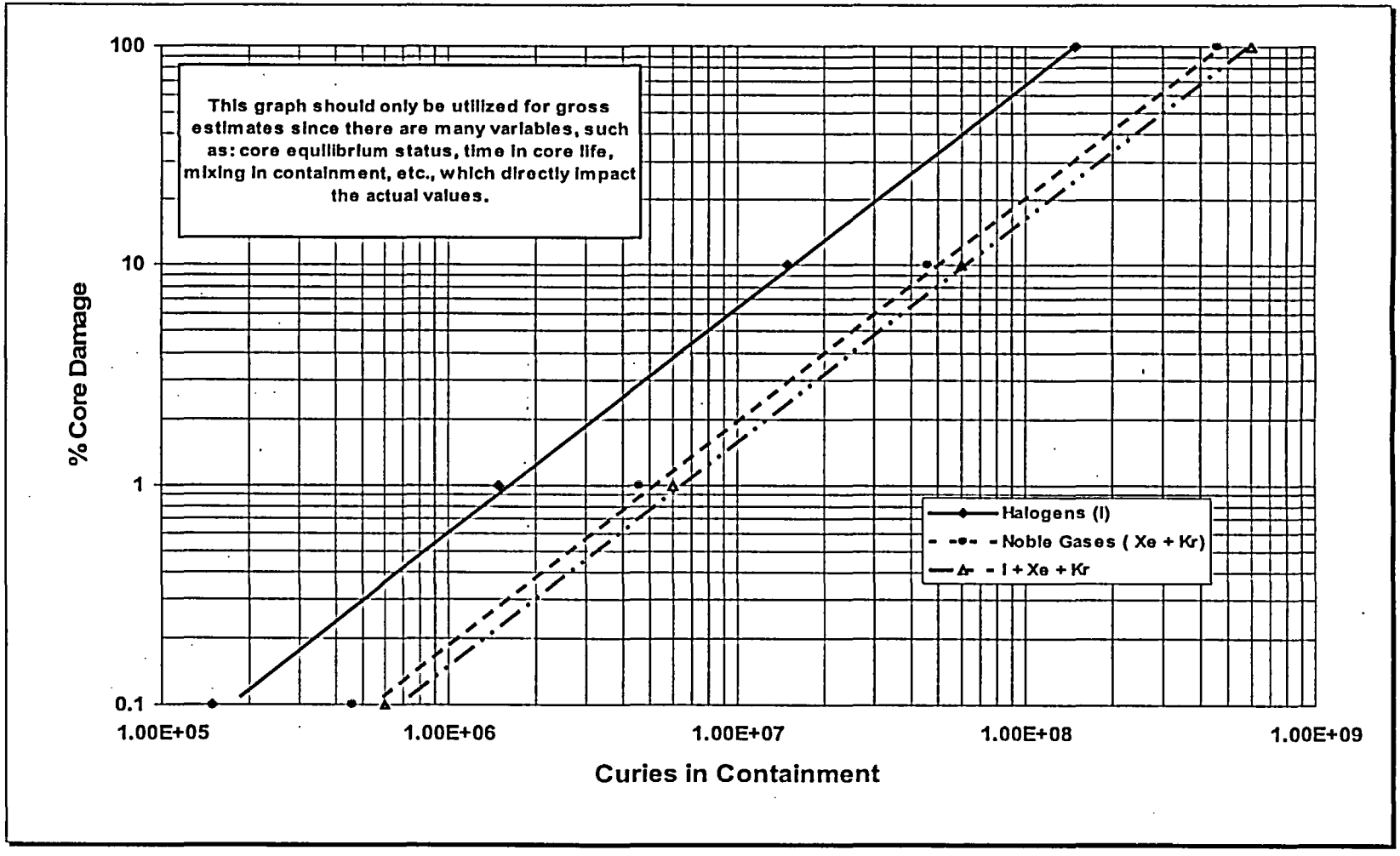
For RB atmosphere samples, calculate RB Total Activity as follows:

$$\text{RB TOTAL ACTIVITY (Ci)} = (2.0\text{E6 cubic feet}) \times \left(\frac{28317\text{ cc}}{\text{cubic foot}}\right) \times \left(\frac{1\text{E}-6\text{ Ci}}{\mu\text{Ci}}\right) \times \left(\text{Total Activity}\frac{\mu\text{Ci}}{\text{cc}}\right)$$

RB Total Activity _____ Ci

_____
Initial/Date/Time

Estimate of Core Damage from Curies in Containment



Power Supplies

Component	Power Supply	Power Supply Location	Power Supply Normal Position	Component Operation Location
PASS Including CMP	B-ES ACDP-59	95'AB near RM-A7	Breakers Closed	NA
WSV-35	DPDP-5A Breaker 2	A-EFIC room	Locked OPEN	A-EFIC room
WSV-34	DPDP-8A Breaker 14	A-EFIC room	Locked OPEN	A-EFIC room
WSV-32	DPDP-8B Breaker 21	B-EFIC room	Locked OPEN	B-EFIC room
WSV-33	DPDP-5B Breaker 27	B-EFIC room	Locked OPEN	B-EFIC room

RANGE AIMS Pre-Analysis Check Guidelines

1. VERIFY dewar weight > 50 as indicated at liquid nitrogen monitor WS-13-LT.

CAUTION

AIMS detector WS-13-CE HV supply potentiometer should be adjusted to 0 volts before resetting liquid nitrogen monitor WS-13-LT low level voltage trip or detector damage may occur.

2. ENSURE RANGE HV supply voltage adjusted per PASS and RANGE AIMS Equipment Logbook.

CAUTION

Increasing detector voltage > 100 volts/second may cause detector damage.

3. IF RANGE detector voltage is secured,
   THEN ADJUST detector voltage as follows:
   a. ENSURE WS-13-CE HV supply voltage potentiometer adjusted full counterclockwise
   b. DEPRESS liquid nitrogen monitor WS-13-LT HV RESET button.
   c. DEPRESS WS-13-CE HV supply voltage RESET button.
   d. ENSURE WS-13-CE HV supply power switch selected to ON position
   e. ADJUST WS-13-CE HV supply voltage per PASS and RANGE AIMS Equipment Logbook.
   f. LOCK WS-13-CE voltage potentiometer at correct voltage reading
4. ENSURE calibration check completed.
   - Calibration Check completed within past 7 days

     OR

   - PERFORM calibration check per CH-234, Post Accident Sampling System Gamma Spectroscopy System.

Guidelines for Performing Gamma Spectroscopy Analysis

1. LOG ON to PASS

   [ ] Log ON PASS from CRCHEM

   ENTER username PASS. There is no password.

   OR

   [ ] Log on PASS from CHIP
   a. LOG ON to CHIP using personal username and password
   b. SELECT PASS (CRCHEM) from Main Menu
   c. ENTER username PASS. There is no password.

2. SELECT PASS menu
3. SELECT Gaseous Sampling
4. SELECT sample point based on section of procedure being performed
5. IF system parameters are displayed (MUX display),
   THEN ENTER Q to quit
   AND ENTER N at prompt for a hard copy

NOTE
The default sample parameters are normally used. Sample time and volume are automatically updated by software. Specific parameters may be edited as needed on a case by case basis.

6. UPDATE sample parameters
7. SELECT ACCEPT

Guidelines for Gas Grab Sampler Installation and Removal

Installation

NOTE
Grab sampler preparation is normally done in a low dose area.

1. PREPARE grab sampler
   a. ENSURE grab sampler bolted to grab sampler cart
   b. ENSURE transit cover removed from grab sampler
   c. STORE transit cover by attaching to lifting ring on grab sampler with break-away type device.
   d. OPEN WSV-72
   e. OPEN WSV-71
2. INSTALL grab sampler
   a. ENSURE ramp installed
   b. GUIDE grab sampler into sample station until sampler is within several inches of connection point
   c. CONTINUE to GENTLY guide grab sampler until fully inserted into sample station
   d. ENGAGE Cart to Station Lock
   e. GENTLY PULL Engagement Handle to connect quick connects
   f. DISENGAGE Cart to Station Lock
   g. ENSURE grab sampler moves when Engagement Handle is moved back and forth.
   h. ENGAGE Cart to Station Lock

Removal

1. ENSURE ramp installed
2. SQUEEZE Engagement handle lever and PUSH to engagement handle toward wall
3. DISENGAGE Cart to Station Lock
4. REMOVE grab sampler from sample station

Grab Sample Shipment and Notifications

NOTE

Notifications may be made in any order.

1. NOTIFY Superintendent, Nuclear Operations Materials Controls
   - A grab sample has been collected
   - Initiate acquisition process for shielded sample cask
2. NOTIFY RNP E&C Superintendent that a grab sample has been collected
3. The following information is needed:
   - Utility and plant name
   - Name and phone number of E&C Specialist to whom follow-up communication should be addressed
   - Number and type of samples being shipped
   - Measured radiation levels at surface and three feet from shipping container
   - Estimated shipping time
   - Mode of transportation
   - Carrier
   - Estimated time of arrival at RNP in Hartsville, SC
4. Use the following shipping address:

   Progress Energy Carolinas
   Robinson Nuclear Plant
   3581 West Entrance Road
   Hartsville, SC 29990
   Attn: E&C Superintendent
   Phone (Caronet) 450-1837

Estimating Grab Sample Curie Content When Gamma Spectroscopy System is Unavailable

1. DETERMINE which of the following best represents the sample. Emergency Response support personnel may be used to make this determination.
   [ ] Fuel Gap Release – use column A

   OR

   [ ] Fuel Melt Release – use column B
2. RECORD Contact Dose Rate (side of pig) from the grab sample in Table 1.

   Contact Dose Rate (side of pig) _____ mR/hr
3. DETERMINE µCi per mR/hr
   For Gas Grab Sampler:
   [ ] Fuel Gap Release = 2.00E+4 µCi per mR/hr

   OR

   [ ] Fuel Melt Release = 2.50E+4 µCi per mR/hr

   For Particulate and Iodine Grab Sampler:
   [ ] Fuel Gap Release = 3.10E+1 µCi per mR/hr

   OR

   [ ] Fuel Melt Release = 4.70E+1 µCi per mR/hr
4. CALCULATE total activity.

   Total Activity = Contact Dose Rate (side of pig) x µCi per mR/hr

   Total Activity _____ µCi
5. CALCULATE individual nuclide activity. RECORD results in Table 1.

   Individual Nuclide Activity = Total Activity x nuclide fraction of total activity

Table 1				
	Column A		Column B	
Nuclide	Nuclide Fraction of Total Activity	Individual Nuclide Activity (µCi)	Nuclide Fraction of Total Activity	Individual Nuclide Activity (µCi)
Co58			5.97E-06	
Co60			4.58E-06	
Kr85	1.22E-03		1.84E-03	
Kr85m	1.65E-02		2.49E-02	
Kr87	1.34E-03		2.02E-03	
Kr88	2.00E-02		3.01E-02	
Rb86	9.19E-05		4.16E-05	
Sr89			5.31E-03	
Sr90			2.88E-04	
Sr91			3.83E-03	
Sr92			9.24E-04	
Y90			2.83E-06	
Y91			6.48E-05	
Y92			1.49E-05	
Y93			4.69E-05	
Zr95			8.19E-05	
Zr97			6.17E-05	
Nb95			7.72E-05	
Mo99			1.04E-03	
Tc99m			3.90E-04	
Ru103			8.39E-04	
Ru105			1.58E-04	
Ru106			1.92E-04	
Rh105			3.25E-04	
Sb127			9.76E-04	
Sb129			1.02E-03	
Te127			5.53E-04	
Te127m			1.32E-04	
Te129			2.91E-05	
Te129m			9.02E-04	
Te131m			1.45E-03	
Te132			1.61E-02	
I131	1.54E-01		9.27E-02	
I132	2.09E-02		1.26E-02	
I133	2.56E-01		1.54E-01	
I134	6.63E-04		4.00E-04	
I135	1.36E-01		8.22E-02	
Xe133	3.20E-01		4.82E-01	
Xe135	3.41E-02		5.14E-02	
Cs134	2.13E-02		9.64E-03	

Table 1 *(continued)*

	Column A		Column B	
Nuclide	Nuclide Fraction of Total Activity	Individual Nuclide Activity (µCi)	Nuclide Fraction of Total Activity	Individual Nuclide Activity (µCi)
Cs136	6.37E-03		2.88E-03	
Cs137	1.19E-02		5.39E-03	
Ba139			1.67E-04	
Ba140			9.08E-03	
La140			8.23E-05	
La141			2.10E-05	
La142			2.29E-06	
Ce141			2.09E-04	
Ce143			1.73E-04	
Ce144			1.26E-04	
Pr143			7.89E-05	
Nd147			3.51E-05	
Np239			2.18E-03	
Pu238			1.36E-07	
Pu239			3.07E-08	
Pu240			3.87E-08	
Pu241			6.52E-06	
Am241			1.72E-09	
Cm242			6.59E-07	
Cm244			3.86E-08	

Manual Collimator Positioning and Manual Gamma Isotopic Analysis

NOTE

Starting with FAR CLOSED and progressively trying more efficient geometries is recommended but not required.

1. POSITION collimator and near line valves per Table 2 until one of the following criteria is met:
   - adequate count rate observed at WS-13-CE rate meter
   - NEAR OPEN position lined up with adequate count rate
   - OSC Chemistry Coordinator or designee determines geometry to be used
2. Manually perform gamma spectroscopy analysis.

NOTE

The collimator position lights represent binary code. The 1, 2, and 3 lights may be disregarded when manually positioning the collimator. These lights represent a total of 7 binary units which is <10% of total collimator movement.

Table 2

Geometry		Binary Code Target	WS-13-CX Collimator Position Lights Lit	Near Line Valve Position			
				RB AIMS		Vent AIMS	
				WSV-54	WSV-57	WSV-64	WSV-67
RANGE	Far Closed	274	1,2,5,9	CLOSED	CLOSED		
	Far Open	113	2,3,4,6,7	CLOSED	CLOSED		
	Near Closed	225	1,2,6,7,8	OPEN	OPEN		
	Near Open	62	1,2,3,4,5,6	OPEN	OPEN		
VENT	Far Closed	733	1,2,3,4,5,7,8,10			CLOSED	CLOSED
	Far Open	887	1,2,3,5,6,7,9,10			CLOSED	CLOSED
	Near Closed	693	3,5,6,8,10			OPEN	OPEN
	Near Open	841	2,3,7,9,10			OPEN	OPEN

RM-A1 LMH Valve Controller Manual Operation Guidelines

NOTE

Numbers by valve positions in the same row indicate order of operation. No indicated valve position indicates that valve is closed.

	RMV-3	RMV-4	RMV-5	RMV-6	RMV-8	RMV-9	RMV-25	
Low range < ½ scale							OPEN	Low range operation
When this condition is observed:	Then establish this valve line-up							Mode of operation
Low range approximately ½ scale increasing		OPEN					OPEN	Low, Mid, High range parallel operation
Low range approximately ¾ scale increasing and Mid range rate meter approximately 1/3 scale		OPEN			OPEN (2) at least 35 minutes	OPEN (1)	CLOSE	Low range purge (at least 35 minutes) Mid, High range operation
Low range monitor purge completed		OPEN			CLOSE (1)	OPEN		Low range secured Mid, High range operation
Mid range approximately ¾ scale increasing and High range responding to radiation levels	OPEN (4) at least 35 minutes	CLOSE (3)	OPEN (1)	OPEN (2)		OPEN		Mid range purge (at least 35 minutes) High range operation
Mid range monitor purge completed	CLOSE (1)		OPEN	OPEN		OPEN		Mid range secured High range operation
High range not responding to radiation levels in sample for at least 5 minutes		OPEN (2)	CLOSE (3)	CLOSE (1)				Mid, High range operation
Mid range 1/3 scale decreasing	OPEN (4)	CLOSE (2)		OPEN (3)		CLOSE (1)	OPEN	Mid, High range purge (at least 35 minutes) Low range operation
Mid, High range monitor purge completed	CLOSE			CLOSE			OPEN	Low range operation

RM-A2 LMH Valve Controller Manual Operation Guidelines

NOTE

Numbers by valve positions in the same row indicate order of operation. No indicated valve position indicates that valve is closed.

	RMV-15	RMV-16	RMV-17	RMV-18	RMV-21	RMV-20	RMV-26	
Low range < ½ scale							OPEN	Low range operation
When this condition is observed:	Then establish this valve line-up							Mode of operation
Low range approximately ½ scale increasing		OPEN					OPEN	Low, Mid, High range parallel operation
Low range approximately ¾ scale increasing and Mid range rate meter approximately 1/3 scale		OPEN			OPEN (2) at least 35 minutes	OPEN (1)	CLOSE	Low range purge (at least 35 minutes) Mid, High range operation
Low range monitor purge completed		OPEN			CLOSE (1)	OPEN		Low range secured Mid, High range operation
Mid range approximately ¾ scale increasing and High range responding to radiation levels	OPEN (4) at least 35 minutes	CLOSE (3)	OPEN (1)	OPEN (2)		OPEN		Mid range purge (at least 35 minutes) High range operation
Mid range monitor purge completed	CLOSE (1)		OPEN	OPEN		OPEN		Mid range secured High range operation
High range not responding to radiation levels in sample for at least 5 minutes		OPEN (2)	CLOSE (3)	CLOSE (1)				Mid, High range operation
Mid range 1/3 scale decreasing	OPEN (4)	CLOSE (2)		OPEN (3)		CLOSE (1)	OPEN	Mid, High range purge (at least 35 minutes) Low range operation
Mid, High range monitor purge completed	CLOSE			CLOSE			OPEN	Low range operation

Revision Summary

1. Step 3.5.4, last sub step, added the words "and pig" to improve description.
2. Step 3.1.5, 3rd bullet, added the words "a distance" and changed the word "diameter" to "a radius" to correct descriptions.
3. Corrected various typographical/formatting problems throughout procedure.