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Nuclear Energy**

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The Northeast Utilities System

OCT 10 2000

Docket Nos. 50-245

50-336

50-423

B18240

Re: 10 CFR 50, Appendix E  
10 CFR 50.47(b)(5)

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555

Millstone Nuclear Power Station, Unit Nos. 1, 2, and 3  
Emergency Plan Operating Procedure (EPOP) 4446  
Revision 002, Minor Revision 02

The purpose of this letter is to inform the Nuclear Regulatory Commission (NRC) Staff that EPOP 4446, Revision 002, Minor Revision 02, "Site Stack PASS," was implemented on September 21, 2000. Attachment 1 is the revised procedure.

There are no commitments contained within this letter.

If you have any additional questions concerning this submittal, please contact Mr. Paul R. Willoughby at (860) 447-1791, extension 3655.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

Stephen E. Scace  
Director - Nuclear Oversight and  
Regulatory Affairs

cc: See next page

A045

**U.S. Nuclear Regulatory Commission  
B18240/Page 2**

**Attachment (1)**

**cc: H. J. Miller, Region I Administrator  
J. B. Hickman, NRC Project Manager, Millstone Unit No. 1  
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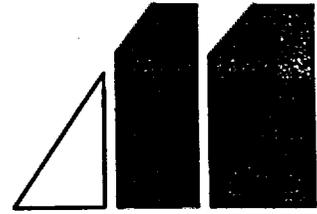
**Attachment 1**

**Millstone Nuclear Power Station, Unit Nos. 1, 2, and 3**

**Emergency Plan Operating Procedure 4446**

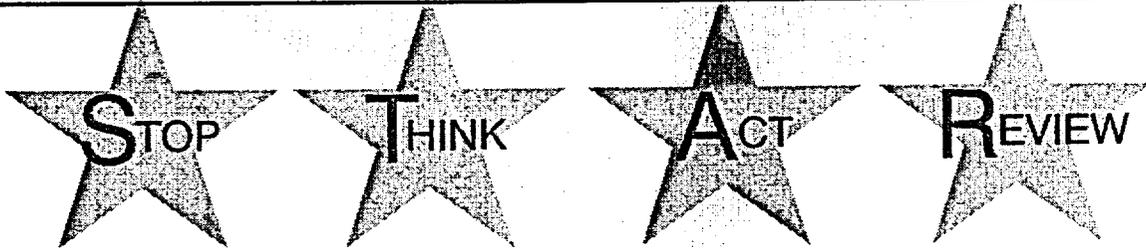
**Revision 002, Minor Revision 02**

**MILLSTONE NUCLEAR POWER STATION  
EMERGENCY PLAN OPERATING PROCEDURE**



**Site Stack PASS**

**EPOP 4446  
Rev. 002-02**



Approval Date: 9/21/00

Effective Date: 9/21/00

**Level of Use  
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**Millstone Units 2 and 3  
Emergency Plan Operating Procedure**

**Site Stack PASS**

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## 1. PURPOSE

### 1.1 Objective

Provide instructions for sampling and analyzing site stack Post Accident Sampling System (PASS) during an event which activates the Station Emergency Response Organization (SERO) when high radioactivity levels, due to an accident, may preclude the normal sampling method. The sampling and analysis are performed by a PASS team as directed by the Manager of Radiological Dose Assessment (MRDA) or the Assistant Manager of Radiological Dose Assessment (AMRDA).

### 1.2 Discussion

This procedure provides the instructions used by the PASS team for sampling and analyzing stack air during post accident conditions. The analysis conducted in this procedure identifies the presence and amounts of various radioactive isotopes contained in the stack air.

Preplanning is necessary prior to obtaining a sample. The Manager of Radiological Consequence Assessment (MRCA) and HP personnel shall determine stay times, routes, protective clothing, respiratory protection, dosimetry, and other HP requirements needed to keep PASS team personnel within allowable radiation exposure limits and to control the spread of radioactive materials.

During the performance of this procedure, all PASS team personnel shall observe the verbal instructions provided from the MRCA, MRDA, or AMRDA.

### 1.3 Applicability

This procedure is applicable to PASS team personnel.

## 2. PREREQUISITES

### 2.1 General

2.1.1 The sample volume listed is not a fixed number. If a larger sample is requested, the required size syringes and samples shall be substituted for those stated in the procedure.

2.1.2 The decision to obtain a PASS sample will be made by the ADTS.

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## 2.2 Documents

- 2.2.1 CP 801/2801/3801AT, "Gamma Spectroscopy Counting System Maintenance and Operation"
- 2.2.2 CP 801/2801/3801AD, "Gas Chromatograph"
- 2.2.3 SP 2814B-001, "Main Station Stack Particulate and Charcoal Filters Changed and Analyzed"
- 2.2.4 SP 2863A-002, "Main Station Stack High Range Filter Data Sheet"

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## 2.3 Personnel

- 2.3.1 Performance of this procedure requires the response of the following personnel:
  - a. MRDA or AMRDA
  - b. One PASS team (2 Chemistry Technicians and 1 HP Technician)

## 2.4 Tools and Consumables

- 2.4.1 Radiation survey meter (0-5000 mR/hr)
- 2.4.2 Transport cart
- 2.4.3 Lead carrying container
- 2.4.4 500 µl syringe
- 2.4.5 1 stoppered and evacuated 14.4 cc vials
- 2.4.6 5 cc gas syringe
- 2.4.7 41 cc side arm flask
- 2.4.8 Two silver zeolite cartridges
- 2.4.9 Two particulate filters
- 2.4.10 Plastic bags
- 2.4.11 Plastic wrap

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2.4.12 Four 4" x 6" plastic bags

2.4.13 PASS drawer contents

- Filter holders
- Silver zeolite cartridges
- Particulate filters
- Mechanical fingers
- Reach rod

## 2.5 Definitions

2.5.1 AMRDA – Assistant Manager of Radiological Dose Assessment

2.5.2 PASS team – SERO personnel designated for sampling and analyzing stack air. The PASS team shall comprise at least two Chemistry Technicians and one HP technician.

2.5.3 SLPM – Standard Liters Per Minute

## 3. PRECAUTIONS

- 3.1 The General Electric sample system filters may be highly radioactive resulting in high radiation levels in the high range monitor room. If radiation levels are greater than 1 R/hr, notify the Manager of Radiological Dose Assessment or the Assistant Manager of Radiological Dose Assessment and wait for instructions.
- 3.2 In the event of unexpected results during the course of this procedure, place the equipment in a safe or stable condition, cease performance of further steps, and contact the Manager of Radiological Dose Assessment or the Assistant Manager of Radiological Dose Assessment for further instructions.
- 3.3 All background and sample counts using the gamma spectrometer shall be performed with the cave door open unless instructed otherwise by the Manager of Radiological Dose Assessment or the Assistant Manager of Radiological Dose Assessment.

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#### 4. INSTRUCTIONS

##### 4.1 Chemistry Lab Preparation for Sampling

- \_\_\_\_\_ 4.1.1 ENSURE lead brick shield is intact in chemistry lab primary sample hood.
- \_\_\_\_\_ 4.1.2 ENSURE exhaust hood above Gas Chromatograph is operating.
- \_\_\_\_\_ 4.1.3 CHECK Computer Radioisotopic Analysis System is operable.
- \_\_\_\_\_ 4.1.4 IF Computer Radioisotopic Analysis System is *not* operable, NOTIFY the Manager of Radiological Dose Assessment or Assistant Manager of Radiological Dose Assessment and WAIT for instructions.
- \_\_\_\_\_ 4.1.5 CHECK Gas Chromatograph is operable.
- \_\_\_\_\_ 4.1.6 IF Gas Chromatograph is *not* operable, NOTIFY the Manager of Radiological Dose Assessment or Assistant Manager of Radiological Dose Assessment and WAIT for instructions.
- \_\_\_\_\_ 4.1.7 LABEL 1.0 ml syringe "HYDROGEN."
- \_\_\_\_\_ 4.1.8 LABEL 500 µl syringe "ISOTOPIC."
- \_\_\_\_\_ 4.1.9 VERIFY operability of syringes.
- \_\_\_\_\_ 4.1.10 COPY the following attachments to expedite data recording:
- Attachment 1, "Post Accident Sampling Stack Gaseous Release Worksheet"
  - Attachment 2, "Post Accident Sampling Stack Particulate and Iodine Release Worksheet"

– End of Section 4.1 –

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**4.2 Stack Gaseous Sampling**

4.2.1 NOTIFY Operations that a stack gas sample will be drawn.

4.2.2 COLLECT the following equipment:

- Radiation survey meter (0–5000 mR/hr)
- 5 cc gas syringe
- Stopped 14.4 cc vial
- 41 cc side arm flask
- Plastic bag
- Lead carrying container
- Required protective clothing

4.2.3 PROCEED to stack sample room and PERFORM the following:

- a. OPEN stopcocks on gas flask.
- b. CONNECT one end of gas flask to the discharge of portable sample pump.
- c. CONNECT the other end of gas flask to sample return line.
- d. OPEN “1–SGM–11.”
- e. OPEN “1–SGM–11A.”
- f. START portable pump.
- g. RECORD start time on Attachment 1.
- h. WAIT 3–5 minutes.
- i. STOP sample pump.
- j. RECORD stop time on Attachment 1.
- k. CLOSE stopcocks on gas flask.

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- l. CLOSE "1-SGM-11."
- m. CLOSE "1-SGM-11A."
- n. Using syringe, DRAW 5 cc of gas from gas flask.
- o. INJECT gas sample into stoppered 14.4 cc vial.
- p. PLACE vial in a plastic bag.
- q. PLACE plastic bag in lead carrying container.
- r. TRANSFER sample to chemistry laboratory.

- End of Section 4.2 -

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**4.3 Stack Gaseous Isotopic Analysis**

\_\_\_\_\_ 4.3.1 REMOVE vial from lead carrying container.

\_\_\_\_\_ 4.3.2 REMOVE vial from plastic bag.

\_\_\_\_\_ 4.3.3 WRAP vial in plastic wrap.

\_\_\_\_\_ 4.3.4 Refer To CP 801/2801/3801AT, "Gamma Spectroscopy Counting System Maintenance and Operation," and PERFORM the following:

\_\_\_\_\_ a. Using a gamma spectrometer, PERFORM a 5 minute, open cave, background count on the detector to be used.

\_\_\_\_\_ b. Refer To Attachment 1 and LIST all identified isotopes and associated activity.

\_\_\_\_\_ c. SAVE gamma spectrometer printout for future reference.

\_\_\_\_\_ 4.3.5 PLACE sample vial on shelf height determined by percent dead time in gamma spectrometer.

\_\_\_\_\_ 4.3.6 Refer To CP 801/2801/3801AT and COUNT vial (open cave) for 5 minutes.

\_\_\_\_\_ 4.3.7 IF dead time is less than 20%, Go To step 4.3.9.

\_\_\_\_\_ 4.3.8 IF dead time is greater than or equal to 20%, PERFORM the following:

\_\_\_\_\_ a. REMOVE sample vial.

\_\_\_\_\_ b. PLACE plastic shelf rack on top of detector shelf.

\_\_\_\_\_ c. Starting with lowest shelf and working up, PLACE the vial on each shelf until a dead time of less than 20% is achieved.

\_\_\_\_\_ d. TERMINATE count.

\_\_\_\_\_ e. Refer To CP 801/2801/3801AT and COUNT vial (open cave) for 5 minutes.

\_\_\_\_\_ f. WHEN count is completed, Refer To Attachment 3 and DETERMINE the shelf ratio.

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- \_\_\_\_\_ 4.3.9 Refer To Attachment 1 and CALCULATE activity for each isotope.
- \_\_\_\_\_ 4.3.10 PREPARE two copies of data sheets and computer printouts.
- \_\_\_\_\_ 4.3.11 NOTIFY Manager of Radiological Dose Assessment or Assistant Manager of Radiological Dose Assessment of results.
- \_\_\_\_\_ 4.3.12 SEND originals to Manager of Radiological Dose Assessment or Assistant Manager of Radiological Dose Assessment.
- \_\_\_\_\_ 4.3.13 FILE copies of data sheets and computer printouts.

– End of Section 4.3 –

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**4.4 Stack Particulate and Iodine Sampling**

\_\_\_\_\_ 4.4.1 **IF** automatic isolation of on-line filters **AND** Kaman high range system is in service, Go To Section 4.6.

\_\_\_\_\_ 4.4.2 **NOTIFY** Unit 1 Control Room that the stack filters are going to be changed.

\_\_\_\_\_ 4.4.3 **EVALUATE** the following and **DETERMINE** acceptable sample time to maintain sample activity less than 25 mR/hr:

- \_\_\_\_\_ • Stack gas radiation level as read on Panel 902 in control room.
- \_\_\_\_\_ • Kaman high range filter monitor as read on Panel 910 in control room.

\_\_\_\_\_ 4.4.4 **IF** a sample time can *not* be determined, **PERFORM** sampling using a short sample time of 3–5 minutes and **ADJUST**, as necessary.

\_\_\_\_\_ 4.4.5 **COLLECT** the following equipment:

- \_\_\_\_\_ • Radiation survey meter (0–5000 mR/hr)
- \_\_\_\_\_ • 2 silver zeolite cartridges
- \_\_\_\_\_ • 2 particulate filters
- \_\_\_\_\_ • Four 4" x 6" plastic bags
- \_\_\_\_\_ • Lead carrying container
- \_\_\_\_\_ • Required protective clothing

\_\_\_\_\_ 4.4.6 **PROCEED** to stack sample room.

\_\_\_\_\_ 4.4.7 Refer To and **COMPLETE** SP 2814B–001, "Main Station Stack Particulate and Charcoal Filters Changed and Analyzed," for filters in service.

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4.4.8 REMOVE in-service stack filters as follows:

- a. PLACE stack sample flow regulator in "MANUAL."
- b. RAISE stainless steel bail from around cartridge holding device.
- c. STOP sample pump.
- d. CLOSE filter inlet valve.
- e. UNSCREW and SEPARATE holding device.
- f. REMOVE particulate and charcoal filters.
- g. PLACE each filter in a plastic bag.
- h. MARK plastic bags containing filters for future identification.
- i. PLACE bags in lead carrying container.

4.4.9 INSTALL new filters, as follows:

- a. INSTALL new particulate and silver zeolite filters.
- b. SCREW holding device together.
- c. LOWER stainless steel bail.
- d. START sample pump.
- e. OPEN filter inlet valve.
- f. PLACE stack sample flow regulator in "AUTO."

4.4.10 EXIT sample room and STAND at base of steps.

4.4.11 RECORD the following information on Attachment 2:

- Start time
- Date
- Sample flow

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4.4.12 WAIT until sample time determined in step 4.4.3 has elapsed and ENTER stack sample room.

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4.4.13 RECORD the following information on Attachment 2:

- Stop time
- Date
- Sample flow

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\_\_\_\_\_

4.4.14 REMOVE in-service stack filters, as follows:

\_\_\_\_\_

- a. PLACE stack sample flow regulator in "MANUAL."
- b. RAISE stainless steel bail from around cartridge holding device.
- c. STOP sample pump.
- d. CLOSE filter inlet valve.
- e. UNSCREW and SEPARATE holding device.
- f. REMOVE particulate and silver zeolite filters.
- g. PLACE each filter in a plastic bag.
- h. MARK plastic bags containing filters for future identification.
- i. PLACE bags in lead carrying container.

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4.4.15 INSTALL new filters, as follows:

\_\_\_\_\_

- a. INSTALL new particulate and silver zeolite filters.
- b. SCREW holding device together.
- c. LOWER stainless steel bail.
- d. START sample pump.
- e. OPEN filter inlet valve.
- f. PLACE stack sample flow regulator in "AUTO."

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4.4.16 With new filters in holder, START a new SP 2814B-001.

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4.4.17 TRANSPORT filters to chemistry laboratory.

- End of Section 4.4 -

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**4.5 Stack Particulate and Iodine Filter Analysis**

\_\_\_\_\_ 4.5.1 PLACE particulate filter and charcoal cartridge that were in service at time of accident in a new plastic bag.

\_\_\_\_\_ 4.5.2 SEAL plastic bag.

\_\_\_\_\_ 4.5.3 PLACE bag in source locker.

\_\_\_\_\_ 4.5.4 PERFORM filter analysis as follows:

\_\_\_\_\_ a. PLACE silver zeolite cartridge in a holder.

\_\_\_\_\_ b. BLOW air through cartridge for 5 minutes.

\_\_\_\_\_ c. REMOVE silver zeolite cartridge from holder.

\_\_\_\_\_ d. PLACE it in a new plastic bag.

\_\_\_\_\_ e. SEAL plastic bag.

\_\_\_\_\_ f. Refer To CP 801/2801/3801AT, "Gamma Spectroscopy Counting System Maintenance and Operation," and PERFORM the following:

\_\_\_\_\_ 1) Using a gamma spectrometer, PERFORM a 5 minute, open cave, background count on the detector to be used.

\_\_\_\_\_ 2) Refer To Attachment 2 and LIST all identified isotopes and associated activity.

\_\_\_\_\_ 3) SAVE gamma spectrometer printout for future reference.

\_\_\_\_\_ g. PLACE silver zeolite cartridge on shelf in gamma spectrometer.

\_\_\_\_\_ h. Refer To CP 801/2801/3801AT and COUNT cartridge (open cave) for 5 minutes.

\_\_\_\_\_ i. IF dead time is less than 20%, Go To step 4.5.4 k.

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j. **IF** dead time is greater than or equal to 20%, **PERFORM** the following:

- 1) **REMOVE** cartridge.
- 2) **PLACE** plastic shelf rack on top of detector.
- 3) Starting with the lowest shelf and working up, **PLACE** the cartridge on each shelf until a dead time of less than 20% is achieved.
- 4) **TERMINATE** count.
- 5) Refer To CP 801/2801/3801AT and **COUNT** cartridge (open cave) for 5 minutes.
- 6) **WAIT** until count is completed, and Refer To Attachment 3 and **DETERMINE** the shelf ratio.

k. Refer To Attachment 2 and **CALCULATE** activity for each isotope.

l. **PLACE** particulate filter on detector in gamma spectrometer.

m. Refer To CP 801/2801/3801AT and **COUNT** filter (open cave) for 5 minutes.

n. **IF** dead time is less than 20%, Go To step 4.5.4 p.

o. **IF** dead time is greater than or equal to 20%, **PERFORM** the following:

- 1) **REMOVE** filter.
- 2) **PLACE** plastic shelf rack on top of detector shelf.
- 3) Starting with the lowest shelf and working up, **PLACE** the filter on each shelf until a dead time of less than 20% is achieved.
- 4) **TERMINATE** count.
- 5) Refer To CP 801/2801/3801AT and **COUNT** filter (open cave) for 5 minutes.

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6) **WHEN** count is completed, Refer To Attachment 3 and **DETERMINE** the shelf ratio.

p. Refer To Attachment 2 and **CALCULATE** activity for each isotope.

q. **NOTIFY** Manager of Radiological Dose Assessment or Assistant Manager of Radiological Dose Assessment of results.

r. **PREPARE** two copies of data sheets and computer printouts.

s. **SEND** originals to Manager of Radiological Dose Assessment or Assistant Manager of Radiological Dose Assessment.

t. **FILE** copies of data sheets and computer printouts.

u. **ENSURE** cartridge and filter are labeled and placed in source locker for future counting or final disposal.

4.5.5 **IF** isotopic analysis of cartridge and filter that were in service when the incident occurred is required, **PERFORM** the following:

a. **REMOVE** bag containing cartridge and filter from source locker.

b. **PLACE** charcoal cartridge in a holder.

c. **BLOW** air through cartridge for 5 minutes.

d. **REMOVE** cartridge from holder.

e. **PLACE** in a new plastic bag.

f. **SEAL** plastic bag.

g. Refer To CP 801/2801/3801AT, "Gamma Spectroscopy Counting System Maintenance and Operation," and **PERFORM** the following:

1) Using a gamma spectrometer, **PERFORM** a 5 minute, open cave, background count on the detector to be used.

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- 2) Refer To Attachment 2 and LIST all identified isotopes and associated activity.
- 3) SAVE gamma spectrometer printout for future reference.
- h. PLACE cartridge on detector in gamma spectrometer.
- i. Refer To CP 801/2801/3801AT and COUNT cartridge (open cave) for 5 minutes.
- j. IF dead time is less than 20%, Go To step 4.5.5.1.
- k. IF dead time is greater than or equal to 20%, PERFORM the following:
  - 1) REMOVE cartridge.
  - 2) PLACE plastic shelf rack on top of detector shelf.
  - 3) Starting with lowest shelf and working up, PLACE cartridge on each shelf until a dead time of less than 20% is achieved.
  - 4) TERMINATE count.
  - 5) Refer To CP 801/2801/3801AT and COUNT cartridge (open cave) for 5 minutes.
  - 6) WHEN count is completed, Refer To Attachment 3 and DETERMINE shelf ratio.
- l. Refer To Attachment 2 and CALCULATE activity for each isotope.
- m. PLACE particulate filter on detector in gamma spectrometer.
- n. Refer To CP 801/2801/3801AT and COUNT filter (open cave) for 5 minutes.
- o. IF dead time is less than 20%, Go To step 4.5.4 q.

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p. **IF** dead time is greater than or equal to 20%, **PERFORM** the following:

1) **REMOVE** filter.

2) **PLACE** plastic shelf rack on top of detector shelf.

3) Starting with lowest shelf and working up, **PLACE** filter on each shelf until a dead time of less than 20% is achieved.

4) **TERMINATE** count.

5) Refer To CP 801/2801/3801AT and **COUNT** filter (open cave) for 5 minutes.

6) **WHEN** count is completed, Refer To Attachment 3 and **DETERMINE** shelf ratio.

q. Refer To Attachment 2 and **CALCULATE** activity for each isotope.

r. **NOTIFY** Manager of Radiological Dose Assessment or Assistant Manager of Radiological Dose Assessment of results.

s. **PREPARE** two copies of data sheets and computer printouts.

t. **SEND** originals to Manager of Radiological Dose Assessment or Assistant Manager of Radiological Dose Assessment.

u. **FILE** copies of data sheets and computer printouts.

v. **ENSURE** filters are labeled and placed in source locker for future counting or final disposal.

– End of Section 4.5 –

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**4.6 Kaman High Range System Filter Sample Collection**

\_\_\_\_\_ 4.6.1 NOTIFY Unit 1 Control Room of intent to operate the stack high range system.

\_\_\_\_\_ 4.6.2 OBTAIN processor key from Chemistry Supervisor.

\_\_\_\_\_ 4.6.3 OBTAIN SP 2863A-002, "Main Station Stack High Range Filter Data Sheet." | ②

\_\_\_\_\_ 4.6.4 PROCEED to panel 910 in Unit 1 Control Room.

\_\_\_\_\_ 4.6.5 INSERT key and TURN to "Enable" position.

**NOTE**

Only an in-service filter will display a radiation level other than zero.

\_\_\_\_\_ 4.6.6 REQUEST current filter radiation level and DETERMINE which filter is in service.

\_\_\_\_\_ 4.6.7 IF filter 3, PERFORM the following:

\_\_\_\_\_ a. PRESS "DSP."

\_\_\_\_\_ b. PRESS "3."

\_\_\_\_\_ c. PRESS "23."

\_\_\_\_\_ d. PRESS "ENT."

\_\_\_\_\_ 4.6.8 IF filter 4, PERFORM the following:

\_\_\_\_\_ a. PRESS "DSP."

\_\_\_\_\_ b. PRESS "4."

\_\_\_\_\_ c. PRESS "23."

\_\_\_\_\_ d. PRESS "ENT."

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4.6.9 IF filter 5, PERFORM the following:

- a. PRESS "DSP."
- b. PRESS "5."
- c. PRESS "23."
- d. PRESS "ENT."

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4.6.10 OBTAIN the volume for each filter, as follows:

a. For filter 3, PERFORM the following:

- 1) PRESS "DSP."
- 2) PRESS "3."
- 3) PRESS "37."
- 4) PRESS "ENT."
- 5) RECORD volume on

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b. For filter 4, PERFORM the following:

- 1) PRESS "DSP."
- 2) PRESS "4."
- 3) PRESS "37."
- 4) PRESS "ENT."
- 5) RECORD volume on SP 2863A-002.

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| ②

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c. For filter 5, PERFORM the following:

- 1) PRESS "DSP."
- 2) PRESS "5."
- 3) PRESS "37."
- 4) PRESS "ENT."
- 5) RECORD volume on SP 2863A-002.

| ②

4.6.11 IF filter 3 had a volume other than zero displayed, CHANGE to the next filter in sequence as follows:

- a. PRESS "FTN."
- b. PRESS "3."
- c. PRESS "04."
- d. PRESS "ENT."

4.6.12 IF filter 4 had a volume other than zero displayed, CHANGE to the next filter in sequence, as follows:

- a. PRESS "FTN."
- b. PRESS "4."
- c. PRESS "04."
- d. PRESS "ENT."

4.6.13 IF filter 5 had a volume other than zero displayed, CHANGE to the next filter in sequence as follows:

- a. PRESS "FTN."
- b. PRESS "5."
- c. PRESS "04."
- d. PRESS "ENT."

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4.6.14 OBTAIN run time for each filter to be changed, as follows:

a. For filter 3, PERFORM the following:

- 1) PRESS "DSP."
- 2) PRESS "3."
- 3) PRESS "45."
- 4) PRESS "ENT."
- 5) RECORD display as hours on SP 2863A-002. | ②
- 6) PRESS "EXP."
- 7) RECORD display as minutes on SP 2863A-002. | ②
- 8) PRESS "EXP."
- 9) RECORD display as seconds on SP 2863A-002. | ②

b. For filter 4, PERFORM the following:

- 1) PRESS "DSP."
- 2) PRESS "4."
- 3) PRESS "45."
- 4) PRESS "ENT."
- 5) RECORD display as hours on SP 2863A-002. | ②
- 6) PRESS "EXP."
- 7) RECORD display as minutes on SP 2863A-002. | ②
- 8) PRESS "EXP."
- 9) RECORD display as seconds on SP 2863A-002. | ②

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c. For filter 5, PERFORM the following:

1) PRESS "DSP."

2) PRESS "5."

3) PRESS "45."

4) PRESS "ENT."

5) RECORD display as hours on SP 2863A-002. | ②

6) PRESS "EXP."

7) RECORD display as minutes on SP 2863A-002. | ②

8) PRESS "EXP"

9) RECORD display as seconds on SP 2863A-002. | ②

4.6.15 RETURN to chemistry laboratory.

4.6.16 OBTAIN Attachment 2 for each filter to be changed.

4.6.17 RECORD the following information on SP 2863A-002: | ②

- Total sample time
- Total sample volume

4.6.18 OBTAIN and LABEL a plastic bag for each filter to be changed.

4.6.19 From the PASS drawer, COLLECT the following equipment for each filter to be changed:

- Filter holder
- Silver zeolite cartridge
- Particulate filter

4.6.20 ENSURE the particulate filter is on inlet side of silver zeolite cartridge, and LOAD each holder with a silver zeolite cartridge and a particulate filter.

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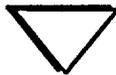
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4.6.21 COLLECT the following equipment:

- Filter holder assemblies assembled in step 4.6.20
- Radiation survey meter (0–5000 mR/hr)
- Mechanical fingers
- Reach rod
- Labeled plastic bags
- Lead carrying container
- Protective clothing

4.6.22 PROCEED to stack door.

4.6.23 MONITOR radiation level at stack door.



**CAUTION**



The General Electric sample system filters may be highly radioactive resulting in high radiation levels in the high range monitor room.

4.6.24 **IF** radiation level is greater than 1 R/hr, NOTIFY Manager of Radiological Dose Assessment or Assistant Manager of Radiological Dose Assessment and WAIT for instructions.

4.6.25 **IF** radiation level is less than 1 R/hr, ENTER the high range monitor room.

4.6.26 MONITOR radiation level inside the high range monitor room.

4.6.27 **IF** radiation level is greater than 1 R/hr, PERFORM the following:

- a. EXIT the high range monitor room.
- b. NOTIFY the MRDA or AMRDA and WAIT for instructions.

4.6.28 **IF** radiation level is less than 1R/hr, NOTIFY Unit 1 Control Room of intent to go to the stack to change Kaman filters.

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\_\_\_\_\_ 4.6.29 OPEN lead carrying container.

\_\_\_\_\_ 4.6.30 For filter to be changed, PERFORM the following:

- \_\_\_\_\_ a. UNLATCH and OPEN door to filter housing.
- \_\_\_\_\_ b. Using reach rod, LOWER filter housing.
- \_\_\_\_\_ c. Using mechanical fingers, REMOVE filter holder and PLACE in labeled bag.
- \_\_\_\_\_ d. PLACE bagged filter holder in lead carrying container.
- \_\_\_\_\_ e. With mechanical fingers, PLACE a new filter holder in housing.
- \_\_\_\_\_ f. With reach rod, RAISE housing back into position.
- \_\_\_\_\_ g. CLOSE and LATCH filter housing door.
- \_\_\_\_\_ h. IF another filter holder needs to be changed, Go To step 4.6.30 a.
- \_\_\_\_\_ i. CLOSE lead carrying container.

\_\_\_\_\_ 4.6.31 WHEN all filters have been replaced, RETURN to chemistry laboratory with lead carrying container.

\_\_\_\_\_ 4.6.32 PLACE lead carrying container behind lead brick shield.

\_\_\_\_\_ 4.6.33 PROCEED to panel 910 in Unit 1 Control Room.

\_\_\_\_\_ 4.6.34 CLEAR data on filters that have been changed, as follows:

- \_\_\_\_\_ a. For filter 3, PERFORM the following:
  - \_\_\_\_\_ 1) PRESS "STP."
  - \_\_\_\_\_ 2) PRESS "3."
  - \_\_\_\_\_ 3) PRESS "ENT."

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b. For filter 4, PERFORM the following:

1) PRESS "STP."

2) PRESS "4."

3) PRESS "ENT."

c. For filter 5, PERFORM the following:

1) PRESS "STP."

2) PRESS "5."

3) PRESS "ENT."

4.6.35 IF sample has been requested at this time, PERFORM the following:

a. WAIT until the radiation level approaches 25 mR/hr.

b. SELECT the next filter.

c. Go To step 4.6.10.

4.6.36 TURN key to "DISABLE" position.

4.6.37 REMOVE key.

4.6.38 PROCEED to chemistry laboratory.

4.6.39 RETURN key to proper storage location.

- End of Section 4.6 -

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**4.7 Kaman High Range System Filter Sample Analysis**

\_\_\_\_\_ 4.7.1 REMOVE filters from filter holder.

\_\_\_\_\_ 4.7.2 PLACE particulate filter in a clean plastic bag.

\_\_\_\_\_ 4.7.3 PLACE silver zeolite cartridge in a purge holder.

\_\_\_\_\_ 4.7.4 BLOW air through cartridge for 5 minutes.

\_\_\_\_\_ 4.7.5 After 5 minute purge, REMOVE silver zeolite cartridge.

\_\_\_\_\_ 4.7.6 PLACE cartridge in a clean, labeled plastic bag.

\_\_\_\_\_ 4.7.7 Refer To CP 801/2801/3801AT, "Gamma Spectroscopy Counting System Maintenance and Operation," and PERFORM the following:

\_\_\_\_\_ a. Using a gamma spectrometer, PERFORM a 5 minute, open cave, background count on the detector to be used.

\_\_\_\_\_ b. Refer To Attachment 2 and LIST all identified isotopes and associated activity.

\_\_\_\_\_ c. SAVE gamma spectrometer printout for future reference.

\_\_\_\_\_ 4.7.8 PLACE silver zeolite cartridge on shelf in gamma spectrometer.

\_\_\_\_\_ 4.7.9 Refer To CP 801/2801/3801AT and COUNT cartridge (open cave) for 5 minutes.

\_\_\_\_\_ 4.7.10 IF dead time is less than 20%, Go To step 4.7.13.

\_\_\_\_\_ 4.7.11 IF dead time is greater than or equal to 20%, PERFORM the following:

\_\_\_\_\_ a. REMOVE sample cartridge.

\_\_\_\_\_ b. PLACE plastic shelf rack on top of detector shelf.

\_\_\_\_\_ c. Starting with lowest shelf and working up, PLACE cartridge on each shelf until a dead time of less than 20% is achieved.

\_\_\_\_\_ d. TERMINATE count.

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\_\_\_\_\_

e. Refer To CP 801/2801/3801AT and COUNT cartridge (open cave) for 5 minutes.

\_\_\_\_\_

f. WHEN count is completed, Refer To Attachment 3 and DETERMINE shelf ratio.

\_\_\_\_\_

4.7.12 Refer To Attachment 2 and CALCULATE activity for each isotope.

\_\_\_\_\_

4.7.13 PLACE particulate filter on detector in gamma spectrometer.

\_\_\_\_\_

4.7.14 Refer To CP 801/2801/3801AT and COUNT filter (open cave) for 5 minutes.

\_\_\_\_\_

4.7.15 IF dead time is less than 20%, Go To step 4.7.17.

\_\_\_\_\_

4.7.16 IF dead time is greater than or equal to 20%, PERFORM the following:

\_\_\_\_\_

a. REMOVE sample filter.

\_\_\_\_\_

b. PLACE plastic shelf rack on top of detector shelf.

\_\_\_\_\_

c. Starting with lowest shelf and working up, PLACE filter on each shelf until a dead time of less than 20% is achieved.

\_\_\_\_\_

d. TERMINATE count.

\_\_\_\_\_

e. Refer To CP 801/2801/3801AT and COUNT filter (open cave) for 5 minutes.

\_\_\_\_\_

f. WHEN count is completed, Refer To Attachment 3 and DETERMINE shelf ratio.

\_\_\_\_\_

4.7.17 Refer To Attachment 2 and CALCULATE activity for each isotope.

\_\_\_\_\_

4.7.18 NOTIFY Manager of Radiological Dose Assessment or the Assistant Manager of Radiological Dose Assessment of results.

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\_\_\_\_\_ 4.7.19 **PREPARE** two copies of data sheets and computer printouts.

\_\_\_\_\_ 4.7.20 **SEND** originals to Manager of Radiological Dose Assessment or  
the Assistant Manager of Radiological Dose Assessment.

\_\_\_\_\_ 4.7.21 **FILE** copies of data sheets and computer printouts.

– End of Section 4.7 –

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**5. REVIEW AND SIGNOFF**

5.1 Indicate (check) Subsections of this procedure which were performed:

- 4.1     4.2     4.3     4.4     4.5     4.6     4.7

5.2 If procedure was terminated prior to completion, specify cause: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5.3 This procedure was performed by the following personnel:

- Job supervisor (MRDA or designee):

_____	_____	_____
Print Name	Signature	Initials

- PASS Team personnel:

_____	_____	_____
Print Name	Signature	Initials

_____	_____	_____
Print Name	Signature	Initials

_____	_____	_____
Print Name	Signature	Initials

_____	_____	_____
Print Name	Signature	Initials

5.4 This procedure was reviewed by:

_____	_____	_____
Print Name	Signature	Initials

5.5 All data recording for this procedure is located in Attachments 1 and 2.

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## 6. REFERENCES

### 6.1 Developmental Documents

- 6.1.1 "Defueled Safety Analysis Report Unit 1," Section 6.3
- 6.1.2 "Millstone Nuclear Power Station Emergency Plan
- 6.1.3 NUREG-0654, Revision 1, "Criteria for Preparation of Radiological Emergency Response Plans, and Preparedness in Support of Nuclear Power Plants"
- 6.1.4 NUREG-0737, "Clarification of TMI Action Plan Requirements, Supplement 1, Requirements for Emergency Response Capability"
- 6.1.5 "Kaman Sciences Corporation, Instruction Manual, Operation-Maintenance Instructions and Parts Catalog for Accident Range Gas Monitor, Model KMG-HRC"
- 6.1.6 "Instructions Model 8500 Gas Chromatograph," Perkin Elmer
- 6.1.7 "VAX/VMS Spectroscopy Applications Package User's Manual 07-0196"
- 6.1.8 "Radiological Effluent Monitoring and Off-Site Dose Calculation Manual," (REM ODCM)
- 6.1.9 Chemistry Memorandum from John P. Kangley to Jeff Broussard, CHEM-93-1212, dated January 18, 1993.
- 6.1.10 Chemistry Memorandum from John P. Kangley to Jeff Broussard, CHEM-93-1221, dated February 11, 1993.

### 6.2 Supporting Documents

- 6.2.1 CP 801/2801/3801AT, "Gamma Spectroscopy Counting System Maintenance and Operation"
- 6.2.2 CP 801/2801/3801AD, "Gas Chromatograph"
- 6.2.3 SP 2814B-001, "Main Station Stack Particulate and Charcoal Filters Changed and Analyzed"
- 6.2.4 SP 2863A-002, "Main Station Stack High Range Filter Data Sheet"

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**7. SUMMARY OF CHANGES**

**Summary of Changes -- Revision 002, Minor Revision 02**

**7.1 Updated references to SP 2814B-001 and SP 2863A-002.**

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## Attachment 3 Shelf Ratio Calculation

(Sheet 1 of 1)

In the event that a counting shelf was required during operation of the Computer Radioisotopic Analysis System, the appropriate shelf ratio must be determined for use in activity level correction calculations. To determine the shelf ratio, perform the following steps upon completion of the isotopic analysis:

1. REMOVE sample from gamma spectrometer.
2. PLACE calibrated source on the same shelf which was used for analysis of the sample.
3. COUNT calibrated source using the following information:
  - Count time: Same as sample's count time
  - Volume: 1
  - Geometry: Particulate filter
4. Upon completion of count, REMOVE counting shelf.
5. PLACE calibrated source on normal counting shelf.
6. With cave door open, COUNT calibrated source using the information provided in step 3.

### NOTE

Shelf ratio should be calculated to two significant digits only.

7. CALCULATE shelf ratio using the following equation and the activity levels obtained in steps 3 and 6:

$$\text{Shelf Ratio} = \frac{\text{Activity on Normal Counting Shelf (step \#6)}}{\text{Activity on Elevated Shelf (step \#3)}}$$

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