CP4-RP-1110 **FRev. 1**	**TITLE**: Radiation Surveys	Page 1 of 9

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TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE 3
- 1.1 Purpose 3
- 1.2 Scope 3

2.0 REFERENCES 3
- 2.1 Use References 3
- 2.2 Source References 3

3.0 COMMITMENTS 3

4.0 RESPONSIBILITIES 3

5.0 GENERAL INFORMATION 4

6.0 INSTRUCTIONS 4
- 6.1 Identify Need for Radiation Surveys 4
- 6.2 Obtaining and Documenting Radiation Surveys 5

7.0 RECORDS 8
- 7.1 Records Generated 8
- 7.2 Records Disposition 8

Attachment A – Acronyms/Definitions 9

1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides overview information on complying with the requirements of *Title 10, Code of Federal Regulations, Part 835* (10 CFR 835), *Occupational Radiation Protection,* specifically §835.401, to monitor for radiation in the workplace.

1.2 Scope

As appropriate, this procedure applies to those individuals qualified to conduct radiation surveys in the workplace [e.g., primarily Radiological Control (RADCON) Technicians (RCT)], Radiation Protection Manager (RPM), Radiation Protection Project Managers (RPPM), and RCT Supervisors who review and approve prepared radiation survey reports. The Paducah Gaseous Diffusion Plant (PGDP) Deactivation and Remediation (D&R) Contractor Radiation Protection Organization has organizational ownership and maintenance responsibility for this procedure. The approval authority for this document is the RPM.

2.0 REFERENCES

2.1 Use References

- CP3-RP-1105, *Receipt, Transport, and Movement of Radioactive Materials*
- CP3-RP-1108, *Posting and Labeling*
- CP4-RP-1111, *Workplace Monitoring*
- CP3-RP-1401, *Radiation Protection Program Records*

2.2 Source References

- 10 CFR 835, *Occupational Radiation Protection*
- CP2-RP-0001, *Radiation Protection Program*
- CP2-RP-0002, *Radiation Protection Glossary*
- Department Of Energy (DOE) G 441.1-1C, *Radiation Protection Programs Guide for use with Title 10, Code of Federal Regulations,* Part 835, *Occupational Radiation Protection*
- DOE-STD-1098-2008, *Radiological Control Standard*

3.0 COMMITMENTS

None

4.0 RESPONSIBILITIES

Responsibilities may be incorporated in Section **6.0**.

5.0 GENERAL INFORMATION

5.1 Routine radiation surveys shall be conducted in the workplace, including surveys in Radiologically Controlled Areas, to [§835.401(a)]:

- Demonstrate compliance with the regulations in 10 CFR 835;
- Characterize the radiation levels present.
- Detect changes in radiological conditions.
- Detect the gradual buildup of radioactive material.
- Verify the effectiveness of engineered and administrative controls in containing radioactive material and reducing radiation exposure.
- Identify **and** control potential sources of individual exposure to radiation and/or radioactive material.

5.2 Instruments and equipment used for monitoring shall be [§835.401(b)]::

- Periodically maintained and calibrated on an established frequency;
- Appropriate for the type(s), levels, and energies of the radiation(s) encountered;
- Appropriate for existing environmental conditions;
- Routinely tested for operability.

6.0 INSTRUCTIONS

6.1 Identify Need for Radiation Surveys

<u>Radiation Protection Manager (RPM)</u>

6.1.1 Ensure radiation surveys include the following:

- **Boundary** – To detect changes and verification that radiological boundaries and postings are correct.
- **RWP** – To monitor radiation dose rates for workers in support of Radiological Work Permit (RWP) generation activities, during work activities, and post-job conditions.
- **Radioactive Waste** – In support of radioactive waste collection and disposal activities where waste volumes may change rapidly.
- **Transportation** – In support of radioactive material shipments according to CP3-RP-1105, *Receipt, Transport, and Movement of Radioactive Materials*.
- **RGDs** - During the operation of radiation generating devices (RGDs) to confirm established boundaries.

- **Pregnancy** – To verify radiation dose rates at normal work locations when a worker documents a declaration of pregnancy.
- **Initial** – To verify the initial effectiveness of engineered and administrative controls in reducing radiation exposures.
- **Routine** – As indicated by annual review of surveys.

6.1.2 Base the frequency of routine radiation surveys on probability of changing radiological conditions.

6.1.3 Use area radiation monitors in frequently occupied areas where radiation levels may rapidly change.

6.1.4 Consideration should be given to ensuring beta source dose rates are adequately characterized.

6.2 Obtaining and Documenting Radiation Surveys

Radiological Control Technician (RCT)

6.2.1 Conduct the radiation survey as directed by the RPM, RCT Supervisor, or as specified in the procedure or other technical work document (e.g., RWP).

6.2.2 Use only maintained, calibrated, and operable instruments to conduct radiation surveys.

6.2.3 For the following conditions, use the instrument type listed:

- **If** $\leq$0.5 mR/hr, **then** use μR or μrem meter.
- **If** $\geq$0.5 mR/hr beta-gamma, **then** use ion chamber. The use of an extendable probe instrument for inaccessible or out of reach areas, or other safety considerations, is acceptable.
- **If** high dose rates (gamma) are expected, (typically > 100 mR/hr), **then** consider use of extendable probe instruments.
- **If** neutron radiation is expected, **then** ensure instrument is sensitive to neutrons (e.g., Rem ball).

NOTE: The quantities "*R*" and "*rem*" may be used interchangeably for conformance with this procedure.

6.2.4 **If** measured radiation dose rates would result in unnecessary exposure to the individual obtaining the measurement, **then** use extendable survey instruments (e.g., Teletector) or remote-reading instruments to keep personnel exposure as low as reasonably achievable (ALARA).

6.2.5 **If** conditions indicate an un-posted area meets the requirements for a High Radiation Area (HRA) or Very High Radiation Area (VHRA), **then** perform the following:

- **STOP WORK and** evacuate the area.
- Warn others (Plant Shift Superintendent, Facility Manager, RPM, and RCT Supervisor).
- Isolate the area.
- Minimize exposure.
- Survey the area for reposting.

6.2.6 **If** conditions indicate an un-posted area that meets the requirements for a Radiation Area, **then** perform the following**:**

- Immediately post the area **and** make sure any work in the area is governed by an appropriate RWP, **and** inform RADCON supervision and the RPM as expeditiously as possible.
- **If** the area cannot immediately be posted as a *Radiation Area* a**nd/or** any work is **NOT** governed by an appropriate RWP, **then STOP WORK**, evacuate the area, **and** immediately inform RCT Supervisor and the RPM.

6.2.7 **If** it is **NOT** feasible to post a (RBA) Radiological Buffer Area within eight hours of discovery, **then** inform the RPM and await written instructions.

6.2.8 **If** conditions indicate an area has an equivalent dose rate that exceeds 50 μR/hr and the area is **NOT** posted "*Dosimeter Required*", **then:**

- Assure a survey is conducted to delineate the area.
- Assure a map showing the area is constructed.
- Provide map and survey to the RPM.

6.2.9 **If** provided a map of an un-posted area with an equivalent dose rate that exceeds 50 μR/hr, **then** determine whether to post the area or whether to perform an ALARA review according to CP3-RP-1108, *Posting and Labeling*.

6.2.10 Document each radiation survey on RP-F-0004 *Radiological Survey*, RP-F-0006, *Radiological Survey Beta Dose Rate*, and RP-F-0007, *Radiological Survey Map* or equivalent electronic record keeping system. Other methods of survey documentation are acceptable only when approved.

NOTE:

A logbook entry is **NOT** an acceptable equivalent to the Radiological Survey Form, or electronic equivalent.

6.2.11 **When** radiation surveys are conducted, document the pertinent survey information as soon as reasonable after the survey is completed, but no later than the end of the next shift worked. For jobs continuing on multiple shifts, job conditions should be documented on survey forms and available for use in turnover and for reference related to current job conditions. Include the following information on the survey record:

- The location of the measurement, either with a symbol on a survey map or by a written description of the location.
- The distance from an object or surface (to be able to correlate the location of the measurement in three dimensions; e.g., 30 cm from a pipe, 1 m above the floor).
- A description of the location where the survey was conducted, either with building and room number, or **if** this is **NOT** applicable, **then** a description to allow others to be able to identify the survey location. Be sure to mark the location so that it can be located by others.
- The date and time the survey was conducted.
- The radiation dose rate, including (as applicable) information necessary to recalculate the information, such as when open-to-closed window readings and correction factors are used.
- Information on the instrument used, including type and unique identification number, and calibration date information.
- Useful cross-reference information, such as procedure numbers, work order numbers, RWP numbers, identification of workers, equipment identification, container number(s), or serial number, etc.
- Other pertinent information about the survey, which will assist the reviewer to more clearly understand conditions and circumstances about the survey or the documented results.
- Unique survey identification number.

RCT Supervisor

6.2.12 Review and approve the survey record no later than five (5) working days from the date of the survey to ensure it is complete, accurate, and legible.

NOTE:

When surveys are returned to the RCT because they are incomplete, inaccurate, or illegible, the five (5) working day review and approval deadline is reset.

6.2.13 **If** the survey record meets acceptance criteria for complete, accurate, and legible information, **then** perform the following**:**

- approve the survey record, **OR**
- return the survey record to the RCT for correction and resubmittal for approval.

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

- Completed and approved radiation survey record form
- RP-F-0004, *Radiological Survey*
- RP-F-0006, *Radiological Survey Beta Dose Rate*
- RP-F-0007, *Radiological Survey Map*

Chg. A

Forms must be completed in accordance with CP3-OP-0024, *Forms Control.*

7.2 Records Disposition

The records are to be maintained in accordance with CP3-RP-1401, *Radiation Protection Program Records,* and CP3-RD-0010, *Records Management Process.*

Attachment A – Acronyms/Definitions

ACRONYMS

ALARA– as low as reasonably achievable

CFR – Code of Federal Regulations

DOE – U.S. Department of Energy

HRA – High Radiation Area

RADCON – Radiological Control

RBA – Radiological Buffer Area

RGD – Radiation Generating Device

RCT – Radiological Control Technician

RPM – Radiation Protection Manager

RPPM – Radiation Protection Project Manager

RWP – Radiological Work Permit

VHRA – Very High Radiation Area

DEFINITIONS

High Radiation Area – any area, accessible to individuals, in which radiation levels could result in an individual receiving an equivalent dose to the whole body in excess of 0.1 rems (0.001 Sv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

Radiation Area – any area, accessible to individuals, in which radiation levels could result in an individual receiving an equivalent dose to the whole body in excess of 0.005 rem (0.05 mSv) in 1 hour at 30 centimeters from the source or from any surface that the radiation penetrates.

Radiological Buffer Area –An intermediate area established to prevent the spread of radioactive contamination and to protect personnel from radiation exposure.