Emergency Procedures for the Calibration of Survey Equipment

RSA Laboratories
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1.0 Purpose

RSA Laboratories is licensed to calibration of radiation survey equipment. This document provides procedures and guidance in the event of an emergency. This supplements the general procedures for calibrating instruments and the guidance given in NUREG 1556, Vol 18, Rev. 1 Appendix F, "Radiation Monitoring Instrument Specifications and Model Radiation Survey Instrument and Air Sampler Calibration Program."

2.0 Safety

2.1 Personal dosimetry must be worn at all times when working with licensed material sources.

2.2 Use time, distance, and shielding to minimize radiation exposure. Perform work as expeditiously as possible.

3.0 General Information

Calibration of survey equipment involves the use of sealed radioactive sources. These can be relatively low-activity sources (up to a few microcuries) to the higher-activity sources used in exposure rate calibration containing many tens of millicuries. Several different isotopes are used in determining detector efficiency, while exposure rate calibrations are performed using Cs-137.

4.0 Emergencies

All users of licensed radioactive materials should be familiar with these procedures before any emergency arises.

When an accident involving licensed radioactive materials occurs, address the greatest hazard first. Lifesaving measures always take precedence over decontamination or other concerns. Advise personnel working nearby of any hazard or accident as soon as possible and prevent them entering the hazardous area. Notify RSO at telephone 860-885-9871 if an incident occurs.

4.1 Spills

4.1.1 Inform the occupants of the laboratory about the spill.

4.1.2 Put on protective clothing, such as shoe covers, and gloves before starting containment and clean up of the spills.

4.1.3 Cover the spill with absorbent material as quickly and as completely as possible to prevent spreading. To localize the contamination, wipe inward toward the center of the spill. Do not wipe back and forth or in a random fashion.

4.1.4 Have someone who is not contaminated call the RSO immediately.

4.1.5 If you leave the contaminated area, remove your gloves, shoes, and laboratory coat; segregate them as radioactive waste before leaving the laboratory.

4.1.6 After removing protective clothing, wash all contaminated areas of skin thoroughly, **without vigorous scrubbing,** with cool water and mild soap for five to ten minutes. Do this as soon as possible after the accident.
4.1.7 Remember also to **remove all clothing that may have been contaminated**.
4.1.8 Take care not to recontaminate yourself after you have thoroughly washed.
4.1.9 Do not leave the area until the RSO has determined that you have been successfully decontaminated.

4.2 Fire

4.2.1 For any fire involving serious injuries, call 911. Do not delay. Tell the dispatcher that radioactive material is involved
4.2.2 Call the RSO.
4.2.3 Try to extinguish the fire without risking the safety of personnel.
4.2.4 Avoid spreading the contamination.
4.2.5 Do not continue work in the laboratory without RSO approval.

4.3 Explosion

4.3.1 For any accident involving serious injuries, first call 911. Do not delay. Inform the dispatcher that the accident involves radioactive material.
4.3.2 Perform any lifesaving and first-aid measure that you can. There may be a significant amount of time before the Hazardous Material (HAZMAT) unit of the Emergency Medical System can get to the accident.
4.3.3 Turn off all fume hoods and ventilation where possible.
4.3.4 If possible, evacuate the area of the explosion. Restrict contamination to the area by removing your gloves, shoes, and laboratory coats before leaving.
4.3.5 Wash all contaminated areas of skin thoroughly, **without vigorous scrubbing,** with cool water and mild soap for five to ten minutes. Do this as soon as possible after the accident.
4.3.6 Flush any superficial wound thoroughly with cool water and cover with a sterile dressing.
4.3.7 Remember also to **remove all clothing that may have been contaminated.**
4.3.8 Take care not to recontaminate yourself.
4.3.9 Do not leave the area until the RSO has determined that you have been successfully decontaminated.

4.4 Accidents Involving Large Sources

4.4.1 If there is any reason to suspect that a large source is unshielded or leaking in any way, you should immediately evacuate all personnel to a safe area.
4.4.2 Contact the RSO.

Operating and Emergency Procedures for Leak Testing and Analysis of Leak Test Samples

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1.0 Purpose

RSA Laboratories is licensed to perform source leak testing and analyze leak test samples. This document provides operating and emergency procedures for performing these actions. This supplements the general procedure NUREG 1556, Vol 18, Rev. 1, Appendix G, "Model Leak Test Program."

2.0 Safety

2.1 Personal dosimetry must be worn at all times when working with licensed material sources.

2.2 Use time, distance, and shielding to minimize radiation exposure. Perform work as expeditiously as possible.

3.0 General Information

Leak tests must b

4.0 Emergencies

All users of licensed radioactive materials should be familiar with these procedures before any emergency arises.

When an accident involving licensed radioactive materials occurs, address the greatest hazard first. Lifesaving measures always take precedence over decontamination or other concerns. Advise personnel working nearby of any hazard or accident as soon as possible and prevent them entering the hazardous area. Notify RSO at telephone 860-885-9871 if an incident occurs.

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4.1.2 Put on protective clothing, such as shoe covers, and gloves before starting containment and clean up of the spills.

4.1.3 Cover the spill with absorbent material as quickly and as completely as possible to prevent spreading. To localize the contamination, wipe inward toward the center of the spill. Do not wipe back and forth or in a random fashion.

4.1.4 Have someone who is not contaminated call the RSO immediately.

4.1.5 If you leave the contaminated area, remove your gloves, shoes, and laboratory coat; segregate them as radioactive waste before leaving the laboratory.

4.1.6 After removing protective clothing, wash all contaminated areas of skin thoroughly, **without vigorous scrubbing,** with cool water and mild soap for five to ten minutes. Do this as soon as possible after the accident.

4.1.7 Remember also to **remove all clothing that may have been contaminated**.

4.1.8 Take care not to recontaminate yourself after you have thoroughly washed.

4.1.9 Do not leave the area until the RSO has determined that you have been successfully decontaminated.

4.2 Fire

4.2.1 For any fire involving serious injuries, call 911. Do not delay. Tell the dispatcher that radioactive material is involved
4.2.2 Call the RSO.
4.2.3 Try to extinguish the fire without risking the safety of personnel.
4.2.4 Avoid spreading the contamination.
4.2.5 Do not continue work in the laboratory without RSO approval.

4.3 Explosion

4.3.1 For any accident involving serious injuries, first call 911. Do not delay. Inform the dispatcher that the accident involves radioactive material.
4.3.2 Perform any lifesaving and first-aid measure that you can. There may be a significant amount of time before the Hazardous Material (HAZMAT) unit of the Emergency Medical System can get to the accident.
4.3.3 Turn off all fume hoods and ventilation where possible.
4.3.4 If possible, evacuate the area of the explosion. Restrict contamination to the area by removing your gloves, shoes, and laboratory coats before leaving.
4.3.5 Wash all contaminated areas of skin thoroughly, **without vigorous scrubbing,** with cool water and mild soap for five to ten minutes. Do this as soon as possible after the accident.
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4.4 Accidents Involving Large Sources

4.4.1 If there is any reason to suspect that a large source is unshielded or leaking in any way, you should immediately evacuate all personnel to a safe area.
4.4.2 Contact the RSO.

5.0 Procedure

5.1 Record the customer's (or Company) name, license number, the date leak test was taken, source or device (by manufacturer, model number, nuclide and activity), and the name of the individual who performed the leak test.
5.2 Select an area for the test near to where the source is located when not in its shielded housing. For example, this could be the outside of a shutter, a shutter operating arm, or tube through which the source passes. DO NOT disassemble the source housing. The surface area wiped should be representative of where, if the source were leaking, the contamination would likely end up.
5.3 Remove the cap from the vial containing a small amount of powdered EDTA. Use warm water to fill the vial about 2/3 of the way. Replace the cap and shake the vial until the EDTA dissolves.
5.4 Remove the cap. Dip one cotton swab into the solution. Remove excess liquid by pressing the swab on the lip of the vial. The swab should be DAMP, not saturated.

5.5 Rub the damp swab over the areas selected for the wipe test. Once completed, place the swab in the plastic bag marked WET & DRY.
5.6 Take a second cotton swab and keep it dry. Rub the swab over the same area sampled by the damp swab. Once completed, place the swab in the plastic bag marked WET & DRY and seal the bag.
5.7 Analyze the sample using a detector appropriate for the type of radiation to be measured, that has a minimum detectable activity well below the applicable limit of 0.005 µCi.
5.8 If the wipe test activity is 0.005 µCi or greater, notify the RSO so the source can be withdrawn from use and disposed of properly.
5.9 Retain leak test records for a minimum of three years.

Operating and Emergency Procedures for Storage and Transfer of Gadolinium-153 Sealed Sources from Customers

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1.0 Purpose

RSA Laboratories is licensed to install, remove, and service Gd-153 sources used in United Technologies DG-1 Density Gauge devices. This document provides procedures and guidance for the storage and transfer of these sources.

2.0 Safety

2.1 Personal dosimetry must be worn at all times when working with these sources.

2.2 Use time, distance, and shielding to minimize radiation exposure. Perform work as expeditiously as possible. Keep the source collimator/housing assembly pointed in a safe direction. Do not leave sources unshielded.

3.0 Emergencies

All users of licensed radioactive materials should be familiar with these procedures before any emergency arises.

When an accident involving licensed radioactive materials occurs, address the greatest hazard first. Lifesaving measures always take precedence over decontamination or other concerns. Advise personnel working nearby of any hazard or accident as soon as possible and prevent them entering the hazardous area. Notify RSO at telephone 860-885-9871 if an incident occurs.

3.1 Spills

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3.1.5 If you leave the contaminated area, remove your gloves, shoes, and laboratory coat; segregate them as radioactive waste before leaving the laboratory.

3.1.6 After removing protective clothing, wash all contaminated areas of skin thoroughly, **without vigorous scrubbing,** with cool water and mild soap for five to ten minutes. Do this as soon as possible after the accident.

3.1.7 Remember also to **remove all clothing that may have been contaminated**.

3.1.8 Take care not to recontaminate yourself after you have thoroughly washed.

3.1.9 Do not leave the area until the RSO has determined that you have been successfully decontaminated.

3.2 Fire

3.2.1 For any fire involving serious injuries, call 911. Do not delay. Tell the dispatcher that radioactive material is involved
3.2.2 Call the RSO.
3.2.3 Try to extinguish the fire without risking the safety of personnel.
3.2.4 Avoid spreading the contamination.
3.2.5 Do not continue work in the laboratory without RSO approval.

3.3 Explosion

3.3.1 For any accident involving serious injuries, first call 911. Do not delay. Inform the dispatcher that the accident involves radioactive material.
3.3.2 Perform any lifesaving and first-aid measure that you can. There may be a significant amount of time before the Hazardous Material (HAZMAT) unit of the Emergency Medical System can get to the accident.
3.3.3 Turn off all fume hoods and ventilation where possible.
3.3.4 If possible, evacuate the area of the explosion. Restrict contamination to the area by removing your gloves, shoes, and laboratory coats before leaving.
3.3.5 Wash all contaminated areas of skin thoroughly, **without vigorous scrubbing,** with cool water and mild soap for five to ten minutes. Do this as soon as possible after the accident.
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3.3.7 Remember also to **remove all clothing that may have been contaminated.**
3.3.8 Take care not to recontaminate yourself.
3.3.9 Do not leave the area until the RSO has determined that you have been successfully decontaminated.

3.4 Accidents Involving Large Sources

3.4.1 If there is any reason to suspect that a large source is unshielded or leaking in any way, you should immediately evacuate all personnel to a safe area.
3.4.2 Contact the RSO.

4.0 General Information

4.1 The Gd-153 sources most typically used contain 190 mCi of Gd-153. The activity is contained in a small active pellet in a double-encapsulated stainless steel housing. This capsule resides in a tungsten collimator/housing assembly.
4.2 Gd-153 has a half life of 240.4 days. It decays by electron capture, and principle gamma emissions are around 100 keV with x-rays between 14 and 49 keV.

5.0 Removal of Source from DG-1 Density Gauge

5.1 Ensure the source has been leak tested within the previous six months.
5.2 Cut and remove the sealed safety wire from the source bracket.
5.3 Remove the socket-head cap screw holding the source housing pin in place, and remove the source housing pin.
5.4 Remove the source collimator/housing assembly from the source bracket.

5.5 Place the collimator/housing assembly into a shielded container with the open end from the collimator facing down.

6.0 Transfer of Source

6.1 Seal the collimator/housing assembly within shielded container. Include padding as needed to secure.

6.2 Place the shielded container into a box meeting DOT general design requirements. Seal this box and mark "Radioactive."

6.3 Place the box into a larger shipping box meeting DOT general design requirements, and seal this container.

6.4 Perform a gamma survey of the entire exterior of this box and confirm that no radiation level at any point does not exceed 0.5 mrem/h (500 μrem/h).

6.5 Seal this box. Perform wipe survey and confirm no detectable removable contamination is present.

6.6 Apply labels with consignor and consignee address labels. Apply appropriate red-bordered label stating "UN 2910."

6.7 Complete a Bill of Lading for the shipment. Ensure that the shipment is described as:

UN 2910 Radioactive Material
Excepted Package – Limited Quantity of Material
Gd-153, Sealed Source, Solid
One (1) Container, meets general design requirements

7.0 Receipt of Source

7.1 Visually inspect package for damage and/or leakage. If damage is noted:

7.1.1 Perform a wipe test and evaluate it (it (<22 dpm/cm2 βγ or <2.2 dpm/cm2 α)

7.1.2 Perform a contact radiation survey (≤0.5 mrem/h)

7.1.3 If one or both of the above limits are exceeded, notify the RSO

7.1.3.1 Notify the final delivering carrier; survey the truck and driver for contamination or for a dose estimate.

7.1.3.2 Notify USNRC and USDOT

7.2 Open the outer package and remove the packing slip.

7.3 Open the inner package to verify the contents.

7.4 Notify the RSO if any discrepancies are found or anything unusual noted.

7.5 Survey packing material and packages for contamination before discarding. If contamination is found, treat as radioactive waste. If no contamination is found, obliterate or remove any radiation labels prior to discarding in regular trash.

7.6 Maintain records of receipt, package survey, and wipe test results.

8.0 Storage

8.1 Gd-153 sources shall be stored within a shielded container inside the Radioactive Materials Storage room.