



Radiation Safety



RADIATION PROCEDURES MANUAL

Procedure Cover Sheet

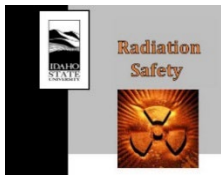
Procedure Title: Sealed Source Leak Test

Procedure Number: RS-04 Rev.1

Effective Date: 07/30/2021

Approved By: Radiation Safety Committee

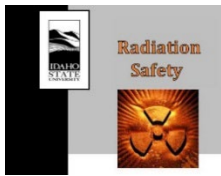
Date: 07/01/2021



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Revision History

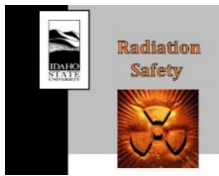
Revision Number	Author Name	Date	Approved by/date
RS 4.0	Mason Jaussi & John Longley	01/04/21	RSO-01/04/21
RS 4.1	Mason Jaussi & John Longley	07/01/21	RSC-07/01/21
RS 4.1	Mason Jaussi	9/1/2023	RSC-07/01/21



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1. INTRODUCTION

The Idaho State University Radiation Safety Manual Section 9.9 requires that certain sealed sources of radioactive material be tested for leakage at regular intervals to verify the integrity of the source containment. Leak tests are performed by the Radiation Safety Department routinely as outlined in this procedure.

2. PURPOSE

This procedure provides instructions for performing leak tests on applicable sealed sources in accordance with the requirements of the ISU Radiation Safety Manual.

3. SCOPE

Sealed radioactive sources that meet any of the following criteria are required to be leak tested at the specified frequency:

- Alpha sources greater than 10 μCi are to be leak tested every three months or at the frequency specified in the respective Sealed Source and Device Registration certificate.
- Beta/gamma sources greater than 100 μCi are to be leak tested every six months or at the frequency specified in the respective Sealed Source and Device Registration certificate.
- Sources in storage are to be leak tested every 10 years.
- Sources removed from storage prior to use.

4. ROLES AND RESPONSIBILITIES

Radiation Safety Officer (RSO)

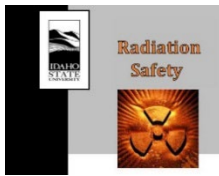
- Revise and maintain this procedure.
- Monitor inventory and leak tests of sealed sources.
- Review and approve leak test report.

Authorized Users (AU)

- Maintain annual radiation safety training.
- Maintain records and proper storage of all radioactive material.

Radiation Workers

- Maintain annual radiation safety training.
- Read and understand this procedure.
- Complete the appropriate qualification of this procedure under the direction of Radiation Safety Department personnel.



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- Perform the leak testing of sources as directed by the Radiation Safety Department.

5. ACRONYMS/DEFINITIONS

ARSO: Assistant Radiation Safety Officer
AU: Authorized User
DPM: Disintegrations per Minute
ISU: Idaho State University
LSC: Liquid Scintillation Counter
MDA: Minimal Detectable Activity
PPE: Personal Protective Equipment
RSO: Radiation Safety Officer

6. REQUIRED MATERIAL(S)

- Dose rate instruments (photon and neutron as necessary)
- PPE (gloves)
- Long-handled swabs
- Long-reach tool (e.g., forceps, tongs) as applicable
- List of sources to be leak tested
- Pen
- Whole-body dosimeter
- Ring dosimeter

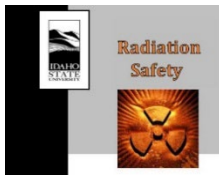
7. REQUIRED TRAINING(S)

- ISU Radiation Safety Training

8. PROCEDURE

8.1. Preparation

- 8.1.1. Obtain the list of sources to be leak tested from the Radiation Safety Officer. The RSO will perform a query of the HPAssist Database to determine if any sources have been received in the last six months that meet the leak test criteria and update the list accordingly.
- 8.1.2. Obtain a response checked dose rate meter(s) to use while near source storage areas to quantify the dose rate field.



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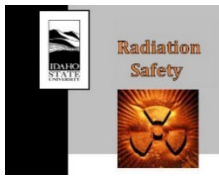
- 8.1.3. Prepare enough swabs to survey each source.
- 8.1.4. Wear a ring dosimeter, under a glove, on the hand expected to receive the most dose with the detector facing the palm when ready to perform leak tests.
- 8.1.5. Prepare and label a swab (LSC vial) for each source to be tested. Include enough data to associate each swab with the source.

8.2. Leak Testing

- 8.2.1. Determine the dose rate of the source storage area by placing the dose rate meter(s) near the storage area and where you can visibly read the response.
- 8.2.2. Find the sources to be leak tested by matching identifier numbers (i.e. serial number and/or HPAssist number).
- 8.2.3. When the source to be leak tested is identified, take the pre-labeled swab (LSC vial) and gently survey the source. See precautions below.
 - 8.2.3.1. Use a long-reach tool to hold high activity sources while performing the leak test. If the source needs to be held, use your gloved hand donned with a ring dosimeter. Do not hold large neutron sources.
 - 8.2.3.2. Perform the leak test in a way that will not scratch the source. For electroplated sources or sources with thin windows, survey the container and the material that contains the source rather than the source itself.
 - 8.2.3.3. For sealed sources in the microcurie range it is acceptable to directly survey the source itself.
 - 8.2.3.4. Return the leak tested source to the appropriate storage container and repeat these steps for each source.

8.3. Sample Counting

- 8.3.1. Leak test swabs are counted on an instrument sensitive enough to detect 0.005 microcuries (185 Becquerels) of the emitted radiation. Therefore, the instruments minimum detectable activity (MDA) must be less than 11,000 dpm for alpha and beta emissions. This will normally be done on the liquid scintillation counter to achieve 4π geometry for the swab samples.
- 8.3.2. Determine a background count rate and check the instrument's efficiency by running a standard check and comparing to the instruments control chart.
- 8.3.3. If any of the swab results appear to be contaminated above 11,000 dpm immediately notify the Radiation Safety Officer.
- 8.3.4. Compile the test results into the Leak Test Report template and submit it to the Radiation Safety Office for review.



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9. LIST OF FORMS

Master Leak Test Form (provided by the RSO/ARSO)
Leak Test Report Template

10. REFERENCES

None.

11. CHANGE HISTORY

None.

12. APPENDICES

None.