



Radiation Safety

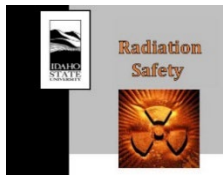


RADIATION PROCEDURES MANUAL **Procedure Cover Sheet**

Procedure Title: Radioactive Material Laboratory Evaluations
Procedure Number: RS-06 Rev.1
Effective Date: 01/31/2022

Approved By: Radiation Safety Committee

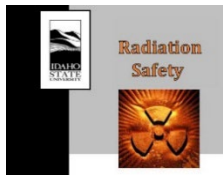
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Revision History

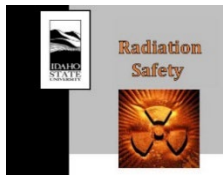
Revision Number	Author Name	Date	Approved by/date
RS 6.0	Mason Jaussi & John Longley	06/18/20	RSO-6/18/20
RS 6.1	Mason Jaussi	08/20/21	RSC-1/21/22
RS 6.1	Kishor Paudel	12/10/23	RSC-1/21/22



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1. INTRODUCTION

A radiation safety audit is a systematic review of all operation and administrative radiation protection requirements. 10 CFR 20.1101(c) requires the licensee to review the radiation program content and implementation at least annually. Licensees that are subject to the requirements in 10 CFR Part 37 must also annually review their access authorization program and security program.

2. PURPOSE

This procedure provides instructions to Radiation Safety Department staff for performing, recording, and reporting the results of radiological laboratory evaluations.

3. SCOPE

This procedure applies to annual radiation safety evaluations of laboratory spaces permitted for the use of radioactive materials, either sealed or dispersible.

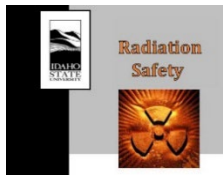
4. ROLES AND RESPONSIBILITIES

The Radiation Safety Officer (RSO) has the responsibility to perform an annual evaluation of each authorized user that is permitted the use of radioactive materials. The responsibility of the laboratory evaluation may be designated to radiation safety staff members and is at the discretion of the RSO.

The Authorized User (AU) has the responsibility to comply with requirements of their issued permit and requirements set in the Radiation Safety Manual. The AU also has a responsibility to allow the radiation safety department to perform the laboratory evaluation.

5. ACRONYMS/DEFINITIONS

ALARA: As Low As Reasonably Achievable
ALI: Annual Limit of Intake
AU: Authorized User
EQ: Exempt Quantity
GM: Geiger-Müller
ISU: Idaho State University
NRC: Nuclear Regulatory Commission
PPE: Personal Protective Equipment
RAM: Radioactive Material
RS: Radiation Safety



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RSM: Radiation Safety Manual
RSO: Radiation Safety Officer
SCA: Subcritical Assembly

6. REQUIRED MATERIAL(S)

- Authorized Users Permit
- Authorized Users RAM Inventory
- Authorized Users Training Records

7. REQUIRED TRAINING(S)

- ISU Radiation Safety Training

8. PROCEDURE

Prior to performing the laboratory evaluation, the evaluator should be aware of the laboratory's status with regard to radioactive material use or radiation producing machines. Prior to performing the physical audit, the evaluator should contact the Authorized User and schedule a time to walk through the laboratory.

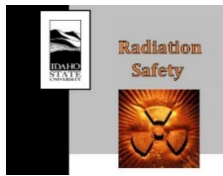
8.1. Preliminary Steps (Records Verification)

Review the Authorized Users permit paying specific attention to the permitted radionuclide(s), activities, storage locations, assigned radiation detection instruments, and user and radiation safety survey frequencies. Select the appropriate RPR 50 form for the Authorized User.

- RPR 50A is for permits that only allow sealed sources (Section 8.2).
- RPR 50B is for permits that allow dispersible radioactive material (Section 8.3).
- RPR 50C is for the subcritical assembly on permit 72 (Section 8.4).

8.1.1. Inventory

- a. Verify the Authorized Users most recent semi-annual inventory was completed and that any discrepancies were addressed.
- b. Review the Authorized Users RPR-13F requests for material addition. If material has been added to the inventory since the last semi-annual inventory audit, select a few inventory items to verify during the laboratory walk-through. Note these items in the table on the RPR 50 form.
- c. Review the Authorized Users RPR-14 requests for RAM shipments and



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compare against current HPA inventory. If discrepancies exist, contact the Authorized User and remind them of their responsibility to arrange for removal of their inventory items, in accordance with RS-16, once material is no longer in their possession.

8.1.2. Leak Tests

- a. Review the Authorized Users Inventory for Leak Testable Sources.
- b. If leak testable sources are present, verify the test has been completed at the required frequency and the source was not leaking. Note the frequency and findings on the RPR 50 form.

8.1.3. Dosimetry

- a. Note on the RPR 50 form if dosimetry has been issued to the Authorized User and their laboratory workers. If necessary, review the subaccount assigned to the Authorized User in the Landauer database to view all assigned dosimeters.

8.1.4. Training Records

- a. Contact the Authorized User for a list of all current laboratory workers.
- b. Verify the Authorized User and laboratory workers have completed the radiation safety training within the last 12 months by searching for each individual in the Active Training Records spreadsheet.
- c. If applicable, update radiation worker records as specified in RS-18, Radiation Safety Training Record Management.

8.1.5. Surveys

- a. Review the last radiation safety department survey to ensure it was performed at the required frequency, as specified in the Authorized Users permit, and to identify any follow-up issues.

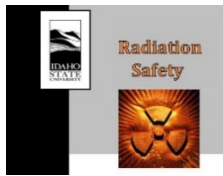
8.1.6. Instruments

- a. Review the instrument(s) assigned to the Authorized User in HP Assist match the instrument types specified in the permit and are in calibration.

8.2. Radiation Laboratory Evaluations – RPR 50A: Sealed Sources

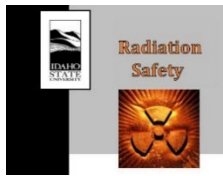
8.2.1. Postings, Labels, and Signs

- 8.2.1.1. Visually inspect the entrance door postings and ensure the following postings are present, in good condition, and up to date.
 - a. Chimera Signs (or equivalent)
 - b. NRC Form 3 English and Spanish (most current revision)



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- c. Documents Notice
 - d. Radiation Safety Call List
 - e. Caution Radioactive Materials or Caution X-ray Generating Devices (or equivalent) sticker is on the entrance door.
 - f. NRC enforcement actions are posed as applicable.
- 8.2.1.2. Verify that radioactive material storage areas are labeled with a Caution Radioactive Materials sticker and a current posting identifying the non-exempt inventory and dose rates as applicable.
- 8.2.1.3. Verify the most recent radiation safety survey is posted.
- 8.2.2. Facilities
- 8.2.2.1. Verify that work areas are uncluttered and adequate for approved procedures.
- 8.2.3. Material Use and Handling
- 8.2.3.1. Verify that gloves, lab coats, and other PPE are available and in-use when appropriate. i.e., gloves are worn when handling leak testable sources.
- 8.2.3.2. Verify that proper laboratory etiquette is being followed. i.e., no eating, drinking, chewing; no open-toed shoes, skirts or shorts worn by laboratory workers handling radioactive material(s).
- 8.2.3.3. If dosimetry has been issued, verify that it is being worn and stored appropriately.
- 8.2.3.4. Verify that shielding and long reach tools are available if necessary.
- 8.2.3.5. Verify the Authorized User has implemented specific radiation safety procedures for performing work in their laboratory.
- 8.2.4. Material Accountability and Security
- 8.2.4.1. Verify that all radioactive materials are labeled properly with a serial number, HP Assist ID, or Exempt Quantity (EQ) as specified in RS-16.
- 8.2.4.2. Verify that source sign out forms, as specified in RS-23, are present and in-use at each storage location.
- 8.2.4.3. Verify that all materials are stored behind a locked single or double-barrier as required by the Section 9.4, Security of Radioactive Material of the RSM.
- 8.2.4.4. Ensure that the laboratory entrance doors are locked when unattended.
- 8.2.4.5. Verify that no discrepancies exist between the HPA inventory and the inventory present in the laboratory. If discrepancies exist, note them in the comments section on the RPR 50 form.



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8.2.5. Records

- 8.2.5.1. Verify response check logs for assigned radiation detection instruments. Ensure the instruments are ranged in accordance with RS-24 and response check records exist and coincide with the radioactive material use logs.
- 8.2.5.2. Verify the Authorized User has laboratory specific training records for all laboratory workers.

8.2.6. Instrumentation

- 8.2.6.1. Verify that all issued radiation detection instruments are within calibration, source checked prior to use, and in working condition.

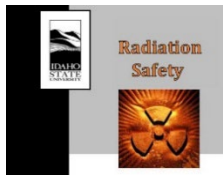
8.3. Radiation Laboratory Evaluations – RPR 50B: Dispersible RAM

8.3.1. Postings, Labels, and Signs

- 8.3.1.1. Visually inspect the entrance door postings and ensure the following postings are present, in good condition, and up to date.
 - a. Chimera Signs (or equivalent)
 - b. Current revision of the NRC Form 3 – Notice to Employees (English and Spanish)
 - c. Documents Notice
 - d. Radiation Safety Call List
 - e. Caution Radioactive Materials or Caution X-ray Generating Devices (or equivalent) sticker is on the entrance door.
 - f. NRC enforcement actions are posted as applicable.
- 8.3.1.2. Verify that radioactive materials storage areas are labeled with a Caution Radioactive Materials sticker and a current posting identifying the non-exempt inventory and dose rate as applicable.
- 8.3.1.3. Verify the most recent radiation safety survey is posted and was performed at the required frequency.

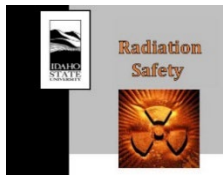
8.3.2. Facilities

- 8.3.2.1. Verify that work areas are uncluttered and adequate for approved procedures.
- 8.3.2.2. Verify that trays, secondary containers, and absorbent paper is in use when appropriate.
- 8.3.2.3. Verify that radioactive material use areas are properly marked with ‘radioactive materials’ tape.



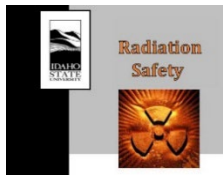
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- 8.3.2.4. If the laboratory contains a fume hood, verify that the fume hood has been certified within the last 12 months and that it is clean and free from clutter or obstructions.
- 8.3.2.5. If the laboratory contains vacuum systems used with radioactive materials, ensure they are correctly filtered.
- 8.3.3. Material Use and Handling
- 8.3.3.1. Verify that gloves, lab coats, and other PPE are available and in-use when handling dispersible radioactive materials or leak testable sources.
- 8.3.3.2. Verify that proper laboratory etiquette is being followed. i.e., no eating, drinking, chewing; no open-toed shoes, skirts or shorts worn by laboratory workers handling radioactive material(s).
- 8.3.3.3. Verify that researchers are practicing ALARA controls appropriately.
- 8.3.3.4. If dosimetry has been issued, verify that it is being worn and stored appropriately.
- 8.3.3.5. Verify that shielding and long reach tools are available if necessary.
- 8.3.3.6. Verify the Authorized User has implemented specific radiation safety procedures for performing work in their laboratory.
- 8.3.3.7. Verify user surveys are performed after handling dispersible radioactive material(s) daily surveys and formal map surveys.
- 8.3.4. Material Accountability and Security
- 8.3.4.1. Verify that all radioactive materials are labeled properly with a serial number, HP Assist ID, or Exempt Quantity (EQ) as specified in RS-16.
- 8.3.4.2. Verify that source sign out logs, as specified in RS-23, are present and in-use at each storage location.
- 8.3.4.3. Verify that all materials are stored behind a locked single or double-barrier as required by the Section 9.4, Security of Radioactive Material of the RSM.
- 8.3.4.4. Ensure that the laboratory entrance doors are locked when unattended.
- 8.3.4.5. Verify that no discrepancies exist between the HPA inventory and the inventory present in the laboratory. If discrepancies exist, note them in the comments section on the RPR 50 form.
- 8.3.5. Records
- 8.3.5.1. Verify that radioactive material use and user surveys are recorded after handling dispersible radioactive material(s).
- 8.3.5.2. Review materials handled in the laboratory logbook, if greater than 200 ALI per day, ensure air sampling or bioassay performed and recorded as specified in RS-11.



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- 8.3.5.3. Verify response check logs for assigned radiation detection instruments. Ensure the instruments are ranged in accordance with RS-24 and response check records exist and coincide with the radioactive material use logs.
- 8.3.5.4. Verify the Authorized User has laboratory specific training records for all laboratory workers.
- 8.3.6. Instrumentation
- 8.3.6.1. Verify that all issued radiation detection instruments are within calibration and in working condition.
- 8.3.7. Radioactive Waste
- 8.3.7.1. Verify that radioactive waste generated by the laboratory is being stored and segregated as specified in RS-19. Each waste container must be labeled with the appropriate “Radioactive Waste” sticker and must have a waste addition log.
- 8.3.7.2. Verify waste containers and clear plastic bags from radiation safety being used.
- 8.3.7.3. Verify that liquid radioactive waste is stored in a secondary containment and properly labeled.
- 8.3.7.4. If mixed waste is present in the laboratory, verify the Authorized User has obtained written permission from the RSO to generate mixed waste.
- 8.4. Evaluations of Sub-Critical Assembly Operations
- 8.4.1. As part of the inspection of Permit 72, ensure proper implementation of the Subcritical Assembly Procedure for the Idaho State University Reactor. If possible, evaluate an SCA operation during the operation using the RPR-50C form. For each operation of the sub-critical assembly, verify the following items on the RPR-50C form.
- 8.4.2. Operation was approved by the reactor administrator.
- 8.4.3. Reactor personnel handling the fuel plates wore Ta dosimeters and laboratory students and visitors wore pencil dosimeters or equivalent as specified in the subcritical assembly procedure.
- 8.4.4. Fuel plates were handled with gloves.
- 8.4.5. One qualified SCA operator and one certified observer were present at a minimum.
- 8.4.6. Rigging equipment inspected and inspection recorded in the SCA log.
- 8.4.7. Instruments source checked per RS-24, Instrument Response Checks.



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- 8.4.8. Radiation safety monitoring equipment recorded in the project log (make, model, serial, calibration due date) for neutron meter, ion chamber, alpha contamination monitor, and GM frisker.
- 8.4.9. Neutron source signed out on appropriate source sign out sheet in accordance with Procedure RS-23, Radioactive Material Sign Out.
- 8.4.10. Source handled in accordance with Administrative Procedure # 5, Reactor Significant Source Handling.
- 8.4.11. Experiment recorded in the logbook.
- 8.4.12. Verify for each set of fuel added to the SCA:
 - 8.4.12.1 Fuel elements signed out on the double barrier log.
 - 8.4.12.2 Dose rate measurements for gamma and neutron performed on the SCA tank and recorded in the SCA logbook.
 - 8.4.12.3 Gamma exposure rated measured on raised fuel assembly and recorded in the SCA log.
- 8.4.13. Experiment ending recorded in the SCA log.
- 8.4.14. Source returned to storage and signed in on the source sign out sheet.
- 8.4.15. Leak test survey performed and recorded on the SCA leak test survey form for ten percent of the fuel plates used.
- 8.4.16. Map survey performed in accordance with Procedure RS-03, Radiological Surveys.
- 8.4.17. Water sample collected and results attached to the map survey.
- 8.4.18. All fuel plates signed in to the cabinet on the double barrier log.

9. LIST OF FORMS

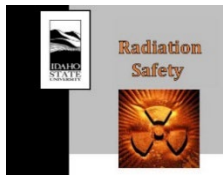
RPR 50A- Sealed Source Radiation Laboratory Evaluation

RPR 50B- Dispersible Ram Laboratory Evaluation Form

RPR 50C- Evaluation of SCA Operations Form

10. REFERENCES

None.



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11. CHANGE HISTORY

None.

12. APPENDICES

None.