

7. Operating Procedure

7.1 Procedure for Loading the Package

1. Ensure that the source is locked into place in its storage position. To check this, the lock should be in the down position, the key removed, and the shipping cap inserted and secured.
2. The storage plug should be properly inserted. (attach a tamper proof security seal with an identification mark to the storage plug).
3. Assure all the conditions of the Certificate of Compliance are met and the package has all the required markings.
4. If the shipping container is to be packaged in a crate or other outer packaging, the outer packaging must be strong enough to withstand the normal conditions of transport. These requirements are outlined in 10 CFR 71. The shipping container should be put in the outer package with sufficient blocking to prevent shifting during transportation.
5. Perform a radioactive contamination wipe test of the outer shipping package. This consists of rubbing filter paper or other absorbent material, using heavy finger pressure, over an area of 16 in.² (100 cm²) of the package surface. The activity on the filter paper should not exceed 0.001 uCi of removable contamination.
6. Survey the package with a survey meter at the surface and at a distance of one meter from the surface to determine the proper radioactive shipping labels to be applied to the package as required by 49 CFR 172.403. If radiation levels above 200 mR/hr at the surface or 10 mR/hr at 40 inches (1m) from the surface are measured, the container must not be shipped.
7. Complete shipment of the package according to proper procedures for transporting radioactive material as established in 49 CFR 171-178.

NOTE: The U.S. Department of Transportation, in 49 CFR 173.22 (c) requires each shipper of Type B quantities of radioactive material to provide prior notification to the consignee of the dates of shipment and expected arrival.

7.2 Procedure for Unloading the Package

The consignee of a package of radioactive material must make arrangements to receive the package when it is delivered. If the package is to be picked up at the carrier's terminal, 10 CFR 20.205 requires that this be done expeditiously upon notification of its arrival.

Upon receipt, survey the exposure device with a survey meter as soon as possible, preferably at the time of pickup and no more than three hours after it was received

during normal working hours. Radiation levels should not exceed 200 milliroentgen per hour at the surface of the exposure device, nor 10 miliroentgens per hour at a distance of 40 inches (1m) from the surface. Actual radiation levels should be recorded on the receiving report. If the radiation levels exceed these limits, the container should be secured in a Restricted Area, and the appropriate personnel notified in accordance with 10 CFR 20.

All components should be inspected for physical damage.

The radioisotope, activity, model number, and serial number of the source and the package model number and serial number should be recorded.

Opening and operation of the device will be performed in accordance with the operation manual supplied with the package in accordance with 10 CFR 71.89.

7.3 Preparation of an Empty Package for Transport

1. For shipment of an empty Gammatron, you must first assure there are no unauthorized source assemblies or cropped sources within the container, by performing the following procedure.
 - a) Remove the authorized source assembly from the Gammatron in accordance with the applicable operations manual for the storage device.
 - b) Hook up the controls to the device and place a survey meter at the rear of the device.
 - c) Remove the shipping plug and slowly crank the drive cable through the the device while observing the survey meter.

NOTE: If radiation levels increase or an obstruction is felt, immediately discontinue the test and secure the device. Contact Amersham Corporation for further instructions.
 - d) The drive cable should pass through the entire length of the S-tube and emerge from the lock box at the rear of the device.
 - e) At the conclusion of the test, disconnect the controls, insert the shipping plugs and attach an empty tag.
2. Assure that the levels of removable radioactive contamination on the outside surface of the outer package do not exceed 0.001 microcurie per 16 in.² (100 cm²).
3. When you have assured the Gammatron is empty, survey the device and prepare the package for transport depending upon the radiation levels obtained, as given in 49 CFR 173.

8. Acceptance Tests and Maintenance Program

8.1 Acceptance Tests

8.1.1 Visual Inspection

The package is visually examined to assure that the appropriate fasteners are properly secured. The package is inspected to assure that the required marking and labeling is securely attached to the package.

The seal weld of the radioactive source capsule is visually inspected for proper closure.

8.1.2 Structural and Pressure Tests

The swage coupling between the source capsule and cable of the source assembly is subjected to a static tensile test with a load of 100 lbs. (445N).

8.1.3 Leak Tests

The radioactive source capsule, which serves as the primary containment, is wipe tested for leakage of radioactive contamination and must be less than 0.005 microcuries of removable contamination. The source capsule is subjected to a vacuum bubble leak test. Failure of either of these tests will prevent use of this source assembly.

8.1.4 Component tests

The lock assembly of the package is tested to assure that the security of the source will be maintained. A simulated (dummy) source assembly is installed in the radiographic exposure device and the lockbox locked. The shipping plugs are installed and checked to be sure they are attached securely to the device. Failure of either of these two tests will prevent use of the package until the cause of the failure is corrected and retested.

8.1.5 Tests for Shielding Integrity

With the package containing a source assembly, the radiation levels at the surface of the package and at 40 inches (1m) from the surface of the package are measured using a small detector survey instrument. These radiation levels, when extrapolated to the rated capacity of the package, must not exceed 200 milliroentgens per hour at the surface of the package nor 10mR/hr at 40 inches (1m) from the surface.

8.1.6 Thermal Acceptance Tests

Not applicable.

8.2 Maintenance Program

8.2.1 Structural and Pressure Tests

Not applicable.

8.2.2 Leak Tests

As described in section 8.1.3, the radioactive source assembly is leak tested at manufacture and must be less than 0.005 microcuries of removable contamination. Additionally, the source assembly is wipe tested for leakage of radioactive contamination every six months with the same acceptance criteria.

8.2.3 Subsystem Maintenance

The lockbox assembly is tested as described in section 8.1.4 prior to each use of the package. Additionally, the package is inspected for tightness of fasteners, proper seal wires, and general condition before each use. The device must be inspected at intervals not to exceed three months as given in Section 8.2.7.

8.2.4 Valves, Rupture Discs, and Gaskets on Containment Vessel

Not applicable.

8.2.5 Shielding

Prior to each use, a radiation survey of the package is made to assure that the radiation levels do not exceed 200 milliroentgens per hour at the surface nor 10 milliroentgens per hour at 40 inches (1m) from the surface.

8.2.6 Thermal

Not applicable.

8.2.7 Miscellaneous

Inspections and tests designed for secondary users of this package under the general license provisions of 10 CFR 71.12(b) are included in Appendix A.

Appendix A

8.2 Maintenance

It is recommended that inspection and maintenance of the Gammatron exposure devices be performed at intervals not to exceed three months.

Exposure Device

Survey the entire circumference of the device to assure that the radiation levels do not exceed 200 milliroentgen per hour at the surface or 10 milliroentgen per hour at three feet from the surface.

To perform maintenance on the exposure device, the source assembly must be removed and replaced in a source changer following the appropriate operating instructions for the source changer.

When the exposure device is empty, a tube wipe should be performed to check for contamination. To clean the "S" tube run a cloth soaked in mineral spirits (or equivalent) through it several times. Dry the "S" tube by running a dry cloth through the tube.

The lock assembly should be removed and cleaned in mineral spirits (or equivalent). Inspect all parts for excessive wear or damage and replace if necessary. Lightly grease all moving parts at their contact surfaces with Texaco Unitemp grease. Replace lock and secure with two 8-32 set screws.

Assure that the female threaded fittings on the exposure device are free of any dirt or sludge buildup. These should be cleaned with chloroethene and then allowed to dry.

Inspect the source outlet nipple by first removing the safety plug. The outlet nipple should be round and smooth so that it will match with the inner diameter of the source tube. If the outlet nipple is out of round or broken return unit to AMERSHAM for repair.

Inspect labelling on exposure device. The warning labels and source identification tags should be clean and legible.