

**WORCESTER POLYTECHNIC INSTITUTE
HEALTH PHYSICS PROCEDURE HP-15**

**INSPECTION AND SURVEY OF RADIOACTIVE
MATERIAL PACKAGES**

1. PURPOSE:

To determine the integrity of radioactive material shipments received at WPI.

2. FREQUENCY:

If the package was received during normal working hours, the RSO, ARSO, or Approved Surveyor will respond within 2.5 hours to ensure the survey is completed within 3 hours of package receipt (105 CMR 120.246.C), then take the package to the PI's lab. If the package was received after normal working hours, the RSO, ARSO, or Approved Surveyor will respond within 2.5 hours of the start of the next normal working day, survey the package, then take it to the PI's lab.

3. MATERIALS, TOOLS, AND EQUIPMENT:

3.1. Form(s):

3.1.1. Inspection and Survey of Radioactive Material Packages Form (HPF-7).
<http://www.wpi.edu/Admin/Safety/RSO/Forms/>

3.2. G-M tube portable survey meter.

3.3. Ion Chamber portable dose rate meter with mR/hr readout (i.e. Victoreen meter).

3.4. Filter paper or another appropriate absorbent material.

3.5. Gas-Flow proportional counter, liquid scintillation counter, or equivalent detection equipment.

4. PRECAUTIONS:

4.1. Ensure that all health physics practices are followed throughout the survey.

4.2. Take all necessary precautions to avoid the spread of possible contamination.

4.3. Perform an operability check on all instrumentation used. Ensure that the instrumentation has been calibrated within the proper time limit.

- 4.4. Utilize the concepts of time, distance, and shielding to maintain exposure as low as reasonably achievable.

5. INSTRUCTIONS:

- 5.1. Ensure that Health Physics Procedure HP-14 Purchasing and Receipt of Radioactive Material was performed correctly.
- 5.2. Package External Surface Monitoring: Monitor all external surfaces of the package (including the bottom of the box) for radiation levels using a portable Ion Chamber dose rate meter (i.e. Victoreen meter). When monitoring a beta-emitter, make sure the beta window is open on the bottom of the meter.
 - 5.2.1. Scan the external surfaces of the package. Measure the maximum surface exposure rate and record in HPF-7.
 - 5.2.2. If the maximum reading exceeds 200 mR/hr at any point on the external surface (105 CMR 120.785.I; 10 CFR 71.47.a), stop the procedure and immediately notify the RSO, the delivery carrier, and the DPH by phone at (617) 427-2913 (emergency) and fax (617) 427-2925 (105 CMR 120.246.D).
- 5.3. Contamination Survey of Packing Material and Packages: Monitor the packing material and packages for contamination before discarding using a G-M survey meter for most isotopes, or a liquid scintillation counter or gas proportional analyzer for tritium or transuranic isotopes not efficiently detected with a G-M meter:
 - 5.3.1. Survey all packing materials. Record the CPM in HPF-7.
 - 5.3.2. For isotopes where a GM detector is appropriate (not tritium or transuranic isotopes), if the G-M detector reading is $\geq 2X$ background, quantify the swipes using a gas proportional analyzer or equivalent detector:
 - 5.3.2.1. Use filter paper, or another suitable material of high wet strength and absorbent capacity. If necessary, moisten the filter paper with alcohol.
 - 5.3.2.2. Take each swipe using an S-shaped motion over an area of 300 cm² if possible (105 CMR 120.785.H.1).
 - 5.3.2.3. Record on the swipe container the location of each swipe.

- 5.3.2.4. If necessary, allow the swipes to dry prior to counting to prevent the shielding of alpha and beta radiation.
- 5.3.2.5. Use alpha and beta calibrated sources to calibrate the equipment prior to counting the swipes.
- 5.3.2.6. Take a background count.
- 5.3.3. If the amount of radioactivity measured on any swipe exceeds the levels of 105 CMR 120.785.H, TABLE III (i.e for a beta-emitter: 10 pCi/cm², 1000 pCi for a typical 10 x 10 cm swipe; or 22 dpm/cm², 2200 dpm for a typical 10 x 10 cm swipe) immediately notify the RSO, the delivery carrier, and the DPH by phone at (617) 427-2913 (emergency) and fax (617) 427-2925 (105 CMR 120.246.D). If contaminated, treat the package materials and the source container as radioactive waste, and discard in accordance with HP-16.
- 5.3.4. If not contaminated, obliterate radiation labels before discarding the package materials in the regular trash.
- 5.4. Contamination Survey of Source Container: Swipe the external surface of the final source container, and follow the procedures of 5.3.
 - 5.4.1. If contaminated, treat the source container as radioactive waste, and discard in accordance with HP-16.
 - 5.4.2. If radiation and contamination levels are found to be within the above stated limits in 5.3.3, the isotope shall be entered into the WPI radioisotope inventory, and the user shall be notified that the package may be picked up, or the package shall be delivered to the appropriate lab.
- 5.5. Sign and date HPF-7. Submit to RSO for approval.
- 6. RESTORATION: None.
- 7. REFERENCES:
 - 7.1. 105 CMR 120.246 and 10 CFR 20.1906. Procedures for Receiving and Opening Packages.
 - 7.2. 105 CMR 120.770. Transportation of Radioactive Material.

- 7.3. 105 CMR 120.785. Routine Determinations [for the Transportation of Radioactive Material].
- 7.4. 10 CFR 71.47. External Radiation Standards for All Packages.
- 7.5. WPI Radiation, Health and Safeguards Committee Radiation Regulations.
<http://www.wpi.edu/Admin/Safety/RSO/rhscregs.html>