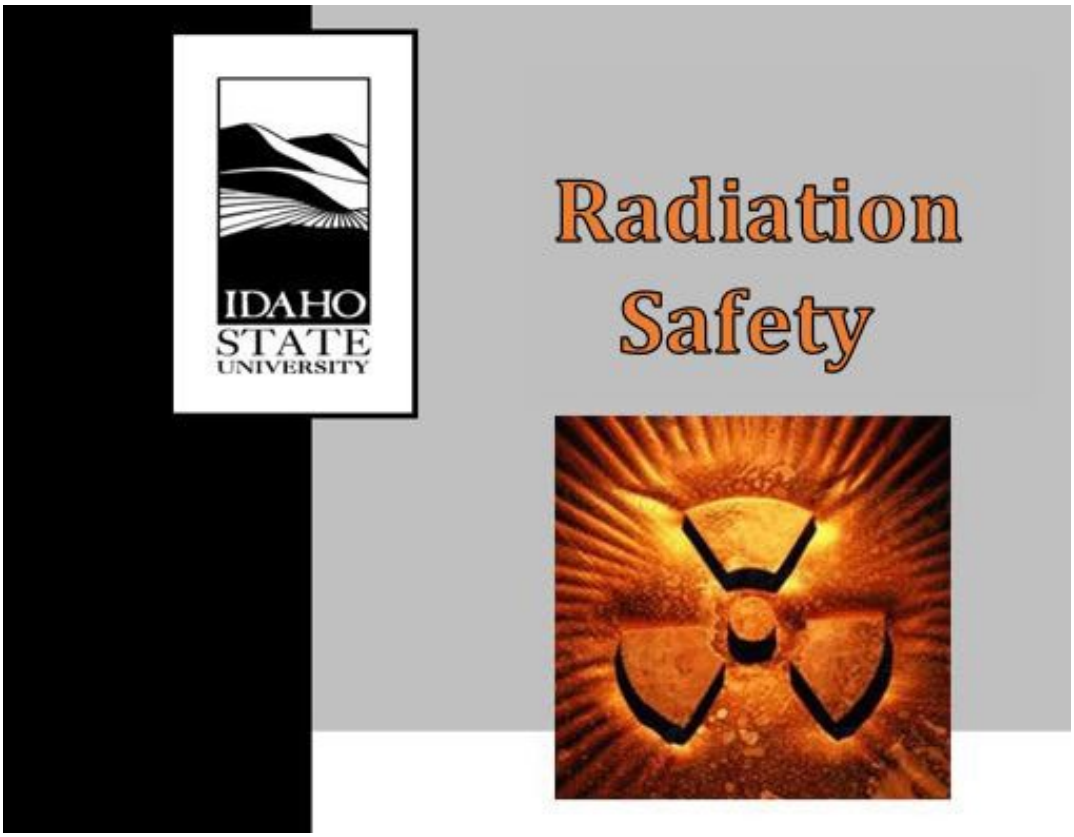

RADIATION PROCEDURES MANUAL

Procedure Cover Sheet

Procedure Title:	Instrument Response Check
Procedure Number:	RS-24 Rev.1
Effective Date:	10/17/2022

Approved By: Radiation Safety Committee Date: 10/06/2022

Revision History

Revision Number	Author Name	Date	Approved by/date
RS 24.0	Mason Jaussi & John Longley	06/20/20	RSO-06/22/20
RS 24.1	Brandon Jenkins	10/01/22	RSC-10/06/22
RS 24.1	Miranda Kriner	09/25/24	RSC-10/06/22

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1. INTRODUCTION

Idaho State University maintains a large number of radiation survey and area monitoring instruments. Calibration of these instruments is performed annually (12 ±2 months) in accordance with section 16.1 of the RSM, RS-12 Calibrations, and 10 CFR 20.1501(c). A response check is performed when an instrument is returned from calibration or when there is justifiable suspicion that it is not operating properly. Source checks are done daily or prior to use. All response and daily check information are recorded on the Instrumentation Performance Log (found on Google Sheets).

2. PURPOSE

The purpose of this procedure is to outline the steps to perform operational checks on radiation detection instruments and keep them in a proper functioning order.

3. SCOPE

The instruction in this procedure is to provide clear details on how to range and source check survey and area monitoring instruments prior to use. Step by step instructions will be outlined to demonstrate the proper method for response checks and daily source checks of instruments used at Idaho State University.

4. ROLES AND RESPONSIBILITIES

Radiation Safety Officer

- Maintain this procedure and applicable sections of the Radiation Safety Manual.

Authorized User

- Assist Radiation Workers when needed.
- Provide access to sources for response and daily checks.
- Verify that the Instrumentation Performance Log is properly filled out by the Radiation Workers.
- Develop methods for reproducible geometric configurations for response checks and daily source checks of exposure rate and contamination instruments at their respective locations.

Radiation Worker

- Maintain annual radiation safety training.

- Perform instrumentation checks per this procedure.
- Fill out the Instrumentation Performance Log.

5. ACRONYMS/DEFINITIONS

AU:	Authorized User
CFR:	Code of Federal Regulations
cpm:	Counts per minute
HV:	High Voltage
IPL:	Instrument Performance Log
mR/hr:	Milliroentgen per hour
PPE:	Personal Protective Equipment
RS:	Radiation Safety
RSM:	Radiation Safety Manual
Battery Check:	Verification that all batteries are properly working by either an analog check or a digital readout.
Contamination instrument:	An instrument used to detect radioactive contamination with units of counts per minute (e.g. 250 cpm).
Daily Check:	A combination of a source, physical, battery, and HV checks for an instrument; followed by adding the required information to the respective Instrumentation Performance Log.
Exposure Rate instrument:	An instrument that is designed and/or programed to measure an exposure or dose rate from an emitting source or field of beta, x-ray, gamma, and neutron radiation or a combination of them. (e.g. 53.6 mR/hr, 15.21 mrem/hr).
HV Check:	A high voltage check is performed by checking the HV range with either an analog check or digital readout.
Physical Check:	Observation of dents, breaks, cracks, punctures of a mylar window, or other forms of damage that may impact functionality.
Response Check (Ranging):	A series of counts are taken (usually ten), averaged and an acceptance range established.
Source Check:	Verifying that the instrument responds to a radioactive source within an established range.

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6. REQUIRED MATERIAL(S)

- Gloves (while handling check sources)
- Instrumentation Performance Log Google Sheet

7. REQUIRED TRAINING(S)

- ISU Radiation Safety Training

8. PROCEDURE

8.1. Instrument Performance Log

8.1.1. The IPLs are created in Google Sheets; an application that can be downloaded on most mobile devices including iOS, android, and windows. Sign in with your ISU school/work Gmail account and password (e.g., firstnamelastname@isu.edu).

8.1.2. A Radiation Safety staff member will grant access to the required IPL workbooks. The Radiation Safety staff will create two new IPL Google Sheet Workbooks for each facility or laboratory.

- The first IPL is the working copy and is used for response and daily checks. It will have a name with your facility or lab in it (e.g., IPL_CAES_MaCS).
- The second IPL is used for archiving sheets from the working copy and will have a similar naming structure (e.g., IPL_CAES_MaCS_ Archive).

8.2. Creating an IPL

8.2.1. Access the appropriate IPL Google Sheet.

8.2.2. Navigate to the “Template” sheet. Every IPL working copy will have this sheet.

8.2.3. Select the down arrow by the sheet name and select “Duplicate”. This will create a new sheet named “Copy of Template”.

8.2.4. Select down arrow next to rename the sheet using the serial number of the instrument associated with the new sheet e.g., 253741.

8.2.5. Enter the data for the instrument and source used for the daily check in the “Make/Model”, “Serial #”, “Response Unit”, “HV Unit”, “Calibration Due”, “Nuclide”, and “Source Number” cells.

NOTE: “Calibration Due” should be set to the first day of the month in which the calibration will be due. Also, if the source is an exempt source then put “EQ” for the source number. If the source is not an exempt source and does not have a source number have the AU contact the Radiation Safety Department.

8.2.6. Perform a Response Check and one Daily Check on the instrument before it is placed into service.

8.3. Archiving an IPL

The active IPL copy will be archived whenever there is a need to perform a Response Check on the instrument. Follow the steps below for archiving an IPL.

8.3.1. Navigate to the appropriate sheet. Using the arrow next to the sheet name, select copy sheet to existing spread sheet.

8.3.2. A new window will appear where an existing IPL sheet can be selected. Select the appropriate IPL Archive sheet.

8.3.3. Once the sheet is copied into the IPL Archive, navigate to the sheet just copied over and rename the sheet to the serial number of the instrument along with the month and year it was archived in parenthesis (e.g. 254561 (05-2022)).

8.3.4. Once the original sheet is successfully copied to the IPL Archive the “Date”, “HV Check”, “Measured Value”, “Performed By”, and “Response Check” data cells can be deleted in preparation for a new Response Check.

8.4. Response Check

A Response Check is required annually after calibration or prior to the instrument being put back into service. It may also be required after instrument maintenance or when an instrument’s check source has been changed. Response Checks should be performed in a low background area away from any radiation work.

8.4.1. Archive the previous working IPL following section 8.3

8.4.2. Update the “Calibration Due” date to the first day of the month one year from the calibrated date e.g., (01/2023). Do NOT use the calibration due date on the instrument. If the “Nuclide” and “Source Number” have changed, update appropriately.

8.4.3. Obtain the check source listed on the IPL of the instrument being checked or the source that is designated by the AU.

8.4.3.1. The authorized user will provide the appropriate check source and instructions on how to place the source in a reproducible geometric configuration in relation with the instrument to achieve a response that is within the response range.

8.4.4. Enter the date performed in the proper format. (e.g., 7-Mar-2022) in the “Date” cell at the top of the sheet directly under the “Response Check” cell.

8.4.5. Perform a physical, HV, and battery check prior to response checks, see Section 8.5 Steps 8.5.3 - 8.5.5.3. Record results during the daily check.

8.4.6. Collect ten consecutive measurements by removing the instrument/source each time and repositioning it into the proper configuration in relation to the instrument/source; then record the results on the IPL under the "Response Check" cell and next to the appropriately numbered run.

8.4.7. The average of the ten measurement results and the +/- 20% acceptance interval is generated in the log sheet.

8.4.8. Upon completion of a successful response check, perform a daily check.

8.5. Daily Check

Daily checks are performed on instruments prior to their first use, on a given day, to ensure the instrument is functioning and responding as expected. Daily checks are valid for a 24-hour period and should be performed in a low background area, if possible. For the best results take the instrument to the same area the Response Check was performed.

8.5.1. In the IPL, scroll down to the next available row and place today's date on the log sheet in the "Date" column.

8.5.2. Check the "Calibration End" date to ensure the instrument is within calibration. The log sheet is tracking when calibration is due and will change from "YES" to "DUE" thirty days before it should be sent for calibration, and "NO" when it is due for annual calibration.

NOTE: All instruments are calibrated every 12 ±2 months in accordance with section 16.1 of the Radiation Safety Manual.

8.5.3. Perform a physical check of the instrument.

8.5.3.1. The default is "Y" for yes

8.5.3.2. If the instrument does not pass the physical check, take the instrument out of service, and send it to the radiation safety office for repairs.

8.5.4. Complete a battery check.

8.5.4.1. The default is "Y" for yes.

8.5.4.2. Replace batteries as necessary.

8.5.5. When applicable, perform a HV check and record the value.

8.5.5.1. HV values should have little to no variation.

8.5.5.2. For faulty HV checks, take the instrument out of service and send it to the radiation safety office for repairs.

8.5.5.3. When not applicable, the default will be N/A.

8.5.6. Perform a count with the specified check source in the same geometric configuration as the response check.

8.5.7. Verify that the result of the count is within +/- 20% of the average value established from the response check. In the "Within Response" section a "YES" will appear if the value is within response.

8.5.7.1. If the value does not respond within the expected range, repeat the count and check again, making sure to double check all other steps of the daily check.

8.5.7.2. If the instrument continually does not respond properly, the instrument must have a new Response Check performed or the instrument must be taken out of service. Contact the Radiation Safety Department for assistance.

8.5.8. Enter your initials on the Instrumentation Performance Log.

8.5.9. Verify that all information is accurate.

8.5.10. When all information is recorded, and the instrument has passed all checks, the instrument is ready for use. The daily check is only valid for a 24-hour period, after the time frame, another Daily Check must be done.

8.5.11. Properly store the source used for the daily check.

9. LIST OF FORMS

Instrumentation Performance Log Google Sheet

10. REFERENCES

None.

11. CHANGE HISTORY

Revision 1 – Reformatted in accordance with RS-27 and revised the creation and archiving of IPL sections for clarity.

12. APPENDICIES

None.