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MEASUREMENT OF GAMMA ACTIVITY FROM THE PUREX STACK
NO 296A010 HEPA FILTERS

Pages: 13

NOV 15 1995

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

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1	1	Cog. Eng. J. M. Barnett	T1-30	11-15-95		D. L. Johnson	S6-17	11-15-95		1	1
1	1	Cog. Mgr. L. P. Diediker	T1-30	11-15-95		C. D. Wollam	S6-17	11-15-95		1	1
1	1	QA L. W. Vance	H4-16T6-03	11-15-95							
		Safety									
1	1	Env. R. E. Johnson	S3-95	11-15-95							
18.		19.		20.		21. DOE APPROVAL (if required) Ltr. No.					
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Number 296-A-10, HEPA Filters

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This document was reviewed following the
procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:


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11/15/95

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SUPPORTING DOCUMENT

1. Total Pages 9

2. Title

MEASUREMENT OF GAMMA ACTIVITY FROM THE PUREX
STACK, NUMBER 296-A-10, HEPA FILTERS

3. Number

WHC-SD-ER-TP-020

4. Rev No.

0

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6. Author

Name: J. M. Barnett

Signature

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7. Abstract

In response to the Environmental Protection Agency's requirements for evaluating radioactive emissions from stacks, this test plan was developed. The test plan employs the use of low resolution (NaI) portable gamma spectrometry to identify and measure gamma emitting radionuclides from HEPA filters. The test description, expected results, and test set-up and steps are discussed.

8.

RELEASE STAMP

OFFICIAL RELEASE
BY WHC

DATE NOV 15 1995

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WHC-SD-ER-TP-020, REV. 0

FACILITY DATA ACQUISITION TEST PLAN

MEASUREMENT OF GAMMA ACTIVITY FROM THE PUREX STACK, NUMBER 296-A-10,
HEPA FILTERS

Prepared by

WESTINGHOUSE HANFORD COMPANY

November 15, 1995

for the

U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE
RICHLAND, WASHINGTON

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1.0 INTRODUCTION

This facility data acquisition test plan is specific to the PUREX stack 296-A-10 HEPA filters. It supports the test plan, "Measurement of Gamma Activity from HEPA Filters," WHC-SD-ER-TP-004, REV. 0. Both test plans support the NESHAP (National Emission Standards for Hazardous Air Pollutants, 40CFR61 Subpart H) compliance assessment conducted by Westinghouse Hanford Company (WHC).

2.0 OBJECTIVE

The objective of this test plan is to collect data by measurement and identification of the gamma emissions from the 296-A-10 stack at PUREX using portable gamma spectroscopy.

3.0 SCOPE

This test plan applies only to the PUREX stack 296-A-10 HEPA filters for the measurement, identification, and quantification of gamma radiation isotopes which may be emitted. This will be accomplished by using a portable gamma spectrometer calibrated to the stack HEPA filter geometry described below.

4.0 DESCRIPTION OF TEST

Gamma radiation emitted from the 296-A-10 HEPA filters will be measured using a portable gamma spectrometer (Microspec-1* or equivalent). Measurements will correspond to specific locations. The portable gamma spectrometer will be calibrated to the stack HEPA filter geometry before actual measurements are made. Background measurements will be taken at the test site.

5.0 EXPECTED RESULTS

Several gamma spectra are expected to be collected. The data will be used to estimate the potential unabated annual release of radioactive material and the dose to the offsite maximally exposed individual (MEI). The 296-A-10 stack is characterized with Cs-137; alpha and beta emitters include Pu-239/240 and Sr-90 which will be ratioed to the Cs-137 concentration.

*Microspec-1 is a trademark of Bubble Technology Industries, Inc., Chalk River, Ontario, Canada.

6.0 SET UP AND TEST STEPS

6.1 INSTRUMENT CALIBRATION

The Microspec-1 shall be calibrated as specified below for the 296-A-10 stack HEPA filters at the PUREX facility, tunnel number two. The 296-A-10 stack has a 3 by 3 array of HEPA filters. There are a total of nine HEPA filters.

Power up the Microspec-1 at least one hour before calibrating it. Two peaks are required to complete an energy calibration for the Microspec-1. Na-22 is recommended by the manufacturer because it has both a low-energy (511 keV) and a high-energy (1,275 keV) gamma emission.

To calibrate the Microspec-1, first place a National Institute of Standards and Technology (NIST) traceable Na-22 ($\approx 1 \mu\text{Ci}$) source into the center of the clean HEPA filter. Set the count time for the Microspec-1 for a minimum of 5 min. and clear the spectrum. Using the Microspec-1 with the collimated lead shield, place the head of the NaI(Tl) detector up against the center of the cinder block shield set up between the center of the HEPA filter and the detector.

Count the Na-22 source manually for the given time. Establish the region of interest (ROI) for the 511 keV peak and manually calibrate to the first energy peak. Next, establish the 1275 keV ROI and manually calibrate to the second energy peak. Wait for the instrument to configure the calibration.

Remove the Na-22 source, and place a NIST traceable Cs-137 ($\approx 1 \mu\text{Ci}$) check source into the center of the HEPA filter. Count the source at least 5 times (two of those times shall be at least a 5 min. count) in the same configuration as that for the Na-22 source energy calibration. Establish the ROI based on the resultant peaks. Record all the data on the attached data sheet. After the ROI has been selected, take one additional count (at least 5 min.) to establish the instrument efficiency; save this spectra. For the ROI, use the isotope identification function to verify that Cs-137 is being counted; this will provide acceptance of the calibration.

6.2 TRAINING

Effluent Monitoring (EM) will use the Microspec-1 for data collection. No other training is necessary.

6.3 DATA ACQUISITION

At approximately 15 m (50 ft) away from the HEPA filter bank, take a 5 min. background reading with the Microspec-1. Record all the data, and save the generated spectra to the system disk.

Using the Microspec-1, take five 5 min. measurements with the head of the collimated and shielded detector against the center of the vertical side of the cinder block of the HEPA filters. Save each file and record the data.

Sign and date the data sheet.

Note the HEPA filter service lifetime on the data sheet. Note, the HEPA filters were put into service in 1983.

7.0 SAFETY

Sampling shall be conducted in accordance with general safety rules in the *Industrial Safety Manual* (WHC-CM-4-3). No industrial hazards are expected to be encountered. All test personnel shall be cognizant of any applicable Radiological Work Permits (RWPs). No Radiological Work Permits are necessary.

8.0 QUALITY ASSURANCE

Quality Assurance is addressed in WHC-SD-ER-TP-004, "Measurement of Gamma Activity from HEPA Filters."

9.0 ORGANIZATION AND FUNCTIONAL RESPONSIBILITIES

All organization and function responsibilities are outlined in WHC-SD-ER-TP-004, "Measurement of Gamma Activity from HEPA Filters." Health Physics is exempted from this particular test plan.

10.0 SCHEDULE

The following schedule will apply:

Release of the data acquisition test plan:	11/16/95
Implementation:	11/17/95
Release test results:	11/21/95

This facility data acquisition plan (test plan), in conjunction with WHC-SD-ER-TP-004, REV. 0, "Measurement of Gamma Activity from HEPA Filters," shall be implemented as a unit for the 296-A-10 stack.

11.0 REPORTS

All documentation associated with this testing will be made available as necessary. Results will be documented with the WHC NESHAP coordinator.

12.0 REFERENCES

Title 40, *Code of Federal Regulations*, Part 61, Subpart H, Office of the Federal Register National Archives and Records Administration: U.S. Government Printing Office: Washington D. C.; July 1, 1992.

HSRCM-1, Current Version, *Hanford Site Radiological Control Manual*, Battelle, Pacific Northwest Laboratories: Richland, WA.

"BTI Portable Gamma-Ray Spectrometer Microspec-1™ with Gamma-Ray Probe," Bubble Technology Industries, Inc.: Chalk River, Ontario, Canada; 1991.

WHC-CM-1-6, Current Version, *WHC Radiological Control Manual*, Westinghouse Hanford Company: Richland, WA.

WHC-CM-4-2, Current Version, *Quality Assurance Manual*, Westinghouse Hanford Company: Richland, WA.

WHC-CM-4-3, Current Version, *Industrial Safety Manual*, Westinghouse Hanford Company: Richland, WA.

WHC-CM-6-1, Current Version, *Standard Engineering Practices*, Westinghouse Hanford Company: Richland, WA.

WHC-SD-ER-TP-004, Rev. 0, *Measurement of Gamma Activity from HEPA Filters*, Westinghouse Hanford Company: Richland, WA; April 1993.

13.0 DATA SHEETS

Data collected shall be written on data sheets; see pages 5 through 6. Data will also be stored electronically.

Data Sheet 296-A-10 Stack HEPA Filters
page 1 of 2

Survey Instruments (identification, serial number, and calibration due date):

HEPA filter service lifetime: _____

Gamma isotopic characterization: Primary: _____ Others: _____

Microspec-1™ Calibration information: _____ Calibration Successful: Y / N

Measurement Number	Time (min)	ROI	Dead Time	Gross Counts
1	5			
2	5			
3				
4				
5				
Average	---			
6 Calibration*	5			

*Calibration spectrum filename: _____

Calibration Isotope Identified? Y/N

Field Data:

Number	Filename (Comment)	ROI keV	Time (min)	Dead Time	ROI Gross Counts
Background	A10BCGD.TXT (PUREX)		5		

Number	Filename (Comment)	ROI keV	Time (min)	Dead Time	ROI Gross Counts
1	1A10.TXT (PUREX)		5		
2	2A10.TXT (PUREX)		5		
3	3A10.TXT (PUREX)		5		
4	4A10.TXT (PUREX)		5		
5	5A10.TXT (PUREX)		5		

Number	Filename (Comment)	ROI keV	Time (min)	Dead Time	ROI Gross Counts
6	6A10.TXT (PUREX)				
7	7A10.TXT (PUREX)				
8	8A10.TXT (PUREX)				

Signature(s) and Date: _____

Printed name(s) and payroll number(s): _____

DISTRIBUTION SHEET

To NESHAP	From Effluent Monitoring	Page 1 of 1
Project Title/Work Order MEASUREMENT OF GAMMA ACTIVITY FROM THE PUREX STACK, NUMBER 296-A-10, HEPA FILTERS		Date November 15, 1995
		EDT No. 613977
		ECN No. NA

Name	MSIN	Text With All Attach	Text Only	Attach. / Appendi x Only	EDT/ECN Only
Central Files	A3-88	X			
J. M. Barnett	S3-95	X			
W. E. Davis	H6-20	X			
L. P. Diediker	S3-95				X
J. G. Granger	H6-25				X
J. H. Jarrett	P7-35	X			
D. L. Johnson	S6-17	X			
R. E. Johnson	S3-95				X
L. W. Vance	T6-03	X			
C. D. Wollam	S6-17				X