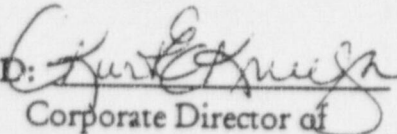

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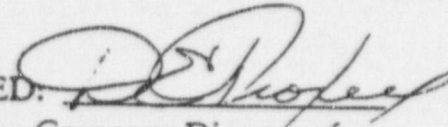
TITLE: Instrumentation and Surveillance

APPROVED: 
Corporate Director of
Health and Safety

DATE: 9-27-96

APPROVED: 
Health Physics Professional

DATE: 9/23/96

APPROVED: 
Corporate Director of
Quality Assurance

DATE: 26 Sep 96

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1 PURPOSE AND OBJECTIVES

This procedure contains the requirements for performing radiation surveys, documenting surveys, and the means by which proper functioning of survey instruments is assured. This procedure applies to all radiation surveys conducted for compliance purposes by IT Radiation Safety Officers, radiation protection technicians (RPTs) or contractor RPTs.

2 RESPONSIBILITIES

2.1 Radiation Safety Officer (RSO)

2.1.1 Shall ensure that all radiation surveys performed for demonstration of compliance conform to the requirements of this procedure.

2.1.2 Shall maintain an adequate inventory of functional, calibrated radiation survey instrumentation.

2.1.3 Shall store and control the use of all radiation survey instrumentation.

2.2 Project Managers or Fixed Facility Managers

2.2.1 Shall assure that no instruments are purchased without approval by the RSO.

2.2.2 Shall assure that only qualified personnel, trained in the proper use and care of instruments, are permitted to operate portable radiation detection instrumentation.

2.3 Authorized Users/Operators

Shall report non-functional equipment to the RSO as soon as identified.

3 REFERENCES

3.1 Requirements and Specifications

3.1.1 Title 10, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation"

3.1.2 IT Corporation Policy No. HS-700, "Radiation Protection Program Plan"

3.2 Related Procedures

3.2.1 IT Corporation Procedure No. RPP-001, "Internal Exposure Control"

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- 3.2.2 IT Corporation Procedure No. RPP-002, "External Exposure Control"
- 3.2.3 IT Corporation Procedure No. RPP-010, "Radiation Protection Records"
- 3.2.4 IT Corporation Procedure No. RPP-011, "Control of Standard Operating Procedures for Radiation Protection"
- 3.2.5 IT Corporation Procedure No. RPP-013, "Handling Sealed and Unsealed Radiation Sources"

3.3 Others

- 3.3.1 American National Standards Institute, ANSI N323, "Radiation Protection Instrumentation Test and Calibration"
- 3.3.2 U. S. Nuclear Regulatory Commission, Regulatory Guide 8.21, "Health Physics Surveys for Byproduct Material at NRC-Licensed Processing and Manufacturing Plants"

4 DEFINITIONS

- 4.1 Approval - An act of endorsing or adding positive authorization or both.
- 4.2 Health Physics Professionals (HPP) - Individuals who, by virtue of their education, and experience, approve and provide oversight for work involving or pertaining to radioactivity. The HPP shall be Certified by the American Board of Health Physics (Comprehensive).
- 4.3 May - The word may is used to denote permission.
- 4.4 Procedure - A document that specifies or describes how an activity is to be performed. It may include methods to be employed, equipment or materials to be used and sequence of operations.
- 4.5 Radiation Safety Officers (RSO) - Individuals who, by virtue of training and/or experience, have been authorized to develop, administer and implement a radiation protection program. Fixed facility RSOs are specified by federal or state license requirements, and shall not be changed without notification of the appropriate licensing authority. Fixed facility RSOs are authorized to use or directly supervise the use of radioactive materials under the specifications of a specific radioactive materials license. Project RSOs shall be selected by the HPP.
- 4.6 Shall - The word shall is to be understood as a requirement.
- 4.7 Should - The word should is to be understood as a recommendation.

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5 EQUIPMENT/MATERIALS REQUIRED

Appropriate Check Sources

6 METHODOLOGY

6.1 Radiation Surveys

6.1.1 Radiation surveys shall be performed as necessary to evaluate:

6.1.1.1 External radiation exposure to personnel;

6.1.1.2 Surface contamination (see RPP-003 "Contamination Control"); or

6.1.1.3 Concentrations of airborne radioactive materials in ambient air or effluents ;

6.1.2 Radiation surveys shall be performed by personnel who are qualified pursuant to HS-700, "Radiation Protection Program Plan".

6.1.3 Results of radiation surveys shall be documented, using the forms and instructions contained in Attachment 1 or equivalent.

6.1.4 The results of radiation surveys shall be reviewed by the RSO for completeness and for trending of radiological conditions in specific buildings or facilities.

6.2 Radiation Survey Instrumentation

6.2.1 The RSO shall authorize and control all radiation survey instrument purchases, and shall issue procurement specifications for all instruments to be purchased.

6.2.2 Radiation survey instrumentation shall be of the appropriate type, and shall have sufficient accuracy and sensitivity to determine the type and magnitude of radiological hazards to which personnel may be exposed.

6.2.3 Prior to purchase of new instrument types the RSO or Health Physics Professional (HPP) shall evaluate them for the following characteristics:

A. Physical construction;

B. Effect of shock, sound, vibration, electric transients, radio frequency energy, magnetic fields and humidity;

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- C. Extent of switching transients, capacitance effects, geotropism and static charge effects;
- D. Power supply, including stability and battery life;
- E. Range, sensitivity, linearity, detection limit, and response to overload conditions;
- F. Accuracy and reproducibility (precision);
- G. Energy dependence;
- H. Angular dependence;
- I. Response to ionizing radiations other than those being measured; and
- J. Temperature and pressure dependence on measurements.

NOTE: These items are normally performed by the manufacturer and credit may be taken for the manufacturer's evaluation and testing.

- 6.2.4 Instrumentation shall be calibrated as described in ANSI-N323, "Radiation Protection Instrumentation Test and Calibration"
- 6.2.5 Instrumentation shall be calibrated/re-calibrated on the following frequency unless otherwise specified in license requirements:
 - 6.2.5.1 Prior to initial use;
 - 6.2.5.2 Every six months \pm one month;
 - 6.2.5.3 Whenever the instrument parameters have been significantly altered or the instrument fails to properly respond to field performance checks;
 - 6.2.5.4 Whenever damage or malfunction is known or suspected.
- 6.2.6 Instrumentation shall be selected and used based on ability to perform adequately in the presence of the ranges and types of radiation expected.
- 6.2.7 Prior to each use, or daily in the case of routine use, each instrument shall be tested in the following functions, as appropriate:

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6.2.7.1 The response of the instrument to a check source;

6.2.7.2 Battery status;

6.2.7.3 A test of the reset button;

6.2.7.4 A test of the audible response;

6.2.7.5 Examination for physical damage; and

6.2.7.6 Verification that a current calibration sticker is fixed to the instrument.

6.2.8 Each instrument should be tested at least weekly against a reference standard source in a fixed geometry on at least one scale, and the response (dpm) shall be within $\pm 20\%$ of the true source emission.

6.2.9 Instruments failing any of the tests shall be taken out of service, segregated from other instruments, tagged as "out of service", and repaired/calibrated prior to further use.

6.3 Smear Counters

6.3.1 Each smear counter (i.e., gross alpha, gross beta, or combination) upon initial setup shall have the following performance checks, or equivalent as determined by the RSO, made once all operational parameters are established:

- A. A minimum of five ten minute background counts shall be made and an average background value and standard deviation (at 95% confidence level) shall be calculated.
- B. A minimum of five source counts shall be made to determine the counting efficiency. Count time shall be determined such that a minimum of 1,000 counts will be collected.
- C. Counter efficiency shall be calculated using the average source counts per minute value, subtracting the average background, and dividing the resultant value by the source disintegrations per minute.
- D. Performance check charts or daily check sheets will be initiated for both background and source counts. Each chart will have 95% confidence bands established for future equipment performance checks.

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- 6.3.2 On a daily basis during routine use each smear counter will have a background and source check count performed, and the resultant values will be plotted on their respective performance check charts or on daily check sheet (see Attachment 3).
- 6.3.3 Any time a performance check count falls outside of the 95% confidence bands the count will be repeated. If the next two counts falls outside of the confidence band the RSO will be contacted.
- 6.3.4 The RSO shall evaluate possible equipment failure modes and review past performance data. The RSO may do either of the following:
 - A. Tag the equipment "out of service" and initiate efforts to get the equipment sent to the factory for repair.
 - B. Establish new background and efficiency performance charts or daily check sheet, and allow the equipment to be used.

NOTE: If option (B) is selected the RSO shall personally review the daily performance check data to ensure that the equipment is functioning properly or is tagged "out of service" and returned to the factory.

7 RECORDS

- 7.1 All records pertinent to this procedure shall be maintained pursuant to RPP-010.
- 7.2 A log (see Attachment 2) shall be maintained of all radiation surveys performed.
- 7.3 A file of inspection, calibration, and maintenance history shall be maintained for each instrument.
- 7.4 An vendor-supplied Certificate of Calibration shall be maintained for each instrument successfully calibrated.
- 7.5 Instruments shall have a label affixed to them with the following information calibration due date and calibrator's initials:
- 7.6 Instruments that require response checks and reference checks shall have a label, tag, or card attached showing the initials of the individual performing the check and the date.
- 7.7 The following records shall be generated and maintained:
 - 7.7.1 Radiological Survey Forms (Attachment 1)

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7.7.2 Radiological Survey Log Sheets (Attachment 2)

7.7.3 Scaler Daily Source Check (Attachment 3)

7.8 All records shall be maintained in accordance with RPP-010 "Radiation Protection Records".

8 ATTACHMENTS

8.1 Attachment 1: "Radiological Survey Form"

8.2 Attachment 2: "Radiological Survey Log Sheet"

8.3 Attachment 3: "Scaler Daily Source Check"

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ATTACHMENT 1

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ATTACHMENT 2

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ATTACHMENT 3

Scaler Daily Source Check

Instrument # _____				Setup Date _____	
Cal Date _____				Source ID _____	
Probe # _____				Project/# _____	
Ranges	Bkgd	_____ cpm	TO	_____ cpm	
	Source	_____ cpm	TO	_____ cpm	

[illegible]

Completed By: _____ Date: _____
Reviewed By: _____ Date: _____