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Level 2 Administrative Procedure

Revision	Record of Issue/Revision	Affected Pages
6	Revision; Added responsibilities and actions to notify Radiation Protection prior to removing any RGD offsite and to evaluate according to FBP-RP-PRO-00004. Updated definition of RGD. Identified regulatory requirements within the body of procedure to address FBP-PR-FY21-2149.	3-6, 8, &,10-12

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1.0 PURPOSE

- 1.1 This procedure provides direction and guidance for Radiation Protection support for radiation generating devices (RGDs) under the Fluor-BWXT Portsmouth LLC (FBP) Radiation Protection Program where FBP conducts radiological operations for the U.S. Department of Energy (DOE).
- 1.2 As specified in FBP-RP-PL-00002, *Radiation Protection Plan Portsmouth Gaseous Diffusion Plant Piketon, Ohio*, this procedure has been developed to implement applicable requirements from the following:
 - Title 10, *Code of Federal Regulations* (CFR), Part 835, *Occupational Radiation Protection* (10 CFR 835)
 - DOE G 441.1-1C Admin Chg 1, *Radiation Protection Programs Guide for Use with Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection*
- 1.3 This document implements applicable regulatory requirements. They are listed in Appendix A, *Regulatory Requirements Flow Down*.

2.0 SCOPE AND APPLICABILITY

- 2.1 This Level 2 procedure applies to all site personnel including contractors, sub-contractors and affiliates involved with the procurement, maintenance and use of RGDs. It provides the requirements for supporting the safe operation of all RGDs during setup, use and/or maintenance.
- 2.2 This procedure implements Integrated Safety Management System requirements as identified in DOE Policy 450.4 (current revision), *Integrated Safety Management Policy*.
- 2.3 As specified in DOE G 441.1-1C, Medical RGDs are to be registered with the Ohio Department of Health.
- 2.4 Should any conflict exist between the requirements and guidance provided in the American National Standards Institute (ANSI) standards and the requirements of 10 CFR 835, then the requirements of 10 CFR 835 take precedence.
- 2.5 This procedure does **not** apply to individual radioactive sealed sources which are utilized for site instrumentation. Individual radioactive sources are controlled by FBP-RP-PRO-00028, *Radioactive Source Control*, with only one exception. This procedure should also be followed for those sealed radioactive sources produce radiation fields exceeding 100 millirem (1mSv) in one hour at a distance of 30 centimeters from the source.

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3.0 GENERAL INFORMATION

FBP does not currently utilize any industrial RGDs, with the exception of small scale XRF devices and Nuclear Moisture Density gauges. It is not anticipated that will change for the duration of the contract. As part of the Decontamination & Decommissioning process, several historical RGD components are stored on site, but have been dismantled or rendered permanently inoperable. The primary intent of the procedure is to assure that any functioning RGD brought on site by contractors or sub-contractors for fulfillment of a contract are adequately identified, secured and utilized under DOE guidelines.

4.0 USE REFERENCES

- A. FBP-BS-PRO-00062, *Records Management Process*
- B. FBP-RP-PRO-00004, *Release of Material and Equipment from Department of Energy Control*
- C. FBP-RP-PRO-00023, *Radiation Protection Program Records*
- D. FBP-RP-PRO-00028, *Radioactive Source Control*
- E. FBP-BS-PRO-00039, *Request for Purchase*

5.0 RESPONSIBILITIES

5.1 Radiation Protection Manager (RPM)

- 5.1.1 Evaluates and authorizes the purchase of all RGDs at PORTS in accordance with FBP-BS-PRO-00039, *Request for Purchase*, evaluates and authorizes use.
- 5.1.2 Maintains independent overview of RGD operations.
- 5.1.3 Ensures the technical qualification and approves the appointment of a RGD Coordinator.

5.2 Radiation Protection Section Manager (RPSM)

- 5.2.1 Provides radiological support to RGD operations as directed by the RPM.
- 5.2.2 Directs the performance of radiation monitoring of open installations to verify proper posting and control of boundaries during operations and removal of hazards (and associated temporary postings and barriers) after operations.
- 5.2.3 Directs the performance of surveys and monitoring all RGD installations for unsafe operations or conditions and conformity to procedures.
- 5.2.4 Provides Radiation Protection support in regards to any development as low as reasonably achievable (ALARA) Reviews, Radiological Evaluations, Radiological Work Permits (RWP), or surveys and for any dosimetry guidance related to RGD operations.

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5.2.5 Ensures all RGD equipment being removed from plant site is processed under the guidance of FBP-RP-PRO-00004.

5.3 RGD Coordinator

NOTE

The RGD Coordinator named by the RPM administratively supports and coordinates the Radiation Generating Device Program as instructed by the RPM.

5.3.1 Evaluates adherence to procedures by conducting pre-operational and periodic inspections of RGD installations.

5.3.2 Maintains an inventory of all RGDs being utilized on site.

5.3.3 Reviews all requisitions and contracts which include the acquisition of any RGD on site and presents information to the RPM for approval.

5.4 Radiological Control Technician (RCT)

5.4.1 Performs radiation monitoring of open installations to verify proper posting and control of boundaries.

5.4.2 Monitors RGD installations for unsafe operations or conditions and conformity to procedures.

5.4.3 Surveys RGD equipment as required to meet the requirements of the procedure.

5.5 Procurement

5.5.1 Notifies Radiation Protection of contracts which require the procurement of RGDs to be used on the DOE reservation.

5.5.2 Notifies Radiation Protection of the shipping date and, if known, the shipping company's tracking number for the purchase of any known RGD.

5.6 Contract Technical Representative (CTR)

Ensures Radiation Protection is informed of all RGD disposition changes associated with the project.

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6.0 ACTIONS

6.1 General Operational Requirements for All RGDs

Radiation Protection Manager

- 6.1.1 Evaluate and authorize as appropriate the purchase and use of all RGDs in accordance with FBP-BS-PRO-00039.
- 6.1.2 Establish and maintain independent overview of RGD operations.
- 6.1.3 Review and approve the technical qualification and appointment of a RGD Coordinator for RGD operations.

Radiation Protection Section Manager

- 6.1.4 Ensure radiation exposure from the handling and use of RGDs is maintained ALARA through engineered and administrative controls:
 - [10CFR835.1001]
 - The primary methods used shall be physical design features, such as remote handling and shielding.
 - [10CFR835.1001(a)]
 - Administrative controls shall be employed only as supplemental methods to control radiation exposure including for specific activities where the use of engineered controls is demonstrated to be impractical.
 - [10CFR835.1001(a),(b)]
- 6.1.5 Oversee the development of RWPs which support the safe operation for all RGDs under their purview.
- 6.1.6 Oversee the development of any ALARA Reviews or Radiological Evaluations which support operation of all RGDs under their purview.
- 6.1.7 Provide necessary RCT support for all required surveys of RGD systems under their purview.
- 6.1.8 **IF** locked entryways are used, **THEN** verify the keys used for one RGD installation or storage facility do not provide access to another RGD installation or storage facility.

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- 6.1.9** IF an individual can enter a container and access a physically controlled high radiation area, THEN implement one or more of the features of 10 CFR 835.502, *High and Very High Radiation Areas*, for the container (in this case, the walls of the container form the boundary of an accessible physically controlled high radiation area).
- A.** Label the entryways or access point to the container consistent with 10 CFR 835.601, *General Requirements*, if adequate warning is not provided by control measures and other required posting.
 - B.** Verify the label specifies the entryways should not be opened without Radiation Protection approval and significant levels of radiation may exist.
- 6.1.10** Verify doors and/or access panels in exempt shielded, shielded, and unattended installations are equipped with one or more fail-safe safety interlocks to prevent irradiation of an individual.
- 6.1.11** IF an area radiation monitor is incorporated into a safety interlock system, THEN confirm the circuitry is such that a failure of the monitor will either prevent normal access into the area or operation of the RGD.
- 6.1.12** Verify one or more physical control devices are used to secure RGDs to prevent unauthorized access and use.
- A.** Verify the control system governing the production of radiation is equipped with a lock and key to prevent unauthorized use.
 - B.** Verify the key controlling the production of radiation in one RGD does not control the production in another.
 - C.** IF the control system cannot be integrally locked, THEN verify the system is contained in a locked repository (or room) which is only accessible to trained and authorized personnel.
- 6.1.13** Confirm that administrative procedures are implemented to ensure the RGD installation and the RGD safety interlock control devices are such that:
- Radiation cannot be produced until the interlock system logic has been completely satisfied.
 - Production of radiation cannot be resumed by merely re-establishing the interlock circuit at the location where an interlock was tripped.
 - The safety circuit cannot be re-energized or re-established automatically, i.e., there should be a manual safety circuit reset on or near the main control console.
- 6.1.14** Verify all RGD warning lights are red or magenta for consistency.

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- 6.1.15** Check that a sufficient number of lights is installed so at least one light is easily visible from all reasonably occupied areas which may have dangerous radiation levels and from reasonable avenues of approach to such areas.

NOTE

The interlocked warning light should provide visual indication which radiation is being produced, and should be used in conjunction with any interlocked safety device which restricts physical access to a radiation beam or field.

When used in this fashion, the RGD should not be operable when the warning light is out.

- 6.1.16** Verify at least one interlocked warning light is used in all circumstances.

NOTE

Where feasible such as for new or significantly modified RGDs which are capable of producing very high acute doses, i.e., that must be analyzed in the documented safety analysis, safety system hardware and software should provide additional safety via computer-assisted operations as well as indicate all abnormal events at the console and remotely notify cognizant personnel of abnormal events and conditions.

- 6.1.17** Verify that it is not possible to override the operation of any warning device activated by a fail-safe function without positive actions by the operator such as resetting controls at the control console.

RCT

- 6.1.18** Verify that all personnel are wearing personnel dosimeters as stated in the applicable RWP.
- 6.1.19** Post all doorways leading to the room with the standard radiological posting stating, as a minimum, "CAUTION, TLD REQUIRED FOR ENTRY, X RAYS IN PROGRESS" while x-ray operations are in progress.
- 6.1.20** Maintain radiation dose due to unwanted radiation from components such as high voltage rectifiers with less than 2.5 mrem/hr in any accessible region 5 cm from the outside surface of the x-ray generator cabinet.

RGD Coordinator

- 6.1.21** Ensure that all RGD users have current Radworker training.
- 6.1.22** Ensure that all RGD users have current RGD specific training on the RGD to be utilized. This can be in the form of a training certificate or documentation supplied by a company Safety Representative.

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- 6.1.23 Ensure that contractors bringing RGDs on site can produce licensure or agreement state documentation that documents their company's RGD registration.

6.2 Procurement of RGDs

Requestor of RGD

NOTE

A requestor may include anyone who is procuring contracted site services that will include the use of an RGD in the execution of the contract (soil density gauges, etc.)

- 6.2.1 Complete FBP-RP-PRO-00040-F02, *Approval for Radiation Generating Device Procurement*.
- 6.2.2 Submit completed RGD approval form to Radiation Protection for approval **before** initiating procurement documentation.

RPM

- 6.2.3 Reviews completed FBP-RP-PRO-00040-F02 for assurance of site radiation safety and general ALARA concerns.
- 6.2.4 **WHEN** complete, **THEN** provide reviewed form to RGD Coordinator for completion and communication to the requestor.
- 6.2.5 **IF** approved, **THEN** perform the following:
- A. Assign the development of an ALARA review (or alternatively a Radiological Evaluation if ALARA review criteria are not met or a review is not beneficial) to a Rad Protection Engineer.
 - B. Assign the development of a RWP to the cognizant RPSM.

Requestor of RGD

- 6.2.6 **IF** the FBP-RP-PRO-00040-F02 is approved, **THEN** continue the procurement process.
- 6.2.7 **IF** utilizing RGDs on site as part of a respective contract, **THEN** supply the following:
- A complete copy of their active licensure to possess and use the RGD that will be utilized in the execution of the contract. This may include their Nuclear Regulatory Commission license and/or agreement state license.

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- Specification documents/sheets that describe the RGD to be used. This may include specific radioactive source information if the RGD contains integrated sources.
- Active training documentation that specifies that the intended RGD operators are adequately trained on the RGD to be utilized in the execution of the contract.
- Notification to Radiation Protection each time a new RGD is brought on site or when an existing RGD is taken off site.

RGD Coordinator

- 6.2.8** Assign a unique ID to the RGD approval form that represents the RGD to be acquired.
- 6.2.9** For each specific RGD, maintain an inventory of the following when applicable:
- RGD approval forms
 - ALARA Reviews
 - Radiological Evaluations
 - Surveys
 - Contractor licensure documentation
 - RGD specific training information
 - Procurement information
 - Supporting information

6.3 Relocation of RGD Equipment

CTR

- 6.3.1** Ensure RPSM is notified of all RGD relocations on site and removal from site.

RPSM

- 6.3.2** Ensure disposition changes of all RGDs are processed according to the guidance of FBP-RP-PRO-00004.

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7.0 RECORDS

7.1 Records Generated

FBP-RP-PRO-00040-F02, *Approval for Radiation Generating Device Procurement*

7.2 Requirements

- A. Records generated or received as a result of performing this procedure shall be managed according to FBP-BS-PRO-00062, *Records Management Process*.
- B. Maintain records as specified in FBP-RP-PRO-00023, *Radiation Protection Program Records*.

8.0 DEFINITIONS/ACRONYMS

8.1 Definitions

Radiation Generating Devices (RGDs) – Devices which are electrically energized to produce ionizing radiation or devices containing sealed radioactive sources that are integrated into the equipment and emit radiation continuously. Specific examples of RGDs include:

- Sealed photon or neutron-emitting radioactive sources (such as nuclear density gauges)
- X-ray producing radiography equipment
- Research and analytical X-ray or electron beam machines
- Sealed radioactive sources used as irradiators
- Electron microscopes
- Cabinet X-ray machines used for security applications

8.2 Acronyms

- A. **ALARA** – As Low As Reasonably Achievable
- B. **ANSI** – American National Standards Institute
- C. **CFR** – Code of Federal Regulations
- D. **CTR** – Contract Technical Representative
- E. **DOE** – Department of Energy
- F. **RCT** – Radiological Control Technician

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- G. RGD** – Radiation Generating Device
- H. RPM** – Radiation Protection Manager
- I. RPSM** – Radiation Protection Section Manager

9.0 SOURCE REFERENCES

- A.** 10 CFR 34, *Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations*
- B.** ANSI/HPS N43.2, *Radiation Safety for X-Ray Diffraction and Fluorescence Analysis Equipment*
- C.** ANSI/HPS N43.3, *Radiation Safety for Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies Up to 10 MeV*
- D.** ANSI/HPS N43.5, *Radiological Safety Standard for the Design of Radiographic and Radioscopic Non-Medical X-Ray Equipment Below 1 MeV*
- E.** Code of Federal Regulations Title 10: Energy, Part 835—*Occupational Radiation Protection (10 CFR 835)*
- F.** DOE G 441.1-1C, Radiation Protection Programs Guide §7.0, *Radiation Generating Devices*
- G.** FBP-RP-PL-00002, *Radiation Protection Plan Portsmouth Gaseous Diffusion Plant Piketon, Ohio*

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Appendix A
REGULATORY REQUIREMENTS FLOW DOWN

1. 10 CFR 34, *Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations*
2. 10 CFR 835, *Occupational Radiation Protection*
3. ANSI/HPS N43.2, *Radiation Safety for X-Ray Diffraction and Fluorescence Analysis Equipment*
4. ANSI/HPS N43.3, *Radiation Safety for Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies Up to 10 MeV*
5. ANSI/HPS N43.5, *Radiological Safety Standard for the Design of Radiographic and Radioscopic Non-Medical X-Ray Equipment Below 1 MeV*

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**Attachment A
APPROVAL FOR RADIATION GENERATING DEVICE PROCUREMENT**



APPROVAL FOR RADIATION GENERATING DEVICE PROCUREMENT

This form is completed by the Custodian of the Radiation Generating Device and is submitted to Radiation Protection for review and approval.

RGD ID		Machine No.:	
RGD Type <i>(Check RGD type in accordance with the RGD terminology)</i>			
<input type="checkbox"/> Sealed Gamma Ray	<input type="checkbox"/> Sealed Neutron Source	<input type="checkbox"/> Small Accelerator	<input type="checkbox"/> Research and Analytical X-Ray
<input type="checkbox"/> Electron Generating Device	<input type="checkbox"/> X-Ray for Radiography	<input type="checkbox"/> Particle Accelerator	<input type="checkbox"/> Neutron Generator
<input type="checkbox"/> Cabinet X-Ray	<input type="checkbox"/> Medical X-Ray		
RGD Information			
Manufacturer:		Requisition No.:	
Location of Use:		Requested Delivery Date:	
Source Information <i>The required radioactive source encapsulation integrity is determined based upon the classification number. Documentation confirming this integrity MUST BE provided upon delivery of the source. Refer any questions to Radiation Protection.</i>			
Radionuclide:		Activity in Ci:	
		Dimensions of Source:	
Source Description:			
Description of RGD Use and Additional Description of the Unit if required <i>(If use is for replacement of an existing RGD please state. If this is a new type or use for an RGD then briefly outline the plans for use and any radiation safety considerations involved)</i>			
Requestor:		Badge No.:	
		Date:	
THIS SECTION TO BE COMPLETED BY RADATION PROTECTION			
Conditions of use:			
Other Comments:			
RPM Approval Signature:			