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TERMINATION SURVEY BACKGROUND ASSESSMENT

1.0 PURPOSE

This procedure defines the method for determining background radiation levels for the Shoreham Decommissioning Termination Survey and documentation of the determination.

2.0 RESPONSIBILITY

- 2.1 The Termination Survey Section Head is responsible for the content and implementation of this procedure.
- 2.2 The Termination Survey Engineer and Termination Survey Section Radiological Engineers are responsible for the collection of background radiation data and the establishment of background radiation values to be used in calculating net contamination and radiation levels.
- 2.3 Health Physics Technicians will perform the data collection and Termination Survey Radiological Engineers will perform administration and calculations required by this procedure.

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3.0 DISCUSSION

- 3.1 The release criteria for the Shoreham Nuclear Power Station (SNPS) facility (References 11.1) are established as levels above the naturally occurring background.
- 3.2 It is necessary to determine the site background levels to enable a comparison of site radiological conditions with the acceptable release criteria limits.
- 3.3 The principal purpose of background measurements described in this procedure is to establish the reference background mean value for each type of instrument/detector used in the Termination Survey.
- 3.4 Background is determined by measurements and/or sampling taken on site and in the immediate vicinity of the site (out to several kilometers from the site boundary), which are unaffected by site operations.
- 3.5 This procedure will establish the methods for collecting background data for portable field instruments and detectors. Laboratory instrument background is determined in accordance with individual counting instrument operating procedures.

4.0 PRECAUTIONS

N/A

5.0 PREREQUISITES

- 5.1 Health Physics Technicians using this procedure shall have successfully completed the Termination Survey Training course and be qualified to operate the instruments referenced in this procedure.
- 5.2 One or more off-site locations have been identified and are available for background measurements.
- 5.3 On-site locations have been identified which are determined to be free of detectable radiation from non-background sources.

6.0 LIMITATIONS AND ACTIONS

N/A

7.0 TEST EQUIPMENT

7.1 Eberline ESP-2 Scaler/Ratemeter with:

- .1 Eberline HP-260 Pancake G-M detector or equivalent.
- .2 Aptec FT126BH Large Area G-M detector.
- .3 Aptec FT252BH Large Area G-M detector.
- .4 Aptec Floor Monitor with three FT252 Large Area G-M detectors.
- .5 Eberline AC3-7 Alpha Scintillation detector.

7.2 Bicron Micro-Rem meter. (μ Rem meter)

- 7.3 Reuter-Stokes Pressurized Ion Chamber. (PIC)
- 7.4 Niton RAD7 Radon Monitor.
- 7.5 Embedded piping monitors.
- 7.6 Instruments and detectors used for background determinations shall be calibrated and the calibration shall be current.

8.0 PROCEDURE

8.1 General

- 8.1.1 Areas are selected for background measurements which are demonstrated to be free of detectable contamination from SNPS operations. This is documented by previous measurements or by a review of the history of the area.
- 8.1.2 The background assessment is designed to establish standard reference background values (and the acceptable variation) for each type of detector identified in sections 7.1, 7.2, 7.3 and 7.5 above.
- 8.1.3 The background assessment also includes measurements to assess the effects of the local measurement environment on the detector background response. Measurements will be taken on surfaces which are the same as or of similar composition to the principal surfaces in the SNPS.
- 8.1.4 Background measurements shall be taken at general locations on the SNPS site and at one or more locations off-site. These include but, are not limited to:
 - a. On-site
 - Turbine Building (multiple locations)
 - Control Building
 - O & S Building
 - O & S Bldg. Annex
 - Other Site Bldgs.
 - Colt Diesel-Generator Bldg
 - Site Grounds (multiple locations)
 - b. Off-site
 - Shoreham-Wading River Fire House
 - Outdoor areas within 2 miles of SNPS.
- 8.1.5 Standard statistics as described in Ref. 11.2 (Equations 8-11 and 8-12) will be calculated for each type of measurement in each area or survey unit. After calculating the mean and standard deviation, a calculation to determine the number of background data points will be performed using equation 8-22 of Ref. 11.2. The results and actions will be noted in the notes section of Appendix 12.2. Additional calculations and statistical evaluations will be performed as directed by the Termination Survey Engineer.

8.1.6 Data for the PIC versus μ Rem meter will be graphed and a correction factor will be calculated for converting the μ Rem meter readings to units of μ R/hr.

8.2 Preparation of Survey Package

The Termination Survey Engineer or the Termination Survey Radiological Engineers are to prepare individual survey packages for each unit or area selected for background assessment. For background assessments a survey package consists of an instruction form (Appendix 12.3), data sheets (Appendix 12.1) and maps as necessary.

8.2.1 Prepare survey instructions. (Appendix 12.3)

8.2.2 Describe measurement objectives and locations.

8.2.3 Have Termination Survey Engineer review instructions.

8.2.3 Fill out headers for background data forms. (Appendix 12.1)

8.2.4 Use survey maps, as necessary, to document the locations and to select measurement locations.

8.3 On-Site Building Interior Locations

8.3.1 For each of the on-site interior building locations, take one thirty-minute scaler count with the ESP-2 and AC-3-7 Alpha Detector at one location, and take thirty one-minute scaler readings at each location identified in the survey instructions with the following instrument/detector combinations:

- | | | |
|-------------|----|---------------------|
| ESP-2 with: | a. | GM Pancake Detector |
| | b. | LAD FC126 |
| | c. | LAD FT252 |

8.3.2 Take thirty one-minute scaler counts with the ESP-2/Aptec Floor Monitor combination as directed by the survey instructions.

8.3.3 Take one μ Rem exposure reading at each of the selected locations - one meter from the surface.

8.3.4 At each of the μ Rem exposure rate points, take a PIC reading.

NOTE: Radon sampling is for informational purposes only and not required for background measurements.

8.3.5 With the RAD7 monitor, take 3 five-minute radon samples. Attach the recorded printout for the eight samples to the Background Data Sheet (Appendix 12.1).

8.3.6 For each type of instrument/detector, note the detector type, serial no. and cal. due date and record the data on the Background Data Sheet.

8.3.7 For the μ Rem readings and PIC readings, record on one Background Data Sheet.

8.4 On-Site Embedded Piping

8.4.1 For each type and size of embedded piping monitor, take thirty one-minute scaler readings as described in the survey instructions.

8.4.2 For each type and/or size of pipe monitor, record the data separately on Background Data Sheet, Appendix 12.1.

8.5 On-Site Structure Exteriors

8.5.1 At each of the on-site structure exteriors, take scaler readings at each location identified in the survey instructions with each of the instrument/detector combinations as described in 8.3.1.

8.5.2 If the building is surrounded by pavement or other hard surface, take thirty one-minute scaler readings, as described in the survey instructions, with the ESP-2/Floor Monitor combination.

8.5.3 Take one μ Rem reading at each designated location as identified in the survey instructions.

8.5.4 At each location, designated for μ Rem reading take PIC readings.

8.5.5 Take a radon sample outside the building as described in 8.3.5.

8.5.6 Record the above readings on Background Sheets as per paragraph 8.3.6 & 8.3.7.

8.6 On-Site Site Grounds

8.6.1 Take 30 dispersed μ Rem readings one meter from the ground as identified in the instructions (Appendix 12.3). At each of the locations, take a PIC reading.

8.6.2 Take radon samples (as described in 8.3.5) outside at one of the survey unit sites, for each day of background readings.

8.6.3 Record the above readings on the Background Data Sheet for each unit and include the appropriate radon concentration.

8.7 Off-Site Building Interior

At three different areas in the off-site building interior, take a series of readings as described in 8.3.1 thru 8.3.7 in accordance with the survey instructions.

8.8 Off-Site Building Exterior

At the off-site building exterior take a series of readings as described in 8.5.1 thru 8.5.6 in accordance with the survey instructions.

8.9 Data Calculations

8.9.1 When data is collected for each area or unit, a Radiological Engineer will do the necessary summary calculations for each type of detector and record the information on the data forms where appropriate.

8.9.2 Standard Background Sheets (Appendix 12.2) will be filled out for each detector by area from the above calculated data.

8.9.3 Have Termination Survey Engineer review the background sheet.

8.9.3 Additional calculations and statistical evaluations will be accomplished as directed by the Termination Survey Engineer.

9.0 ACCEPTANCE CRITERIA

For each type of measurement, the number of background data points shall be greater than or equal to the number calculated in 8.1.5.

10.0 FINAL CONDITIONS

N/A

11.0 REFERENCES

11.1 Shoreham Decommissioning Project Termination Survey Plan.

11.2 NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination. (Draft Report)

12.0 APPENDICES

12.1 Background Data Sheet (Sample)

12.2 Standard Background Sheet (Sample)

12.3 Background Survey Instruction Form (Sample)

Shoreham Decommissioning Project
BACKGROUND DATA SHEET sheet

of

SAMPLE

[illegible]

Shoreham Decommissioning Project
STANDARD BACKGROUND SHEET

SAMPLE

Survey Unit No.		Survey Unit Name:	
Location/Description			
Surveyed By:		Date:	
Instrument Ser No=>			
Detector Ser. No =>			
Type of Detector =>			
<p>THE MEAN BACKGROUND FOR THE _____ DETECTOR FOR THIS AREA IS:</p> <p>_____ cpm / uRem/h</p> <p>_____ cpm / uRem/h (Std. Deviation)</p>			
Notes:			
Prepared by:		Date:	
Reviewed by:		Date:	

Shoreham Decommissioning Project
BACKGROUND SURVEY INSTRUCTION FORM

Sheet of _____

PART 1. SURVEY UNIT/AREA DESCRIPTION

Survey Unit No.		Description:	
Unit Name/Area:			Base Map No.
Offsite Area	Indoor area		Outdoor area
Background Survey	Special Survey	Other Survey	

PART 2. GENERAL INSTRUCTIONS

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Prepared By:

Date:

Reviewed By:

Date:

prc 11/17/92