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DOCUMENT CATEGORY: Administrative	**LEVEL OF USE:** Information Level

Check all that apply:
TSR/NCS ☐ **WCO** ☐ **Shared Site** ☐

FUNCTIONAL AREA: Radiation Protection **SUBJECT MATTER AREA:** Radiation Protection	**SUBJECT MATTER EXPERT**: Dan Tockstein, Radiological Engineering Manager
NUCLEAR SAFETY REVIEW DOCUMENTATION: FRNP-25-0299-S	**RESPONSIBLE MANAGER/OWNER**: Craig Nesshoefer, Radiation Protection Manager
REQUIRED REVIEW DATE (or expiration date for temporary change): 05/21/2030	**EFFECTIVE DATE**: 05/27/2025

REVISION/CHANGE LOG

Revision/ Change Letter	Description of Changes	Pages Affected	Date of Revision/ Change	Approved By (signature on file)
FR0	Bluesheet	ALL	9/28/2017	Documentation on file
FR1	Non-intent changes for bluesheet incorporation	ALL	12/18/2017	
FR2	General revision	ALL	10/28/2020	
FR3	General revision: change section 6.2.9, address electronic survey database use.	ALL	1/25/2023	
FR4	General revision: change section 6.2.1 on when radiation survey required.	ALL	06/17/2024	
FR5	Revise section 6.2.4 on radiation instrument use.	ALL	05/21/2025	Craig Nesshoefer

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides overview information on complying with the requirements of Article 551 of CP2-RP-0002, *Radiological Control Manual* to monitor for radiation in the workplace.

1.2 Scope

As appropriate, this procedure applies to those individuals qualified to conduct, review, or approve radiation surveys in the workplace..

The Radiation Protection Organization of the Paducah Gaseous Diffusion Plant (PGDP) Deactivation and Remediation (D&R) Contractor, has organizational ownership and maintenance responsibility for this procedure. The approval authority for this document is the Radiation Protection Manager (RPM).

2.0 REFERENCES

2.1 Use References

- CP3-RP-1105, *Receipt, Transport, and Movement of Radioactive Materials*
- CP3-RP-1108, *Posting and Labeling*
- CP3-RP-1109, *Radioactive Contamination Control and Monitoring*
- CP3-RP-1301, *Radiation Generating Devices*
- CP3-RP-1302, *Radioactive Source Control*
- CP3-RP-1401, *Radiation Protection Program Records*
- CP4-RP-1116, *Radiological Routines*
- CP5-RP-2024, *Guidance for Documenting Radiological Surveys*.

2.2 Source References

CP2-RP-0002, *Radiological Control Manual*

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 inside and outside Radiologically Controlled Areas, to:

- Demonstrate regulatory compliance
- Characterize workplace conditions
- 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 a**nd** control potential sources of personnel exposure

5.2 Instruments and equipment used for monitoring shall be:

- 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.

5.3 Logbook entries shall **NOT** be considered an acceptable equivalent to the use of approved radiation survey forms.

6.0 INSTRUCTIONS

6.1 Identify Need for Radiation Surveys

RPM

6.1.1 Ensure radiation surveys are conducted on the following when applicable:

- Boundary – To detect changes and verification that radiological boundaries and postings are correct.
- *Radiological Work Permit (RWP)* – To monitor radiation dose rates for workers in support of RWP, during work activities, and post-job conditions.
- 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, according to CP3-RP-1301, *Radiation Generating Devices,* and according to RWP requirements when RGDs are used.
- Radioactive sources – To verify dose rates of radioactive source storage location and when verifying the presence of a radioactive source, in accordance with CP3-RP-1302, *Radioactive Source Control*.
- 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 and in accordance with CP4-RP-1116, *Radiological Routines*.

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 Give consideration to ensuring beta source dose rates are adequately characterized.

6.2 Performing Radiation Surveys

Radiological Control Technician (RCT)

6.2.1 Conduct radiation survey for the following:

- As directed by Radiological Control (RADCON) Supervision, as specified in the procedure or other technical work document (for example, RWP, Survey Plan, or ALARA Review)
- Performing tasks that could change the radiological conditions of the area (such as removing a radiological source from a pig or removal of shielding).
- Task are being performed that could change the radiological conditions of an area (such as bagging, or collecting a drum, bulk product that exceeds the detection capability on a beta/gamma hand held contamination survey instrument).
- Beta/gamma background on hand held contamination survey instrument has dramatically increases during evolution of work.

NOTE:

The monitoring threshold for skin or extremities is 5 rem. **If** an individual is going to directly handle highly contaminated items for 2000 hours/year, **then** a contact beta dose rate of 2.5 mrad/hour would necessitate extremity dosimetry. A worker handling an item for 2000 hours in a year is extremely unlikely. A bounding time (based on a review of access data) would be 400 hours/year. Based on this time, a contact dose rate of 10 mrad/hour would necessitate extremity dosimetry. Directly handling a contaminated surface for 400 hours/year is still **NOT** very likely. Thus, Radiological Engineering will evaluate extremity dosimetry requirements.

- When continually handling highly contaminated surfaces throughout the work day (work that will require an individual to continually touch the highly contaminated surface (beta).

6.2.2 **When** beta dose rates may require the need for extremity dosimetry as discussed above, **then** contact RADCON Supervision.

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

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

- Use μrem meter for dose rates < 0.5 mR/hr for performing routine or job coverage surveys.
- Use an ion chamber instrument when beta dose rate is required.
- Use an instrument capable of detecting < 0.05 mR/hr (50 μrem/hr) for off-site shipment of materials that require a Radioactive White-I, Radioactive Yellow-II, Radioactive Yellow-III, or upon request from Shipping Organization.
- Use an instrument capable of detecting < 0.5 mR/hr for off-site shipment meeting the requirements for Limited Quantity (LQ) and Empty RAM packages.

- Use an extendable probe instrument for inaccessible or out of reach areas, or other safety considerations.
- **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 (for example, Rem ball).

NOTE:

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

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

6.2.6 **If** conditions indicate (gamma plus neutron) 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 in the area **and** make proper notifications (Plant Shift Superintendent, RADCON supervision, etc.).
- Isolate the area.
- Minimize exposure.
- Survey the area for reposting, if safe to do so.

6.2.7 **If** conditions indicate (gamma plus neutron) an un-posted area that meets the requirements for a Radiation Area, **then** perform the following**:**

- **STOP WORK** and evacuate the area, unless it is part of the planned evolution of the job under the RWP being used.
- Inform RADCON Supervision as expeditiously as possible.
- Immediately post the area **and** make sure any further work in the area is governed by an appropriate RWP.

6.2.8 **If** it is **NOT** feasible to post a (RA) Radiation Area within eight hours of discovery, **then** inform the RPM and await instructions.

6.2.9 **If** conditions indicate an area has an equivalent dose rate (gamma plus neutron) ≥ 50 μR/hr **and** the area is **NOT** posted "*Dosimeter Required*" or covered under a RWP requiring a dosimeter, **then:**

- Assure a survey is conducted on the area including the area immediately outside the boundary (<50 uR/hr).
- Provide a map showing the area, how it is constructed, with corresponding readings on the map, which will include inside and outside of the newly posted area.

- Notify RADCON Supervision for posting requirements
- Provide map and survey to RADCON Management.

RADCON Management

6.2.10 **If** provided a radiological survey of an un-posted area with an equivalent dose rate (gamma plus neutron) ≥ 50 μR/hr, **then** determine whether to post the area according to CP3-RP-1108, *Posting and Labeling* **or** perform a technical evaluation documenting expected individual dose based on occupancy factors.

- **IF** possible, try to remove the offending item or items to an already posted area that is not generally occupied.

6.3 Documenting Radiation Surveys

RCT

6.3.1 Document surveys according to CP3-RP-1109, *Radioactive Contamination Control and Monitoring* and CP5-RP-2024, *Guidance for Documenting Radiological Surveys*.

NOTES:

Other methods of survey documentation are acceptable only when approved by the RPM.

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.

6.3.2 Include the following additional information on the radiation survey record, as applicable:

- 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.
- 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 radiation dose rate, including (as applicable) information necessary to recalculate the information, such as open and closed window readings.
- Useful cross-reference information, such as procedure numbers, work order 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.

Radiological Control Supervisor (RCS)

6.3.3 Review **and** approve the survey according to CP3-RP-1109.

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

Radiological Surveys

Forms must be completed according to CP3-OP-0024, *Forms Control.*

7.2 Records Disposition

The records are to be maintained according to 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

HRA – High Radiation Area

RADCON – Radiological Control

RGD – Radiation Generating Device

RCS – Radiological Control Supervisor

RCT – Radiological Control Technician

RPM – Radiation Protection Manager

RWP – Radiological Work Permit

VHRA – Very High Radiation Area

DEFINITIONS

Refer to CP2-RP-0002, *Radiological Control Manual*.