STATE OF FLORIDA
DEPARTMENT OF HEALTH
BUREAU OF RADIATION CONTROL

# REGULATORY GUIDE

## *Regulatory Guide 1.10*

***Revision 6***

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### Instructions for Preparing Applications for Radioactive Materials Licenses Authorizing

## USE OF SEALED SOURCES IN PORTABLE GAUGING DEVICES

Regulatory guides are issued to describe and make available to the public acceptable methods of implementing specific parts of Chapter 64E-5, Florida Administrative Code ("State of Florida Control of Radiation Hazard Regulations") to delineate techniques used by the staff in evaluating specific problems or postulating accidents, or to provide guidance to applicants or licensees. Regulatory guides are not a substitute for regulations and compliance with them is not required unless specifically referenced in a radioactive materials license. Methods or solutions different from those set forth in the guides will be acceptable if they provide a basis for the Bureau of Radiation Control to make necessary determinations to issue, renew, amend, or terminate a license, or to establish standards of protection.

Guides are issued in the following six broad categories:

1) License Application Guides
2) Inspection and Enforcement
3) General Health Physics
4) Radioactive Waste
5) Transportation
6) General

Written comments and suggestions for improvements to regulatory guides are encouraged at all times. Guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience. Comments, or requests for single copies or issued guides (which may be reproduced) should be sent to: Department of Health, Bureau of Radiation Control, Radioactive Materials Program, 4052 Bald Cypress Way, Bin C21, Tallahassee, FL 32399-1741.

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# I. INTRODUCTION

## A. PURPOSE OF GUIDE

This guide contains instructions to prepare a radioactive materials license application. It is intended for applicants requiring licensure of the following portable gauging devices:

- Portable moisture/density gauges;
- X-ray fluorescence analyzers; and
- Other portable gauging devices.

Each of these devices contains radioactive material in the form of a sealed source. There are numerous designs and uses of portable gauging devices. The design of each is largely based on the intended use. These uses range from analyzing lead-in-paint to measuring the moisture and density of construction materials and soils.

This guide contains appendices and exhibits, which are model procedures and forms. As a whole, they represent the minimum information necessary to comply with the regulatory requirements. They also serve as the foundation for an effective radiation protection program. The model procedures are written to be stand-alone documents. Therefore, acronyms, abbreviations, and other information may be repeated.

This guide also contains supplements. They are intended to serve as resources for preparing the application. The supplements also provide additional information and resources, including training resources.

### License Type: General and Specific

There are two license types: general license and specific license. Certain concentrations, quantities, and items are exempt from the regulatory requirements and may be received without a general or specific license. For additional information concerning exempt concentrations, quantities, and items, review section 64E-5.203, Florida Administrative Code (F.A.C.).

A general license does not require the filing of an application with the department or the issuance of a licensing document, although the filing of a certificate with the department is required of certain users as specified in subsections 64E-5.206(7) and (8), F.A.C. The general license becomes effective upon receipt of the radioactive material. The distributor is required to notify Florida whenever radioactive material has been delivered to a Florida customer. While general licenses offer ease of acquisition, minimal documentation requirements and lower fees, they are subject to certain conditions, requirements, limitations and restrictions. For additional information concerning issuance of a general license or the various types of general licenses, review section 64E-5.204, F.A.C., and section 64E-5.206, F.A.C.

Radioactive materials whose nuclear properties, chemical and physical form, and activity present a greater health and safety hazard or are not otherwise permitted under a general license require issuance of a specific license. The specific license is a document issued to an applicant, authorizing a particular use of radioactive material. The license identifies the radioactive material, chemical and physical form, maximum activity and the purposes for which it may be used. Applicants must demonstrate that they have appropriately trained and qualified personnel, appropriate facilities, equipment and procedures to ensure safe operations. The fees for a specific license are significantly higher than a general license. The specific license application process is detailed, requiring establishment and implementation of a comprehensive radiation protection program.

Florida allows authorization for a general license to be included under a specific license. Applicants seeking to include authorization for generally licensed radioactive materials as part of their specific license must include a written request for general license authorization as part of their application; see section III.7. of this introduction for additional guidance. Once approved, authorization for generally licensed radioactive materials will be included as part of Items 6, 7, 8 and 9 of the license, and a general license condition describing requirements associated with generally licensed radioactive materials will be included in the license. This condition does not provide an exemption from compliance with the current regulatory requirements. Refer to Information Notice 2007-02, which summarizes additional requirements that were incorporated in Revision 6 to Part II, Subpart B, Chapter 64E-5, F.A.C., dated September 28, 2006.

This guide provides instructions for applicants seeking a specific license. Unless otherwise noted, when used in this guide, the term "license" refers to a specific license.

### Appendices, Exhibits and Supplements

Applicants must acquire and maintain appropriate facilities and equipment, have appropriately trained workers, and implement procedures that ensure compliance with regulatory requirements. This guide provides a set of appendices, exhibits and supplements to assist in the development of a radiation protection program.

- **Appendices** are model procedures that may be used to address regulatory requirements.
- **Exhibits** are samples of the types of documents or forms that must be submitted as part of the application, and in some cases, are model forms that may be used to satisfy regulatory requirements.
- **Supplements** include resources for preparing the application and additional resources and reference material.

Model procedures and forms may be adopted by submitting them as part of the license application, or may be used as guides for developing equivalent procedures and forms. Carefully review the regulations, model procedures and forms before deciding if the models are appropriate for the activities being requested.

**IMPORTANT NOTICE:**

The information provided in a license application must demonstrate that proposed equipment, facilities, personnel and procedures are adequate to protect public health and property in accordance with regulatory requirements. Submission of incomplete or inadequate information will result in delays in the license approval process. Additional information will be requested when necessary to ensure that an adequate radiation protection program has been established. Such requests will delay completion of the application review, and may be minimized by a thorough study of the regulations and this guide prior to submitting the application.

While adoption of the attached model procedures and forms should provide for a radiation protection program that complies with regulatory requirements, applicants may need to consider additional equipment, procedures and training that may be appropriate for the scope of their operations.

## B. APPLICABLE REGULATIONS

Florida is an Agreement State; it has an agreement with the U.S. Nuclear Regulatory Commission (NRC) to assume regulatory authority over most activities involving radioactive material within the state. With certain exceptions, the Department of Health (department), Bureau of Radiation Control (bureau) regulates the possession and use of radioactive material within Florida. Exceptions include nuclear power plants and federal agencies, and national security issues involving radioactive material, which remain under NRC jurisdiction.

Under authority of Chapter 404, Florida Statutes (the Florida Radiation Protection Act), the bureau issues licenses to users of radioactive material and performs inspections to ensure safe operations and compliance with Chapter 64E-5, Florida Administrative Code (F.A.C.), the department's radiation control regulations. Chapter 64E-5, F.A.C., is available on the Internet at http://www.doh.state.fl.us/environment/radiation. The bureau amends these regulations periodically. Licensees are notified of changes as they occur. When applicable, licensees will need to revise their safety programs to address changes in regulatory requirements.

The following portions of the regulations are applicable to the use of radioactive material in the form of sealed sources in portable devices and should be used in conjunction with these instructions:

**Part I** "General Provisions"

**Part II** "Licensing of Radioactive Materials"

**Part III** "Standards for Protection Against Radiation"

**Part IX** "Notices, Instructions and Reports to Workers; Inspections"

**Part XIII** "Radiation Safety Requirements for Possession and Use of Sealed or Unsealed Sources of Radioactive Materials"

**Part XV** "Transportation of Radioactive Materials"

Licensees engaging in transportation of radioactive materials or related activities are also subject to U.S. Department of Transportation (DOT) regulations, which are found in Title 49, Code of Federal Regulations (49 CFR), and are incorporated into Chapter 64E-5 by reference. DOT regulations are available on the Internet at http://www.access.gpo.gov/nara/cfr/cfr-table-search.html#page1 and can be ordered from the U.S. Government Printing Office by calling (866) 512-1800 or writing P.O. Box 37954, Pittsburg, PA 15250-7954, Attn: Superintendent of Documents.

## C. LICENSE REQUIREMENTS AND RESTRICTIONS

Licensees are required to confine use and possession of radioactive material to the locations and purposes authorized by the license. The license is divided into two sections: **Items** and **Conditions**, which are described below. The first section of the license lists Items 1 - 9. The remainder of the document lists the license conditions, which may vary in number based on the authorizations provided by the license, but always begin with Condition 10.

### License Items

| Item No. and Title | Description |
|---|---|
| **1. Name** | Lists the legal name of the licensee (individual or business). If the license is issued to a business, Item 1 must list the company's name as it is registered with the Florida Department of State, Division of Corporations; (800) 755-5111 or http://www.sunbiz.org/. If a business operates under another name, Item 1 must list both the registered name and the fictitious name it is doing business as (d/b/a). |
| **2. Address** | Lists the mailing address, which may be different from the physical address where records and portable gauging devices are stored. If the two addresses are different, the physical address must be listed in Condition 10; if they are the same, Condition 10 will reference the address listed in Item 2. |
| **3. License Number** | Lists the number assigned to the license by the bureau. The number should be referenced in all license-related correspondence. |
| **4. Expiration Date** | Lists the date the license is due to expire. A radioactive materials license is valid for 5 years from the date of issuance. A renewal application must be received by the bureau at least 30 days prior to the expiration date to ensure that the license remains valid. The bureau sends out reminder notices as the license nears its expiration date. |

| Item No. and Title | Description |
|---|---|

| | | |
|---|---|---|
| 5. | **Category** | Lists the license category: 3L(I). Activities involving possession and use of radioactive materials are divided into license categories. Portable gauging devices (i.e., portable moisture/density gauges, X-ray fluorescence analyzers, and similar devices) are covered under Category 3L(I). Organizations seeking to conduct more than one category of licensed activity must obtain separate licenses for each category of use. Refer to section 64E-5.204, F.A.C., or Regulatory Guide 6.20 for a complete listing of license types and fees. |
| 6. | **Radioactive Material** | Describes the type (element and mass number) of radioactive material the license authorizes for possession and use. Many portable gauging devices contain dual sources, so one device may list two sources under separate subitems. |
| 7. | **Form** | Describes the form of radioactive material the license authorizes for possession and use. Virtually all portable gauging and measurement devices use sealed sources, so the source manufacturer's name and model number are listed. |
| 8. | **Possession Limit** | Lists the maximum possession limit for radioactive sealed sources. In order to accommodate future business growth, a licensee may request authorization for a possession limit higher than the number of sources initially being obtained. Possession of more sources than authorized is a license violation and may result in enforcement actions. |
| 9. | **Use** | Describes the types of uses that are approved for the sources and devices listed in the previous items. Improper use of radioactive material is a license violation and may result in enforcement actions. |

License conditions describe requirements and limitations applicable to the radioactive materials authorized by the license. Additional requirements and conditions may be incorporated as appropriate to protect public health and the environment. If a licensee seeks added authorizations, supplementary license conditions may be added. All Category 3L(I) licenses contain conditions addressing the following:

- Authorized locations of use and storage
- Enforcement provisions
- Authorized User (AU) and Radiation Safety Officer (RSO) designations
- Radioactive material transfer limitations
- Radioactive material transportation requirements
- Enforcement provisions
- Part III and IX provisions
- Leak testing requirements
- Inventory requirements
- Licensee commitments

# II. FILING AN APPLICATION

## A. GENERAL

Chapter 64E-5, F.A.C., this guide, forms, and other guidance documents are available on the bureau website: http://www.doh.state.fl.us/environment/radiation.

An application for a specific license requesting authorization to possess and use portable gauging devices, must be submitted on Form DH-1054, "Application For Radioactive Materials License, Non-Human Use." The form is included as Supplement A of this guide, and is also available on the bureau website. Space provided on the application form is limited, so 8.5" x 11" paper should be used to append additional pages. Each page submitted with the application should be identified and keyed to the item number on Form DH-1054 to which it applies. Three copies of the application and all attachments must be submitted (original and two copies), with another copy retained by the applicant.

All application items must be addressed in sufficient detail to demonstrate that equipment, facilities, personnel qualifications and procedures are adequate to protect public health and safety or property. Complete and submit the table provided as Supplement B to this guide to indicate whether model or equivalent procedures and forms have been included in the application.

| Mail to: | If using an overnight delivery service, use: |
|---|---|
| Florida Department of Health<br>Bureau of Radiation Control<br>Radioactive Materials Program<br>4052 Bald Cypress Way, Bin C21<br>Tallahassee, FL 32399-1741 | Florida Department of Health<br>Bureau of Radiation Control<br>Radioactive Materials Program<br>4042 Bald Cypress Way, Rm. 220.09<br>Tallahassee, FL 32399 |

With the exception of security-related information, all license applications and documents submitted to the bureau are available for review by the general public. Do not submit proprietary information unless it is absolutely necessary for evaluation of the application. Any request for withholding documents is subject to a determination by the department as to whether the document may actually be withheld in accordance with applicable laws and regulations.

Personal information about employees should not be submitted unless it is necessary. Home addresses, home telephone numbers, dates of birth, and social security numbers should not be submitted unless the bureau specifically requests it.

When issued, the license will require that radioactive material be possessed and used in accordance with statements, representations and procedures provided in the application and supporting documentation (which are incorporated by referenced into the license). Regulatory requirements specified in Chapter 64E-5, F.A.C., shall govern unless the statements, representations and procedures set forth in the license application and correspondence are more restrictive than the regulations.

## B. LICENSE FEES

The following fees are assessed:

Application fee — A non-refundable fee for processing the license application. The amount is dependent on the category of license the applicant is seeking; refer to section 64E-5.204, F.A.C., or Regulatory Guide 6.20 for a description of application fees. Review of the application will not begin until the proper fee is received by the department. An application fee is also required to process an application for a new license replacing an existing license due to a change of ownership.

Annual fee — An annual fee covers department costs for administration of the materials licensing program. The amount is dependent on the license category. Refer to section 64E-5.204, F.A.C., or Regulatory Guide 6.20 for a description of annual fees. Annual fees are due within 60 days of issuance of the new license; an invoice for this fee is included with the cover letter accompanying a new license.

Reclamation fee — In addition to the application and annual fees, a reclamation fee will be assessed for the Radiation Protection Trust Fund, established to pay department costs associated with a licensee's abandonment of radioactive materials, default on lawful obligations, insolvency, or other inability to meet regulatory requirements, and to assure the protection of the public and environment. Reclamation fees are equal to 5% of the annual fee. Reclamation fees are due within 60 days of issuance of a new license; a fee invoice is included with the cover letter accompanying a new license.

Notes:
1. Annual and reclamation fees are assessed on the anniversary of the license issuance date. An invoice is sent to the licensee 30 days in advance of the due date.
2. Fees are not assessed for license renewals, amendment requests, licensing actions, inspections initiated by the department, license terminations, or requests for regulatory information (except for document copying costs).

# III. CONTENTS OF AN APPLICATION

This section provides instructions on completing each item listed in Form DH-1054.

## 1.a. NAME AND MAILING ADDRESS

List the name, mailing address, and telephone number of the individual or company to whom the license will be issued. If available, please include an e-mail address and fax number. An applicant corporation or other legal entity must be specified by legal name as registered with the Department of State, Division of Corporations. If a fictitious name is to be included, it will be identified as the name the applicant is doing business as (d/b/a) and must also be registered with the state Division of Corporations. For example, “ABC Corporation d/b/a ABC Enterprises of Florida.” Business registration should be verified by contacting the Division of Corporations at (800) 755-5111 or on the Internet at http://www.sunbiz.org/.

To assist in identifying the proper legal entity, applicants should also list their business’ Federal Employer Identification (FEI) or Document Number if known or applicable; the FEI or Document Number is available on the Division of Corporations website.

If the mailing address is different from where radioactive material will be used and/or stored and where license-related records will be maintained, list that address in Item 1.b.

## 1.b. STREET ADDRESS AT WHICH RADIOACTIVE MATERIAL WILL BE USED AND/OR STORED, IF DIFFERENT FROM 1.a.

Identify by street address any facilities or places of radioactive material use and/or storage other than described in Item 1.a. Do not list an address by post office box.

Use of temporary job sites should be requested by adding the statement ”at temporary job sites.” Use of licensed material at temporary job sites will become part of the license conditions. Each separate location of temporary use does not need to be specified so long as the job sites are used only for a single job lasting less than two years.

## 2.a. LICENSE FEE CATEGORY

Indicate the appropriate license fee category; for moisture/density gauges, XRF analyzers, and other portable devices, list category 3L(I). Refer to section 64E-5.204, F.A.C., or to Regulatory Guide 6.20 for a complete list.

## 2.b. LICENSE FEE ENCLOSED

Indicate the amount of the enclosed license application fee in the space that is provided. Refer to Section II.B., of this guide for a description of licensing fees.

## 3. THIS IS AN APPLICATION FOR:

Mark the appropriate choice; if submitting an amendment request or a renewal application, indicate the applicable radioactive materials license number.

## 4. INDIVIDUAL USERS

List each individual to be designated as an Authorized User (AU) of radioactive material (i.e., gauge operator) and attach a copy of their gauge training certificate. A portable gauging device license does not typically list the name of each AU. Instead, Condition 12 of the license typically states that "licensed materials shall be used by, or under the supervision and in the physical presence of, individuals who have successfully completed a training program for gauge users accepted by the department. . . ." Maintaining documentation of training (including valid training certificates) for each user on file for inspection purposes is required to demonstrate that personnel are adequately trained.

The training program (submitted as part of the radiation protection program under III.13.) must provide a commitment that all Authorized Users will complete either:

- An approved radiation safety course provided by a third party (portable gauging device manufacturer or another training provider), supplemented by training in the licensee's operating and emergency (O&E) procedures; or
- An approved in-house training program meeting the requirement of sections 64E-5.1307 and 64E-5.1312, F.A.C. If this option is chosen, a detailed description of the in-house training program must be submitted.

## 5. RADIATION SAFETY OFFICER (RSO)

Provide the name of the individual assigned the position of RSO. This person is designated by, and responsible to, management for the coordination of the radiation safety program and for ensuring compliance with the applicable regulations and license provisions. The RSO shall have sufficient training and experience to be an Authorized User of the requested radioactive materials. Attach a copy of the RSO's gauge operator training certificate.

## 6. TRAINING AND EXPERIENCE IN RADIATION SAFETY

### a. FORMAL TRAINING IN RADIATION SAFETY

Submit documentation of radiation safety training for each individual listed in Item 4 of the application. Restrict training documentation to relevant information; i.e., demonstrating that the individual has the radiation safety training and experience specific to the requested activities to be conducted. Appropriate training certificates such as those provided by portable gauging device manufacturers or other approved third parties are acceptable, but may need to be supplemented with documentation of completion of training in company operating and emergency (O&E) procedures (third party trainers typically do not provide training in specific O&E procedures). If seeking approval to conduct in-house radiation safety training, a detailed description of the training program must be submitted for review (refer to III.13 of this guide).

### b. EXPERIENCE

Describe any additional relevant work experience with radioactive materials indicating and include where the experience was obtained. Descriptions of experience are typically unnecessary unless seeking approval to act as an instructor for in-house radiation safety training.

Note: To prevent the potential for identity theft, never submit documentation that lists individuals' social security numbers or birth dates.

## 7. RADIOACTIVE MATERIAL

### a. ELEMENT AND MASS NUMBER

List each type of radioactive material requested.

### b. CHEMICAL AND/OR PHYSICAL FORM

Complete for each type of radioactive material requested. State the name of the source manufacturer and the source model number.

### c. MAXIMUM AMOUNT TO BE POSSESSED AT ANY ONE TIME

Complete for each radioactive material requested. Indicate the total number of sources and maximum activity per source.

Example:

| (a) | ELEMENT AND MASS NUMBER | (b) | CHEMICAL AND/OR PHYSICAL FORM | (c) | MAXIMUM AMOUNT TO BE POSSESSED AT ANY ONE TIME |
|---|---|---|---|---|---|
| 1. | Cesium 137 | | Sealed source (XYZ, Inc. Model 123 ) | | 2 sources; not to exceed 10 millicuries each |
| 2. | Americium 241: beryllium | | Sealed source (XYZ, Inc. Model 456 ) | | 2 sources; not to exceed 50 millicuries each |

If authorization for generally licensed sources or devices is sought, include a request for generally licensed sources and devices.

Example:

| (a) | ELEMENT AND MASS NUMBER | (b) | CHEMICAL AND/OR PHYSICAL FORM | (c) | MAXIMUM AMOUNT TO BE POSSESSED AT ANY ONE TIME |
|---|---|---|---|---|---|
| 3. | Radioactive material distributed to a general licensee per 64E-5.206(1) & (4), F.A.C. | | Sealed or contained source | | No single source to exceed that quantity authorized for the general license |

Note: Applicants seeking authorization for generally licensed sources and devices must comply with section 64E-5.1308, F.A.C., which describes requirements for generally licensed devices possessed under a specific license. Annual inspections/inventories must include the generally licensed sources, and the sources must be leak tested at the interval specified by the manufacturer.

## 8. PURPOSE FOR WHICH RADIOACTIVE MATERIALS LISTED IN ITEM 7 WILL BE USED

Complete for each radioactive material requested. Include the name of the manufacturer of the device or source holder in which each source is used or stored.

Example:

1. and 2. For use in XYZ Corporation Model 2000 moisture/density gauge(s) to measure properties of construction materials or soils.

If authorization for GL material, sources, or devices is requested, describe the intended use of the GL material, sources or devices.

Example:

3. To be used in devices approved for receipt under general license provisions.

**CURRENT INVENTORY**

Applicants for renewal of an existing license must include an inventory of all sealed sources and devices currently possessed. List all generally licensed and specifically licensed sources and devices, and indicate the licensing designations for each (i.e., general or specific). If in possession of any exempt sources (e.g., check sources), it is recommended that they be included in the inventory in order to avoid any confusion over their licensing status. If exempt sources are included, identify their exempt status on the inventory form.

## 9. RADIATION DETECTION INSTRUMENTS

For licensees conducting routine portable gauging activities, possession of a survey instrument is not required, so this item may be marked "N/A." However, if a survey meter will be used, all requested information must be provided. If authorization is sought to perform non-routine maintenance involving access to the sources, then at least one low range beta-gamma survey meter (with a minimum range of 0 – 50 mR/hr or 0 – 200 mR/hr) must be available for use. Approval of non-routine maintenance also requires submittal of personnel qualifications and maintenance procedures for review.

There are other situations where a survey meter is needed to determine whether a portable gauging device's radioactive source has been breached (e.g., receipt of a damaged portable gauging device, incidents involving a portable gauging device being run over at a construction site, etc.). In most cases, the source will remain intact. Nonetheless, such incidents necessitate seeking technical assistance to arrange for a timely evaluation of the source's integrity following an incident or receipt of a damaged package. Therefore, an arrangement must be made with the survey meter manufacturer/distributor, another third party or a local authority to obtain a calibrated survey meter in the event of an incident or when damage to a portable gauging device is suspected. The RSO should maintain a list of manufacturer/distributors or other providers who could provide immediate access to a calibrated survey meter in the event that it should be required.

## 10. CALIBRATION OF INSTRUMENTS

If radiation detection instruments will be used, mark the appropriate box to indicate how calibrations will be performed. Additional guidance on each subitem is provided below. Calibrations should be sensitive enough to detect all types of radiation emitted from the sources, and must meet all requirements identified in section 64E-5.314, F.A.C.

### a. CALIBRATED BY SERVICE COMPANY

If using a calibration service company, list their name, address, license number and the government agency that issued the company's license (i.e., U.S. Nuclear Regulatory Commission or an Agreement State agency such as the Florida Bureau of Radiation Control). Survey instruments identified in Item 9 must be calibrated annually, in accordance with subsection 64E-5.314(2), F.A.C.

### b. CALIBRATED BY APPLICANT

If seeking approval to calibrate instruments in-house, submit detailed information describing the facilities, equipment, personnel, and procedures to be used to perform the calibrations. Contact the bureau for additional guidance on equipment calibration requirements. Note: In-house calibration requires use of reference sources; list each requested calibration/reference source in Item 7.

## 11. PERSONNEL MONITORING DEVICES

Complete Items a., b., c., and d. Unless otherwise authorized, subsection 64E-5.1310(1), F.A.C., requires individuals working with portable gauging devices to wear a whole body personnel monitoring (PM) badge. Common PM badges include film badges, thermoluminescent dosimeters (TLDs) and optically stimulated luminescent dosimeters (OSLDs), which are described below.

**Film badges** are small pieces of x-ray film contained in a plastic holder. The film darkens in proportion to the amount of radiation it has been exposed to, so measurements of the film's density provides a measurement of the wearer's radiation exposure. Film badges must be exchanged on a monthly basis.

**TLDs** are PM badges that contain small crystals capable of storing some of the energy from radiation. If the crystals are then heated to a specific temperature, they release the stored energy as light. The amount of light released is proportional to the amount of radiation the TLD badge received, which can be measured to determine the badge wearer's dose. TLDs should also be protected from extreme environmental conditions which may affect their ability to accurately record radiation. They must be exchanged at least every three months.

**OSLDs** measure radiation through a thin layer of aluminum oxide. A laser light stimulates the aluminum oxide after use, causing it to become luminescent in proportion to the amount of radiation exposure. OSLDs must be exchanged at least every three months.

PM badges must detect beta, gamma and neutron radiation, so verify the capabilities of available badges before making a selection. Dosimetry processors must hold accreditation from the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology. A list of NVLAP accredited dosimetry vendors is available on the Internet at http://ts.nist.gov/Standards/scopes/dosim.htm.

Each order of badges includes a control badge for measuring the amount of radiation the badges receive during shipment in the mail and the background radiation received while at the licensee's facility. This is then subtracted from the PM badges total reading to provide an accurate record of each worker's occupational exposure. When not in use, PM badges should be stored with the control badge away from radiation sources to ensure accurate dosimetry records. The control badge must be returned with the other PM badges each monitoring period.

## 12. FACILITIES AND EQUIPMENT

Submit an annotated diagram of the permanent portable gauging device storage facility, identifying all entrances and points of access, rooms, uses of the rooms, the location of the portable gauging device storage area, and its distance from occupied work areas. Describe and label all areas adjacent to the permanent facility. If the facility is a multi-story and/or multi-tenant building, identify floors above and below the storage area and their uses, including areas occupied by other tenants. Exhibit A provides a sample facility diagram.

Provide evidence that the storage area is capable of storing at least the maximum number of portable gauging devices to be authorized by the license. Describe the security measures to be used to prevent unauthorized removal of radioactive materials. A minimum of two independent physical controls that form tangible barriers must be used to secure devices from unauthorized removal, whenever they are not under the immediate control and constant surveillance of an Authorized User. Refer to sections 64E-5.320 and 64E-5.1311, F.A.C., for regulations on security of radiation sources.

## 13. RADIATION PROTECTION PROGRAM

Submit a detailed description of the proposed radiation protection program, which must include the components as described below and continuing on the following pages. The appendices and exhibits included with this guide are model procedures and forms that may be adopted by including them as part of the submitted radiation protection program, or used as guides for developing equivalent procedures and forms.

> Reminder: Complete Tables 1 – 3 of Supplement B of this guide to indicate whether model or equivalent procedures and forms have been submitted, and attach a copy to Form DH-1054.

**Member of the Public (MOP) Dose Limit Compliance Study** **Appendix A**

Applicants for a new license must submit proposed procedures for demonstrating compliance with the public dose limits specified in section 64E-5.313, F.A.C. (2 millirem in any one hour and 100 millirem per year). Applicants for renewal of an existing license must submit a completed study demonstrating compliance with the limits. Appendix A is a model study.

**ALARA Policy** **Appendix B**

Applicants must submit a policy describing management's commitment to the ALARA philosophy of maintaining doses as low as reasonably achievable, and a description of the commitments of management and workers for implementing the policy. Appendix B is a model ALARA policy.

**Duties and Responsibilities of the Radiation Safety Officer (RSO)** **Appendix C**

Applicants must submit a description of the RSO's duties and responsibilities that includes the duties listed in section 64E-5.1305, F.A.C. Appendix C is a model procedure.

**Radiation Safety Training Program** **Appendix D**

Multiple training requirements apply to the use of portable gauging devices, as described below.

- **Radiation awareness training** ("Instructions to Workers") must be provided to personnel engaged in licensed activities (Authorized Users and workers under their supervision). This training is also recommended for individuals that work in the vicinity of radioactive materials. Section 64E-5.902, F.A.C., specifies radiation awareness training requirements. The rule does not specify the minimum duration for this training, because the amount of training needed will vary depending on the scope of the radiological hazards present in the applicant's workplace.
- **Hazmat employee training** must be provided to any worker with job functions associated with portable gauging device shipments. Hazmat employee training is specified in 49 CFR Part 172, Subpart H. U.S. DOT regulations are incorporated by reference in Chapter 64E-5, F.A.C. The rule does not specify the minimum duration for this training.
- **Authorized User training** must be provided to workers independently performing gauge operations or supervising such activities by other workers. Training requirements are specified in subsection 64E-5.1312(1), F.A.C. Authorized Users must complete a minimum of 8 hours training covering the subjects listed in section 64E-5.1307, F.A.C.

The training program must describe how the above training requirements will be addressed. Because the topics that must be addressed to satisfy radiation awareness and hazmat employee training overlap with the topics that must be covered during Authorized Users training, these training requirements may be addressed concurrently. Training can be provided by qualified third parties, in-house, or by using a combination of the two. Appendix D is a model radiation safety training program aimed at licensees using an approved third party training course, supplemented by in-house training in the licensee's Operating and Emergency (O&E) procedures.

Applicants seeking to conduct in-house training must address the requirements specified in subsection 64E-5.1307(2), F.A.C., by submitting a detailed description of the training program for review and approval, including a description of training reference materials, instructor qualifications, and a sample exam. Supplement E is a model training course outline for users of portable gauging devices.

**Personnel Monitoring Procedure** **Appendix E**

If PM is conducted, a procedure is required to provide instructions on proper use, exchanges, use of spare badges, lost or damaged badges, and PM record-keeping requirements. Appendix E is a model PM procedure. Exhibits E, F and G are model forms for addressing requirements regarding declared pregnant female workers.

**Operating and Emergency Procedures**

Sections 64E-5.208 and 64E-5.1302, F.A.C., require establishment and implementation of O&E procedures that provide instructions adequate to ensure safety to workers, the public and to property. As a minimum, O&E procedures must include the procedures described below.

- **Operating Procedure** **Appendix F**

  Appendix E provides generic instructions on trained personnel, availability of procedures, personnel monitoring general rules of use/ALARA principles, radiation surveys, security, transportation, routine maintenance and posting requirements. Operating procedures must include instructions on those topics; additional guidance is provided below.

  Training

  Proper training is the most important factor contributing to safe handling, transport and use of radioactive materials. Individuals shall complete applicable training prior to handling or using radioactive materials.

  Availability of Procedures

  Operating procedures must include a commitment that Authorized Users will have access to the licensee's O&E procedures, as well as the manufacturer operation/maintenance manual for each portable device possessed.

  Personnel Monitoring Instructions to Workers

  Individuals supplied whole body personnel monitoring devices must be provided instructions about when and how the device should be worn, stored and exchanged.

  General Rules of Use/ALARA Principles

  Instructions should be provided on techniques for minimizing dose, general precautions and the performance of radiation surveys if damage to a portable gauge or device is suspected. The instructions may be supplemented by any specific instructions provided by the manufacturer or distributor of the radioactive source or device.

  Security

  Portable gauging devices must be used, transported and stored in a manner that secures them from unauthorized access or removal. A minimum of two independent physical controls must be used to prevent unauthorized access or removal of portable gauging devices in transport or storage.

  Routine Maintenance

  Portable gauging devices require periodic maintenance. Maintenance must be performed in accordance with the manufacturer's procedures and recommendations. Typically, the manufacturer's procedures allow for the performance of routine maintenance by authorized users. However, the performance of non-routine maintenance is restricted to the manufacturer and third parties licensed by the bureau.

- **Emergency Procedures** **Appendix G**

The procedures must provide instructions for responding to the loss, theft or damage of a portable gauging device, and must include emergency notification numbers for the RSO and the Florida Bureau of Radiation Control. Appendix G is a model emergency procedure.

- **Procedures for Ordering, Receiving, Opening and Shipping Packages Containing Radioactive Material** **Appendix H Exhibits D and E**

Procedures must address preparation and handling of incoming and outgoing shipments of radioactive material transported by common carriers and by private motor carrier. The instructions must conform to the U.S. Department of Transportation regulatory requirements specified in 49 CFR. Sample shipping papers and emergency response information must be provided. Appendix H is a model procedure, Exhibits D-1 and D-2 are sample shipping papers for common carrier and private use shipments, and Exhibit E is a model emergency response information sheet.

- **Posting Procedure** **Appendix I**

Areas where radioactive materials are used and stored must be posted with appropriate radiation warnings as described in section 64E-5.323, F.A.C. This procedure also addresses the posting of documents specified in section 64E-5.901, F.A.C. Appendix I is a model posting/ labeling procedure.

- **Record Retention Procedure** **Appendix J**

Certain records must be retained for specified periods for compliance purposes. These intervals have been established for bureau inspection staff and other authorized entities (e.g., U.S. DOT) to have access to the documents as required by the regulations. Appendix J provides a model procedure addressing record retention requirements.

**Leak Testing Procedures** **Appendix K**

Sealed sources must be tested at regular intervals to ensure that the radioactive material is not leaking contamination. Leak test requirements are specified in section 64E-5.1303, F.A.C. If a leak test kit is used, indicate the manufacturer and model number. The procedure must specify the leak test interval and include instructions on collecting leak test samples. This information may be obtained from the manufacturer. The procedures must identify the vendors who will be contracted to conduct leak test analysis or include a commitment to have analysis performed by licensed vendors. The procedures must provide instructions for retention of leak test records. Appendix K is a model leak test procedure.

**Inventory Procedure** **Appendix L**

The procedure must provide instructions for performing annual physical inventories and inspections of all generally and specifically licensed sealed source or devices. Inspections must evaluate the physical condition of the sealed source and/or device and the associated labels. A sample inventory form is also required. Appendix L is a model inventory procedure; Exhibit B is a model inventory form.

**Notification and Reporting Procedure** **Appendix M**

Notification and reporting requirements are specified in Parts II and III of Chapter 64E-5, F.A.C. Appendix M provides a model procedure summarizing notification and reporting requirements.

### 14. WASTE DISPOSAL **Appendix N**

Submit a procedure describing how the licensed radioactive materials contained in portable gauging devices will be disposed. Procedures must include a commitment that sealed sources will be disposed of either by return to the manufacturer or by transfer to a specifically licensed recipient. Refer to Appendix N for a model waste disposal procedure. Note: Low level radioactive waste brokers and most portable gauging device manufacturers require a fee to accept gauges for disposal.

### 15. CERTIFICATE

A radioactive materials license is a legal document. License applications and all future correspondence must be signed and dated by an individual authorized to make legally binding statements for the applicant (i.e., a certifying official). Exhibit J is a model delegation of authority.

## IV. LICENSE AMENDMENTS

Licensees are required to conduct operations in accordance with applicable regulations and the statements, representations and procedures contained in the license application and supporting documents. The license must be amended if any changes are planned. Submittal of an amendment request does not allow immediate implementation of proposed changes. Until the license has been amended to reflect approval of the change(s), the licensee must comply with the original terms and conditions of the license. Applications for license amendments may be filed in letter form or on Form DH-1054, "Application For Radioactive Materials License, Non-Human Use." The request must be dated and signed by a certifying official, identify the license by name and number, be submitted in triplicate, and clearly describe the nature of the changes, additions or deletions requested. Attach all supporting documentation, including facility diagrams, survey measurements, dosimetry data and calculations. References to previously submitted documents must be specific and identify the applicable information by date, page and paragraph. The licensee must maintain a copy of the submitted and referenced documentation on file for inspection. Note: To prevent the potential for identity theft, never submit documentation that lists individuals' social security numbers or birth dates.

## V. LICENSE RENEWAL

Absent any actions by the department or the licensee, a license remains in effect for five years. An application for license renewal must be received by the department at least 30 days prior to the expiration date. This filing will ensure that the license does not expire until final action on the application has been taken, as provided for by subsection 64E-5.207(3), F.A.C. If the application is received less than 30 days before the expiration date, the facility or individual may be without a valid license when the license expires. Renewal applications should be filed using Form DH 1054, "Application For Radioactive Materials License, Non-Human Use." The renewal application should be completed as if it were an application for a new license, with complete and up-to-date information about the applicant's radiation protection program, demonstrating compliance with all licensing and regulatory requirements in effect at the time of renewal. Renewal applications should be submitted without reference to documentation and information submitted previously. Eligible participants in the department's pilot program, which is described in Information Notice 2007-04, may submit a renewal attestation in lieu of the above.

## VI. LICENSE TERMINATION

Prior to license termination, the licensee must properly dispose of all licensed radioactive material. Complete Form DH-1059, "Certificate – Disposition of Radioactive Material" to satisfy the requirements of section 64E-5.214, F.A.C., and submit it to the Bureau before the expiration date of the license with a request that the license be terminated.

# MOP DOSE LIMIT COMPLIANCE STUDY

## I. *Introduction*

Section 64E-5.312, Florida Administrative Code (F.A.C.), requires portable gauging devices operations to be conducted so that the below limits are met:

- Radiation doses in unrestricted areas do not exceed **2 millirem (0.02 mSv) in any one hour**
- Doses to members of the public do not exceed **100 millirem (1 mSv) in a year**

Section 64E-5.313, F.A.C., requires surveys, calculations and/or environmental monitoring to be used to demonstrate compliance with the dose limits. A member of the public (MOP) dose compliance study ("MOP study") provides documentation of compliance with both regulatory limits. This procedure describes methodologies developed by the Florida Bureau of Radiation Control (bureau) for use by portable gauging device license applicants and license holders conducting MOP studies.

This procedure applies to our application for **(Select one box):**

| | | |
|---|---|---|
| ☐ | **New license**: | This procedure describes the methods that will be used to demonstrate compliance with the individual MOP dose limits. Supporting data, measurements and/or calculations will be maintained on file once licensed activities begin. |
| ☐ | **Renewal**: | The procedure describes the methods that will be used to demonstrate compliance with the individual MOP dose limits. Applicable data, measurements and/or calculations included as attachments. |

## II. *Dose Limit for Unrestricted Areas*

For portable gauging device operations, there are three situations that must be addressed in order to demonstrate compliance with the 2 millirem in any one hour dose limit for unrestricted areas:

- Storage of portable gauging devices in transport vehicles;
- Use and storage of portable gauging devices at temporary job sites; and
- Storage of portable gauging devices at the permanent facility.

Section A demonstrates compliance with the unrestricted area dose limit for shipment of portable gauging devices to and from temporary job sites and their use and storage at job sites.

Section B's Method 1 describes the procedure followed when a survey meter is available to conduct radiation measurements. Compliance with the unrestricted area dose limit can also be demonstrated without direct measurements. Section B's Method 2 describes the procedure followed when a survey meter is unavailable. The selected box indicates the method used.

### A. Transport Vehicles and Temporary Job Sites

Security procedures, approved by the bureau and incorporated into the license, describe the measures taken by operators to restrict public access to portable gauging devices while in transport vehicles or at temporary job sites. During transport and storage at temporary job sites, the procedures require a minimum of two independent physical controls, which comprise of tangible barriers, must be used to prevent public access to the device. While in use, the portable gauging device must always be under the direct supervision of the operator to prevent unauthorized access. Adherence to these procedures ensures compliance with the 2 mrem in any one hour public dose limit.

## II. *Dose Limit for Unrestricted Areas*

### B. Permanent Facility

☐ **Method 1. Physical Surveys**

Procedures approved by the bureau prevent unauthorized public access to gauges at the permanent facility. Portable gauging devices are stored in an approved storage area and are kept locked in their transport cases and secured using a minimum of two independent physical controls, comprising of tangible barriers. All portable gauging devices will be appropriately secured from public access, unless they are kept under the physical control and personal supervision of an operator.

A radiation detection instrument was used to measure ambient radiation levels in the unrestricted areas around the permanent storage area while all possessed portable gauging devices were in storage. This survey evaluated the "worst case scenario" – where radiation emitted by the portable gauging devices(s) are at their highest levels. Survey results revealing dose rates below 2 millirem per hour demonstrate compliance.

The following information is attached:

- Date of the survey and the name of the individual(s) performing the measurements
- Information about the instrument used to perform the survey (manufacturer and model number, the types of radiation detected by the instrument, its minimum and maximum range, and the date it was last calibrated)
- Diagram of the permanent facility identifying the restricted area, adjacent unrestricted areas, nearby MOP workstations, and the locations where all recorded measurements were taken
- Information about the type and number of portable gauging devices present during the survey and a description of their placement within the storage area (e.g., contained in transport cases, stacked against back wall, etc.)
- Results of survey(s) of unrestricted area radiation levels, with results keyed to facility diagram

**Note**: If surveys note radiation levels > 2 mR/hr, attach a description of controls in place to further restrict access to the storage area (e.g., establishment of expanded restricted area around the storage area, using barricades and/or posted notices).

☐ **Method 2. Calculations**

Radiation levels in unrestricted areas can be calculated using information provided by portable gauging device manufacturers. Prior to shipment, the manufacturer lists the Transport Index (TI) number on the RADIOACTIVE YELLOW II label on the transport case's exterior surface. The TI indicates the radiation levels at 1 meter (3.3 feet) from the case when it contains a portable gauging device. The TI value was used as the basis for the calculations. If the TI is less than 2, then radiation levels in all directions around the portable gauging device when it is stored in its transport case are 2 millirem per hour (or less) at 1 meter, so that is the boundary of the restricted area. Additional distance and shielding provided by the storage area lower the dose rate even further. Storing the portable gauging device in its case, then storing the case in a cabinet, locker, room, etc. prevents unauthorized access to within a meter or more, so no MOP can receive 2 millirem in any one hour.

## II. *Dose Limit for Unrestricted Areas*

### B. Permanent Facility Method 2: Calculations

When calculating for two or more stored portable gauging devices, each case's TI is added together; this method is overly conservative, but should not cause the 2 mrem limit to be exceeded.

The following information is attached:

- Diagram of the permanent facility identifying the restricted area, adjacent unrestricted areas, and distance to MOP workstations
- Information about the type and number of portable gauging devices present and a description of their placement within the storage area (e.g., contained in transport cases, stacked by wall)
- Copies of manufacturer-provided documentation providing information on portable gauging device dose rates and/or TI numbers for the portable gauging devices being evaluated
- Results of calculations demonstrating estimated radiation levels in unrestricted areas, with results keyed to the facility diagram

**Note:** If calculations note radiation levels > 2 mR/hr, attach a description of controls in place to further restrict access to the storage area (e.g., establishment of expanded restricted area around the storage area, using barricades and/or posted notices).

## III. *Annual Public Dose Limit*

"Total effective dose equivalent" (TEDE) describes the dose from summation of internal and external radiation doses. However, there is little possibility of internal exposures during routine operations so internal doses can be ignored for portable gauging device MOP studies. Thus, for portable gauging device licensees demonstrating compliance with the 100 mrem annual MOP dose limit, the individual's external dose ("deep dose equivalent" or DDE) is equal to the total dose (TEDE).

Paragraph 64E-5.313(2)(a), F.A.C., states that licensees can demonstrate compliance with the annual dose limit with measurements or calculations showing that the MOP likely to receive the highest dose from the licensed operations does not exceed the 100 millirem limit. Different methods of using this regulatory approach are described below. The selected box indicates the method used in this study.

☐ **Method 1. Radiation Level Data**

Survey measurements and calculations can be used to demonstrate that the radiation levels resulting from licensed operations are not likely to cause any MOP to exceed the annual public dose limit.

Radiation levels generated by RAM present in the workplace can be determined by direct measurement with survey instruments, or from indirect information, such as radioactive material package transport index values (describing radiation levels at 1 meter from a package's exterior surface). The radiation level data can then be used with the inverse square law to calculate the DDE.

## III. *Annual Public Dose Limit*

**Method 1: Radiation Level Data** (Continued)

In Table 1, check to indicate use of either rad. survey instrument measurements (Box A-1) or RAM package Transport Index (TI) values (Box B-1) with the inverse square law to calculate the DDE.

The issue of occupancy factors is addressed by selecting one of two options provided in Table 1. Check off the Box A-2 to indicate use of the most conservative scenario -- assuming a MOP is continuously present in the unrestricted area (24 hours/day, 365.25 days/year = 8766 hours). Check Box B-2 to indicate use of a more realistic (but still very conservative) assumption -- the individual located in the unrestricted area is present during all business hours (8 hours/day x 40 hours/week x 50 weeks/year = 2,000 hours).

Inverse Square Law: $I_2 = \frac{I_1 R_1^2}{R_2^2}$ Where: $I_1$ = intensity (radiation dose rate) at distance $R_1$
$I_2$ = intensity (radiation dose rate) at distance $R_2$.
$R_1$ = distance from RAM with dose rate $I_1$
$R_2$ = distance from RAM where dose rate $I_2$ is calculated

Notes: A. This formula has two limitations: (a) it only applies to gamma-emitters; and (b) the closest distance should be at least five source diameters.
B. If using transport package exterior radiation levels, set $R_1$ = 1 inch.

**Example of an Inverse Square Law Calculation Using Survey Meter Measurements**

A lab contains a variety of sealed sources. The sources may be treated as a single point source by positioning them together for the measurement. Assuming a collective source diameter of 12 inches, a radiation measurement ($I_1$) is taken at a distance equal to at least five source diameters from the grouped sources, which serves as $R_1$ in the inverse square formula. The intensity at 10 feet is the unknown value being sought (the distance to the nearest unrestricted area).

$I_1$ = 0.1 mR/hr
$I_2$ = ? mR/hr
$R_1$ = 60 in. (5 x 12 in.)
$R_2$ = 120 in. (10 ft.)

$I_2 = \frac{0.1 \times (60)^2}{(120)^2}$

$I_2$ = .025 mR/hr

A 2,000 hour occupancy factor yields:
.025 mR/hr x 2,000 hours
= 50 mrem = DDE

**Example of an Inverse Square Law Calculation Using a Package Transport Index**

A shipping case used to store a portable nuclear density gauge bears a Radioactive Yellow II label that shows its TI = 0.6. The nearest MOP workstation is located 24 feet away.

$I_1$ = 0.6 mR/hr
$I_2$ = ? mR/hr
$R_1$ = 3.3 ft. (1 meter)
$R_2$ = 24 ft.

$I_2 = \frac{0.6 \times (3.3)^2}{(24)^2}$

$I_2$ = .011 mR/hr

A 2,000 hour occupancy factor yields:
.011 mR/hr x 2,000 hours
= 22 mrem = DDE

## III. *Annual Public Dose Limit*

**Method 1: Radiation Level Data** (Continued)

| Table 1. | Radiation Level Data | |
|---|---|---|
| ☐ | DDE (millirem) | ☐ **A-1.** Check to indicate use of radiation survey instrument measurements and the inverse square law to calculate the DDE<br>**OR**<br>☐ **B-1.** Check to indicate use of RAM package Transport Index (TI) values or RAM package surface radiation levels and the inverse square law to calculate DDE<br>**********<br>☐ **A-2.** Check if dose is based on continuous year-round occupancy (8766 hours) in unrestricted areas<br>**OR**<br>☐ **B-2.** Check if dose has been adjusted for workplace occupancy factors (e.g., 2000 hours for a work year) in unrestricted areas<br>**********<br>☐ Check to indicate that documentation of all calculations is attached, along with instrument identification, specifications and calibration information<br>☐ Check to indicate a facility diagram showing restricted and unrestricted areas is attached<br>← Enter the calculated DDE in the space provided to the left; use this value in App. A |

☐ **Method 2. Dosimetry Data for the Maximally Exposed Individual MOP**

If annual occupational doses for workers exceed 100 millirem, the MOP that is likely to receive the highest dose from the licensed operations may be used to demonstrate compliance with the annual public dose limit. The "maximally exposed individual MOP" may be a person that does not operate portable gauging devices but works at the same site where they are used or stored. It could also be an employee working in a management, clerical, or maintenance position at the permanent facility, or an employee or a regular customer that has routine contact with the operators when they are working.

Justification for how the maximally exposed individual was identified must be documented; i.e., why the person is likely to receive the highest radiation dose compared to other members of the public. Next, assign the individual a personnel monitoring device (film badge, TLD or OSLD). Provide instructions on when (during working hours) and where (on the torso, waist or chest level) the badge must be worn, and on proper use (protect badge from excessive heat, light, moisture or chemicals, store with control badge in low background area when not being worn). In general, at least one year of monitoring should be conducted to provide adequate measurement data and to account for seasonal fluctuations in work loads. If the dosimetry reports show that the monitored person received < 100 millirem for the year, compliance with the annual public dose limit has been demonstrated, because if the MOP likely to receive the highest dose from the licensed operations is receiving < 100 millirem, then so are all other members of the public. It is not necessary to wait for a full year of dosimetry records to begin drawing conclusions from the collected data. As dosimetry reports arrive, the recorded dose can be multiplied to gain an estimate of the annual exposure, which can serve as a MOP study "in-progress" until the year of monitoring is completed. The study can then be updated to reflect the results of a full year of monitoring.

## III. *Annual Public Dose Limit*

**Method 2: Dosimetry Data for the Maximally Exposed Individual MOP** (Continued)

If this method is employed, complete Table 2 and attach the following:

- Description of the maximally exposed individual MOP (name, title) and justification for why the individual was selected
- Facility diagram identifying all restricted areas, adjacent unrestricted areas, and where the monitored MOP's workstation is located
- Copies of the dosimetry reports used in the study. Prior to submitting the reports, be sure to delete all personal information (e.g., social security numbers, last names, birth dates).

| Table 2. Dosimetry Data for the Maximally Exposed Individual MOP | | |
|---|---|---|
| ☐ | DDE = TEDE (millirem) | Monitoring Period (*dates*): _____ to _____ |
| | | ← Enter the highest individual cumulative external dose for the monitoring period in the space provided to the left. A dose ≤ 100 mrem demonstrates compliance with the annual MOP dose limit specified in 64E-5.312(1)(a), F.A.C. |

☐ **Method 3. Environmental Monitoring Data**

If the maximally exposed individual MOP is a worker at the permanent facility, a third approach is available. A film badge/TLD/OSLD can be mounted at the person's work station to record radiation levels, which can then be related to the dose received by the person working in the area. If environmental monitoring demonstrates that the annual workplace continuous exposure to the ambient radiation levels results in a total dose less than 100 mrem, then it can be concluded that no MOP would be likely to exceed the annual public dose limit from the licensed operations. If environmental monitoring indicates that continuous occupancy would result in exposures that would exceed the public dose limit, then the use of realistic occupancy factors might be used to demonstrate compliance. The maximally exposed individual MOP's annual occupancy time can be determined by review of the person's time cards, interviews of the person and his/her co-workers, etc. Note: An environmental badge is not the same type of badge used for personnel monitoring, so it is important to specify to the dosimetry supplier what type of monitoring is planned when ordering badges. In addition, posted badges must be protected from adverse environmental conditions such as excessive heat, light and moisture.

One or more badges should be posted in the unrestricted areas adjacent to restricted areas (or in the restricted area on a wall adjacent to unrestricted areas) for at least 12 months. Badges should be posted where the highest radiation exposure is expected and where exposure to non-regulated sources of radiation (e.g., medical patients injected with radionuclides) will not contribute to the measurements. If the results for the monitoring period total < 100 mrem, use continuous occupancy for the dose determination; check Box A and enter the total value in the box provided in Table 3. If the results for the monitoring period exceed 100 mrem, it may be possible to demonstrate compliance with the annual dose limit by applying a more realistic (but still very conservative) occupancy factor, such as 2,000 hours for a work year. Box B should be checked if using a normal work week occupancy factor to calculate the TEDE.

## III. *Annual Public Dose Limit*

**Method 3: Use of Environmental Monitoring Data** (Continued)

**Example:** The total dose measured by the environmental badge = 280 mrem; the dose received by a MOP working 2,000 hours in the area that the badge was posted is

280 mrem/8,766 hrs = .032 mrem/hr x 2,000 hrs = 64 mrem

Using a 2,000 hour occupancy factor means that any annual dose from environmental monitoring that totals < 438 mrem will demonstrate compliance

**Example:** 438 mrem/8,766 hrs = .049 mrem/hr x 2,000 hrs = 99.9 mrem

If the results for the 12 month monitoring period total > 438 mrem, compliance may still be demonstrated by using an even more realistic occupancy factor, provided the number can be legitimized by supporting documentation (e.g., employment records).

**Example:** Environmental badges total 680 mrem for the 12 month monitoring period; time sheets indicate that a conservative estimate of the most time spent by any MOP in the monitored area is 25 hours a week, 50 weeks a year = 1,250 hours.

680 mrem/8,766 hrs = .078 mrem/hr x 1,250 hrs = 97 mrem

In each case, attach an annotated diagram of the facility identifying restricted areas, adjacent unrestricted areas, and the location of posted badges.

**Table 3. Environmental Monitoring Data**

| ☐ | DDE = TEDE (millirem) | Monitoring Period (*dates*): _____ to _____<br>☐ **A.** Check if calculations are based on continuous year-round occupancy (8766 hours) in unrestricted areas<br>☐ **B.** Check if calculations are adjusted for workplace occupancy factors (e.g., 2,000 hours for a work year) in unrestricted areas<br>← Enter the highest individual cumulative external dose for the monitoring period in the space provided to the left. A dose ≤ 100 mrem demonstrates compliance with the annual MOP dose limit specified in 64E-5.312(1)(a), F.A.C. |
|---|---|---|

☐ **Method 4. Occupational Worker Dosimetry Data**

If measurements show that all of a licensee's portable gauging device operators receive < 100 millirem annually, then by extrapolation, no MOP receives 100 millirem annually, because operators receive higher exposures from portable gauging devices than any MOPs. If a review of monitored workers' dosimetry reports verifies that none have received annual doses exceeding 100 mrem, completion of Table 4 and attachment of the referenced reports finishes the study. Prior to submitting the reports, be sure to delete all personal information (e.g., social security numbers, last names, birth dates). Note that the evaluation period should cover at least 12 continuous months of operations.

## III. ***Annual Public Dose Limit***

**Method 4: Occupational Worker Dosimetry Data** (Continued)

| Table 4. | Occupational Worker Dosimetry Data | |
|---|---|---|
| ☐ | DDE = TEDE (millirem) | Monitoring Period (*dates*): _____ to _____ |
| | | ← Enter the highest individual cumulative external dose for the monitoring period in the space provided to the left. A dose ≤ 100 mrem demonstrates compliance with the annual MOP dose limit specified in 64E-5.312(1)(a), F.A.C. |

# ALARA POLICY

## I. *THE ALARA PHILOSOPHY*

Part III of Chapter 64E-5, Florida Administrative Code (F.A.C.), establishes standards for protection against radiation hazards. Section 64E-5.303, F.A.C., requires use, to the extent practical, of procedures and engineering controls based upon sound radiation protection principles to achieve occupational and public doses that are as low as reasonably achievable (ALARA). Management, the radiation safety officer (RSO) and all authorized users must participate in the establishment, implementation and operation of a radiation protection program that applies the ALARA philosophy of minimizing exposures to radiation.

The primary concept of the ALARA philosophy is that unnecessary exposure to radiation should be avoided, even though current occupational exposure limits provide a very low risk of harm. The objective is to reduce occupational exposures (both individual and collective) as far below regulatory limits as is reasonably achievable by means of good radiation protection planning and practice.

## II. *MANAGEMENT COMMITMENT*

**A.** Management is committed to the ALARA philosophy of maintaining occupational and public radiation doses as low as reasonably achievable. It is a management priority for all personnel using radioactive materials to be aware of our commitment to the ALARA philosophy and for them to be instructed in the procedures used to keep their exposures as low as possible.

**B.** Management has delegated authority to our RSO to ensure adherence to ALARA principles. Management will support the RSO in instances where this authority must be asserted.

**C.** Management will make all reasonable modifications to procedures, equipment and facilities to reduce exposures, unless the cost is considered to be unjustified. We will be prepared to describe the reasons for not implementing modifications that have been recommended.

## III. *WORKER COMMITMENT*

All personnel working with portable gauging devices will adhere strictly to policies and procedures applicable to activities involving ionizing radiation sources, and will apply ALARA principles and good work practices to minimize their occupational radiation exposures. Time, distance and shielding will be used to keep exposures ALARA. When working with sources of radiation, minimize the time spent near the source, maximize the distance from the source, and make use of available radiation shielding. Workers must report to the RSO any conditions in the workplace that have the potential for causing unnecessary exposures.

## IV. ***RADIATION SAFETY OFFICER RESPONSIBILITIES***

**A.** The RSO will emphasize the ALARA philosophy to workers, instruct personnel on current procedures and provide guidance on relevant changes to reduce exposures.

**B.** The RSO will review dosimetry reports for all monitored personnel to determine if unnecessary exposures are being received. The RSO will investigate within 30 days the cause of any dose considered to be excessive. If warranted, the RSO will take corrective actions to prevent recurrence. A report of each investigation and the actions taken, if any, will be recorded and maintained for inspection purposes.

**C.** At least annually, the RSO will conduct a formal review of the radiation protection program's content and implementation, as required by 64E-5.303(3), F.A.C. The review will include an evaluation of equipment, procedures, dosimetry records, inspection findings, and incidents. The RSO will assess trends in occupational exposures as an index of the program's success and determine if any modifications to the program are needed. A summary of the results of each annual review, including a description of actions proposed and taken (if any) will be documented by the RSO, discussed with management, and signed and dated by both. A report on each audit will be maintained on file for 3 years from the date of the review.

**D.** The RSO will provide written notifications of annual radiation exposures to all monitored personnel and will be available to respond to any questions regarding the exposure reports.

# *DUTIES AND RESPONSIBILITIES OF THE RADIATION SAFETY OFFICER*

In accordance with section 64E-5.1305, Florida Administrative Code (F.A.C.), management delegates to the Radiation Safety Officer (RSO) the authority to fulfill the following duties and responsibilities:

**A.** Ensure that all terms and conditions of the license and the regulations are complied with;

**B.** Ensure that the sealed sources are leak tested as prescribed by the license;

**C.** Ensure that radioactive materials are used only by individuals who are authorized by the license and that all individuals wear required personnel monitoring equipment;

**D.** Maintain all records required by the license and state of Florida regulations. These include personnel monitoring, leak test, inventory, training, and receipt, transfer and disposal records;

**E.** Ensure that radioactive materials are properly secured against unauthorized access or removal;

**F.** Serve as a contact with the department for events such as the loss, theft or damage of radioactive material; and

**G.** Ensure that all users read and understand emergency, operating and radiation safety procedures.

**In accordance with subsection 64E-5.213(7), F.A.C., the Florida DOH Bureau of Radiation Control will be notified in writing within 30 days after the RSO permanently discontinues performance of RSO duties. The notification must identify the new RSO and include documentation demonstrating the new RSO's qualifications as a portable gauge operator.**

# I. *Introduction*

Handling and use of portable gauging devices is restricted to trained personnel. An operator will either be an Authorized User (AU) -- an individual that has completed an approved formal radiation safety class – or will work under an AU's direct supervision.

There are three training components associated with portable gauging devices. Radiation awareness training (instructions to workers) will be provided to each worker handling or operating portable gauging devices, and to any other worker likely to exceed 100 millirem/year from the company's licensed operations as determined by the RSO. Authorized User training will be provided to workers independently using portable gauging devices or supervising their use by other workers. Hazmat employee training will be provided to any worker involved in work that directly affects radioactive material transportation. Sections II – IV provide additional details for each type of training.

| **Training Requirement** | **Regulations** |
|---|---|
| ♦ Radiation awareness training | Section 64E-5.902, F.A.C. |
| ♦ Authorized User (Operator) training | Sec. 64E-5.1307 & 64E-5.1312, F.A.C. |
| ♦ Hazardous materials (Hazmat) employee training | Sec. 64E-5.1501 & 64E-5.1502, F.A.C., 49 CFR 172.700 - 172.704 |

# II. *Radiation Awareness Training/Instructions to Workers*

**A.** Prior to handling, transporting or operating portable gauging devices, all workers will receive the general radiation safety training specified in section 64E-5.902, F.A.C. The following instructions will be provided:

- ♦ Information on the storage, transfer, or use of portable gauging devices at permanent facilities and temporary job sites
- ♦ The health protection problems associated with exposure to ionizing radiation or radioactive material
- ♦ Precautions and procedures used to minimize exposures
- ♦ Applicable provisions of Florida's radiation control regulations and the radioactive materials license
- ♦ Workers' responsibility to report any unsafe conditions
- ♦ Appropriate responses to warnings made in the event of incidents having the potential to involve radiation exposure
- ♦ Reporting requirements for occupational radiation exposures described in section 64E-5.903, F.A.C.

**B.** Training will typically last 2 – 4 hours. The duration may vary based on attendees' comprehension of the topics covered. A question and answer session will be held at the end of the training period, and attendees will be encouraged to request clarification as necessary during the presentation.

**C.** Documentation of training will be maintained to demonstrate compliance.

## III. *Gauge Operator/Authorized User (AU) Training*

**A.** Portable gauging devices will be used by, or under the direct supervision of individuals that have completed at least 8 hours of formal radiation safety training covering the subjects listed in subsection 64E-5.1307(1), F.A.C. Authorized Users (AUs) will complete a training course accepted by the Florida Bureau of Radiation Control. Any third party course offered by a gauge manufacturer or independent consultant may be used, provided the bureau accepts the training.

If in-house radiation safety training is provided, it will be conducted in accordance with a training program that has been approved by the Florida Bureau of Radiation Control and incorporated into the company's radiation protection program.

**B.** Subsection 64E-5.1307(1), F.A.C., includes operating and emergency (O&E) procedures as a required training topic. Unless training in our company's O&E procedures is addressed during third party training and documentation is provided by the trainer demonstrating its inclusion in the course, in-house training in O&E procedures will be provided. O&E procedures training will be conducted by the RSO or another experienced gauge operator, and separate documentation of O&E procedures training will be provided for each worker.

**C.** Documentation of radiation safety training for each AU will be maintained on file for inspection purposes.

## IV. *Hazmat Employee Training*

**A.** Radioactive material contained in portable gauges is classified as hazardous material by the U.S. Department of Transportation (DOT). In accordance with DOT regulations (49 CFR Part 172, Subpart H) workers must complete hazmat training prior to performing work that directly affects hazardous material transportation safety. (Exception: employees can work for 90 days without the training, provided a hazmat-trained employee directly supervises them.) Refresher training must be provided at least once every 3 years.

**B.** Hazmat training will include the following: general awareness/familiarization, function specific, safety training, and security awareness. It will be provided either in-house or by qualified third party trainers. **Completion of radiation awareness training and gauge operator/AU training can satisfy the hazmat training requirement; however, additional documentation is required** (see below).

**C.** Documentation of hazmat training will be maintained for the duration of each worker's employment, plus 90 days, and will include the following information:

- The employee's name and date of most recent training completed;
- Description, copy or location of training materials used;
- Name and address of the person providing the training; and
- Certification that the employee has been trained and tested as required.

# PERSONNEL MONITORING PROCEDURES

## I. *INSTRUCTIONS FOR USING PM BADGES*

### A. General Instructions

A whole body personnel monitoring (PM) badge (film, TLD or OSLD) will be worn at all times when handling, using, or transporting a portable nuclear gauge. Each Authorized User (AU), and individual gauge operators working under their supervision, will be assigned a PM badge bearing their name, which can only be worn by the individual to whom it has been assigned. Badges are to be worn on the front of the torso, at or above the waist and below the shoulder. Badges must be promptly returned to the Radiation Safety Officer (RSO) at the end of each monitoring period to ensure rapid processing.

**Recommended Work Practices for Personnel Monitoring**

- Never leave badges in close proximity to a gauge or other radiation source
- Protect badges from moisture, intense heat or light and chemicals
- When not in use, store badges with their control badge in a low background radiation area

### B. Instructions for New Hires and Lost/Damaged Badges

To ensure accurate monitoring of occupational exposures, an assigned badge will be ordered immediately for new gauge operators and provided for use at the start of the next monitoring period. A spare/visitor badge may be provided to new workers until the assigned badge arrives. Spare badges may also be used to replace a badge that has been lost or damaged before the end of the monitoring period. To ensure their use by only one individual, spare badges will be imprinted with the worker's name or another form of identification. Workers assigned spare badges will have the dose recorded by the badge added to their occupational dose record. In the event of a lost/damaged badge, the RSO will estimate the worker's dose for the period the badge was worn, and notify the dosimetry processor if the individual's dosimetry record needs to be revised.

## II. *PM RECORD REQUIREMENTS*

### A. Records of Prior Occupational Dose

If deemed necessary for compliance with subsection 64E-5.308(1), F.A.C., prior to assigning a PM badge to a worker, every reasonable effort will be made to obtain records indicating the individual's dose during the current year as well as the individual's lifetime cumulative occupational radiation dose. If a worker is unable to provide the information, records from their previous employer will be obtained. If no records are obtained, documentation will be maintained on file demonstrating that a request for records was furnished to the worker's previous employer. Prior occupational dose records shall include all of the information required by section 64E-5.308, F.A.C., using DOH Form DH 1623 or an equivalent form.

### B. Records of Individual Monitoring Results

Records of doses received by each monitored worker will be maintained as long as the license remains in effect. Dosimetry records will be kept on DOH Form DH-1622 or an equivalent form and will contain all of the information required by section 64E-5.339, F.A.C. and subsection 64E-5.903(1), F.A.C. These records will be updated annually.

## II. *PM RECORD REQUIREMENTS*

### C. Annual Reports to Monitored Individuals

Each worker assigned a PM badge will receive a written annual exposure report describing the past year's monitoring results, as required by section 64E-5.903, F.A.C. Records documenting that the reports have been furnished to monitored workers will be maintained for at least 3 years.

### D. Termination Reports to Monitored Individuals

Within 30 days of termination of employment, or within 30 days after the individual's exposure has been determined, whichever is later, each monitored worker will receive a written exposure report summarizing the individual's occupational radiation exposure, as required by section 64E-5.903, F.A.C. Records documenting that the reports have been furnished to monitored workers will be maintained for at least 3 years.

### E. Records for Female Workers and Declared Pregnancies

Upon hiring, female personnel assigned to work with portable gauges and devices will be provided verbal instructions concerning the potential risks involved for pregnant women exposed to radiation and a copy of U.S. NRC Regulatory Guide 8.13 (**"**Instruction Concerning Prenatal Radiation Exposure" – Rev. 3, 6/99). Following receipt of the instructions and guidance, female workers will document receipt of these instructions by signing the *Instructions for Women Working With Radiation* (Exhibit G or equivalent).

Declared pregnant women will be provided verbal instructions to always wear their assigned PM badge at waist level to estimate the embryo/fetus dose. Such workers will sign an *Instructions for Declared Pregnant Women* form (Exhibit I or equivalent) to document receipt of instructions on PM requirements during pregnancies and a *Declaration of Pregnancy* form (Exhibit H or equivalent) that includes the estimated date of conception. The forms will be retained until license termination.

Fetal doses will be kept ALARA, and will not be allowed to exceed 500 millirem during the entire pregnancy as a result of occupational exposures. Efforts will be made to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman. In addition, reasonable efforts will be made to adhere to regulatory recommendations to limit the embryo or fetus exposure to 50 millirem in any one month. Records of fetal dose will be documented in an *Occupational Radiation Dose Record* (Form DH-1623 or equivalent) and the forms, with the dose records of the declared pregnant woman, will be retained until license termination.

### F. Occupational Dose Limits for Minors

Minors will not exceed an annual occupational dose of 500 millirem. Record-keeping requirements specified in section 64E-5.339, F.A.C., will be met.

### G. Worker Overexposure Reports

When a report of an individual's exposure is sent to the bureau as required by section 64E-5.347, F.A.C., the exposed individual will also be notified no later than when the report is sent out.

# OPERATING PROCEDURES

## I. *Training*

Proper training is the most important factor contributing to safe handling, transport and use of portable gauging devices.

**A.** Prior to handling or operating portable gauging devices, workers shall:

**1.** Have received radiation awareness instructions required by section 64E-5.902, Florida Administrative Code (F.A.C.); and

**2.** **(a)** Have documentation on file of their completion of a minimum of 8 hours of approved radiation safety training meeting the requirements of Part XIII of Chapter 64E-5, F.A.C., or

**(b)** Work under the supervision and in the physical presence of individuals who have received the training described in A.2.(a).

**B.** Prior to engaging in transportation-related activities (e.g., loading, unloading, preparation for shipment, or transport) workers must complete hazmat employee training as required by the U.S. Department of Transportation in Title 49, Code of Federal Regulations (49 CFR), Part 172, Subpart H.

**Notes:**
– There is an initial 90-day grace period whereby individuals may transport portable gauging devices without having completed hazmat employee training, provided they are accompanied by a hazmat-trained worker.
– Workers must receive refresher hazmat employee training every 3 years.

## II. *Availability of Procedures*

**A.** A complete and current copy of the company's operating and emergency procedures must accompany portable gauges at all times.

**B.** Copies of the manufacturer's operation/maintenance manual for each device model authorized by the company's license are kept on file by the RSO for ready reference.

## III. *Personnel Monitoring*

**A.** A whole body personnel monitoring (PM) badge (film, TLD or OSLD) must be worn at all times whenever handling, transporting, operating a portable gauging device. Individuals supervising or assisting in the use of portable gauge must wear whole body PM badges.

**B.** PM badges are assigned to only one individual and cannot be shared. An assigned badge bears the name of the individual that has been assigned the badge. If a spare badge is used, it must be marked with the name, initials and/or identification number of the individual using it, and cannot be shared.

**C.** PM badges are to be worn at the chest or waist level. Badges cannot be worn during non-occupational radiation exposures (e.g., medical or dental x-rays, etc.).

## III. *Personnel Monitoring*

**D.** Do not store PM badges near a gauge; store them in a low background area whenever possible. They must be protected from moisture and extreme environmental conditions such as intense heat or light, or chemicals. Promptly return badges to the Radiation Safety Officer (RSO) for exchange at the required interval.

**E.** Immediately notify the RSO if a PM badge is lost or damaged. A record of the worker's estimated dose must be provided to the badge vendor and kept on file. A spare badge will be issued for the remainder of the monitoring period. If a spare badge is used, the dose recorded on the badge must be added to the worker's occupational exposure total by notifying the badge processor.

## IV. *General Rules of Use*

**A.** **ALARA Philosophy.** All personnel participating in licensed operations must follow the ALARA philosophy – keep radiation exposures As Low As Reasonably Achievable. The objective is to reduce occupational and public exposures as far below regulatory limits as possible by means of good work practices. Apply the following methods to minimize radiation exposures:

- Minimize the **TIME** spent in close proximity to the radiation source (the shorter the time, the lower the dose);
- Maximize the **DISTANCE** from the radiation source (doubling the distance quarters radiation intensity); and
- Make use of available **SHIELDING** to block out radiation.

**B.** Use of portable gauging devices, including routine cleaning and maintenance, must be in accordance with the manufacturer's instructions and recommendations.

**C.** **Radiation Surveys.** If damage to a portable gauging device appears to have the potential to cause excessive exposures, a radiation detection instrument must be used to measure the radiation levels. If damage is suspected, immediately notify the RSO, who will arrange to have the device surveyed as soon as possible. Refer to the emergency procedures for further instructions.

| **Recommendation:** | Portable gauging devices can be made more visible to heavy equipment operators with use of a "stake and flag" at field sites; flags atop fiberglass whips (available at bike shops) will make their presence evident. |
|---|---|

**D.** Opening or removing sealed sources in portable gauging devices is prohibited, as is direct contact with an unshielded source or placement of hands, fingers, feet or other parts of the body within the radiation field from an unshielded source.

**E.** Direct viewing of an open or unshielded radiation source is prohibited. If the source rod or shutter must be inspected, use an inspection mirror to eliminate the need for directly viewing the source.

## V. *Security*

**A.** Each portable gauging device must have a minimum of two independent physical controls that form tangible barriers to secure it from unauthorized removal, whenever it is being transported or stored. While locking the source rod or transport container does serve to restrict immediate access to the radiation source, these measures alone do not constitute the tangible barriers needed to prevent unauthorized removal of the device. Because portable gauging devices stored overnight at temporary job sites are especially vulnerable to theft, where possible, use additional controls (covers, locks, etc.) to enhance security.

| | |
|---|---|
| **Recommendation:** | Extra precautions can deter thefts, such as concealing gauges from view during transportation and storage, and maintaining an elevated level of awareness in high crime areas. |

**B.** Before removal from storage, check each portable gauging device to verify that the source is in its shielded position and locked (for models equipped with locking mechanisms), then lock it in the transport case.

**C.** After completing each measurement in which the source is unshielded, immediately return the source to the shielded position. Keep the source holder locked in the "off" or closed position whenever the portable gauging device is not in use.

**D.** When not in storage, keep the portable gauging device under constant surveillance and immediate control, and keep unauthorized persons away.

| | |
|---|---|
| **Recommendation:** | Utilization logs can improve accountability when working with multiple gauges by providing a system for tracking dates and locations of use. |

## VI. *Routine Maintenance*

**A.** Only authorized users are allowed to perform routine maintenance and cleaning. PM badges must be worn at all times during such activities. A copy of the appropriate manufacturer's operation manual must be on hand, and the maintenance instructions strictly followed. If recommended, use remote handling tools and an inspection mirror as instructed.

**B.** Non-routine maintenance or repair that requires removal of the radiation source or source rod is prohibited. Such operations can only be performed by the manufacturer or other specifically authorized persons.

# *EMERGENCY PROCEDURES*

**I.** In the event of a stolen, lost or missing portable gauging device, immediately notify the Radiation Safety Officer (RSO), who will then contact the appropriate local authorities and the Florida Bureau of Radiation Control.

**II.** Implement the following procedure in the event of physical damage to a portable gauging device or any other emergency or unusual situation:

**A.** Immediately secure the area around the portable gauging device and keep people at least 15 feet away until the situation is assessed and radiation levels are known. Maintain surveillance of the perimeter to prevent unauthorized entries.

**B.** Care for life-threatening injuries first, even if individuals may be contaminated. Perform first aid and remove them from the area only when medically safe to do so. Evaluate the situation to determine if anyone may have been exposed to radiation. Notify emergency personnel and hospital staff about possible radioactive material contamination. Do not allow any potentially contaminated people to leave the scene; have them remain at least 15 feet from the damaged device until they can be surveyed for contamination.

**C.** Visually inspect the portable gauging device to determine whether damage to the source housing or shielding has occurred. If appropriate, wait for technical assistance or instruction from the RSO prior to moving the device. The full extent of damage/contamination will be determined and if necessary appropriate actions will be taken to decontaminate the area.

**D.** The portable gauging device (and vehicle, if appropriate) will be evaluated with a survey meter for the presence of contamination prior to being released from the accident scene. The RSO will make arrangements to obtain a meter.

**E.** As soon as possible, notify the RSO, who will notify the Florida Bureau of Radiation Control in accordance with reporting requirements specified in Part III, Subpart L of Chapter 64E-5, Florida Administrative Code.

**F.** At the earliest practical moment, the U.S. Department of Transportation's National Response Center will be notified at (800) 424-8802, of an accident that occurs during the course of transportation (including loading, unloading and temporary storage) in which fire, breakage, spillage or suspected contamination occurs involving shipment of radioactive materials, in accordance with 49 CFR 171.15.

**Radiation Safety Officer:** _____

**RSO Phone No.: (Work):** _____ **(Home):** _____

**(Cell):** _____

**Florida Bureau of Radiation Control**
**24-Hour Radiological Emergency Notification No.: (407) 297-2095**

# *PROCEDURES FOR ORDERING, RECEIVING, OPENING & SHIPPING PACKAGES CONTAINING RADIOACTIVE MATERIAL*

To address requirements specified in Chapter 64E-5, Florida Administrative Code, and by the U.S. Department of Transportation (DOT) in Title 49, Code of Federal Regulations (49 CFR), the procedures described below will be followed.

Only personnel qualified as hazmat employees in accordance with 49 CFR Part 172 requirements are allowed to perform the transport-related functions described below.

## I. *Ordering and Receipt*

**A.** The Radiation Safety Officer (RSO) will place or approve all orders for radioactive material and ensure that the requested material, quantity, manufacturer and model are authorized by the license and will not exceed possession limits specified in the license.

**B.** Transportation carriers must be provided instructions on where to deliver packages containing radioactive materials.

## II. *Opening Packages*

**A.** Visually inspect each package for signs of damage. If a radiation survey meter is available, survey the package as soon as possible to verify that radiation levels are at acceptable levels (refer to the manufacturer's information on radiation levels). **If any damage or excessive radiation levels are noted, immediately notify the RSO or RSO designee.** Damaged packages will be evaluated for the possibility of degradation of the package's integrity. If a survey meter is unavailable and the device shielding appears compromised, arrangements will be made to have the package's radiation levels monitored to determine the presence and extent of any radioactive contamination.

**B.** Verify that the portable gauging device model and serial numbers and source activity listed on the attached label match the information provided in the shipping papers and packing slip. In addition, verify that documentation indicating that the gauge's source has been leak tested. If any discrepancies are identified, notify the RSO or RSO designee.

**C.** If no damage is evident and the documentation is in order, secure the portable gauging device in the designated storage area.

## III. *Transportation*

**A.** **Markings and labels** on portable gauging device transport containers must be durable, legible, in English, and printed on or affixed to the package surface (e.g., a label, tag or sign). Required package labels and markings cannot be obscured by any other markings, labels or obstructions.

**1.** Required **markings** include:

- *Shipping name*;
- *RQ* (Reportable Quantity; applies to shipments with activities specified in 49 CFR 172.101, Appendix 2, Table A);
- *Identification number*; and
- *Package type*.

***RQ Package Marking***

# III. *Transportation*

## A. Markings and labels (contd.)

**2.** Required **labels** include:

- *"Cargo Aircraft Only" label* (for shipments by air)
- *Two DOT warning labels* applied to opposite sides of the package, listing the radionuclide and activity in SI units (English units may be listed after SI units) and the package's Transport Index (TI), the dimensionless number indicating the package's radiation level at 1 meter.

***Cargo Only Label***


***Package Labeling Criteria***

| Warning Label | Max. Rad. Level at Package Surface (mR/hr) | Max. Rad. Level at 1 m (TI) |
|---|---|---|
| RADIOACTIVE WHITE I | 0.5 | None |
| RADIOACTIVE YELLOW II | 50 | 1 |
| RADIOACTIVE YELLOW III | 200 | 10 |


RADIOACTIVE WHITE I


RADIOACTIVE YELLOW II


RADIOACTIVE YELLOW III

**3.** **Overpacks**. If a convenience overpack is used that prevents package labels from being visible, then all required labels must be applied to the overpack, along with a label bearing the following statement: "Inner Package Complies with Prescribed Specifications."

## B. Shipping papers

The information required on a shipping paper (bill of lading) depends on the type of shipment being made, as described below.

**1.** **Private use shipments** are sole use shipments, with all loading, transport and unloading carried out by the licensee's trained personnel in accordance with the shipper's instructions, which must accompany the package during shipment. Private use shipments require a bill of lading with the information listed below.

# III. *Transportation*

## B. Shipping papers

### 1. Private use shipments (contd.)

- *Description of shipment* [proper shipping name, RQ (if applicable), identification number, hazard class, package type, name and activity of each radionuclide, category of warning label and Transport Index) (same as for common carrier shipments)
- *Emergency response telephone number* (24-hour-monitored number of a person knowledgeable about the hazards associated with the radioactive material contained in the portable gauging device being shipped)
- *Date of shipment*

While not a requirement, the name, address and telephone number of the shipper should be included as a security enhancement.

### 2. Common carrier shipments

**Common carrier shipments** (packages offered to third parties for transport) require a bill of lading with the information listed below. If shipped by air, the carrier will provide a "Dangerous Goods Airbill" form to document required information. Common carrier shipping papers must have all information typed in. In addition to the information described above, common carrier shipments require a bill of lading with the information listed below.

- *Name and address of shipper* [can be the *consignee* (licensee offering the package for shipment) or the *consignor* (service company shipping the package)]
- *Description of shipment* [RQ (if applicable), proper shipping name, hazard class, identification number, type of package, name and activity of each nuclide, category of labeling and Transport Index)
- *Emergency response telephone number* (24-hour-monitored number of a person knowledgeable about the hazards associated with fixed gauges)
- *Shipper's certification* (statement certifying that the package has been properly classified, described, packaged, marked and labeled, and is in proper condition for transportation)
- *Signature of shipper and date of shipment*

Additional Statements Required for Air Shipments

- *Cargo aircraft statement*: "Cargo aircraft only"
- *Package dimensions*
- *Overpack statement*: "Overpack Used" (if applicable)
- *Candy-stripe borders*

## III. *Transportation*

### B. Shipping papers (contd.)

**3. Emergency response information (ERI)** provides first responders (i.e., medical, fire and law enforcement personnel) with the information needed to take appropriate action in the event of an emergency. Drivers are required to have in their possession a separate ERI sheet for each type of radioactive material being transported.

**4. Accessibility.** Shipping papers and ERI will be immediately accessible to the driver during transport of portable gauging devices. That is, the papers must be within immediate reach and either readily visible to a person entering the driver's compartment or in a holder mounted to the inside of the door on the driver's side of the vehicle.

### C. Inspection

Prior to shipment, transport containers will be inspected to ensure proper packaging and unimpaired physical condition of the container and its closure devices. Any defects must be promptly reported to the RSO. The RSO will tag and remove from use any device or package found to be defective and ensure its repair or replacement.

### D. Blocking and bracing

Transport containers will be blocked and braced to prevent shifting during normal transportation conditions. Portable gauging devices will not be transported in a vehicle's passenger compartment.

### E. Type A package requirements

Transport containers will be equipped with a tamper-evident seal. In addition, transport containers will conform to the Type A package requirements indicated in 49 CFR 178.350. Records will be maintained for each Type A package demonstrating compliance with the package construction and design requirements. Records will be maintained for one year after the latest shipment.

### F. Excepted instruments/articles

Devices classified as excepted instruments/articles are exempt from marking, labeling and shipping paper requirements, but must have a notice included with the package that lists the shipper's name and the statement: "This package conforms to the conditions and limitations specified in 49 CFR 173.424 for radioactive material, excepted package – instruments or articles, UN2911."

# *POSTING PROCEDURE*

A current and legible copy of the following documents must be conspicuously posted as described below to permit workers to observe them on the way to or from work. Temporary job sites must also be posted as required.

## I. ***Radiation Warning Signs*** 64E-5.322, .323 & .324, F.A.C.

When required, areas or rooms where portable gauging devices are located will be posted with a conspicuous sign or signs bearing the radiation symbol and the words "Caution (or Danger), Radioactive Material(s)." The criteria for posting an area with a "Caution (or Danger), Radioactive Material(s)" sign is specified in subsection 64E-5.323(5), F.A.C.

Accessible areas where radiation levels exist that could result in an exposure greater than 5 millirem in any 1 hour at 30 cm from the source of radiation, or from any surface that the radiation penetrates must be posted with a conspicuous sign or signs bearing the radiation symbol and the words "Caution, Radiation Area."

## II. ***Emergency Procedures*** 64E-5.901, F.A.C.

Emergency procedures approved by the Bureau of Radiation Control (bureau) must be conspicuously posted for quick reference in the event of an emergency. The bureau's radiological notification poster may also be posted.

## III. ***"Notice to Employees"*** 64E-5.901, F.A.C.

A current copy of the bureau's "Notice to Employees" must be conspicuously posted for review by workers. The notice describes radiation control regulations, employer and worker responsibilities, radiation exposure reporting requirements, and inspection requirements.

## IV. ***Other Required Documents*** 64E-5.901, F.A.C.

The documents listed will be conspicuously posted, unless the "Notice to Employees" document is used to identify where they can be examined by workers (the form has space available to list where the other documents may be examined).

- Parts III and IX of Chapter 64E-5, Florida Administrative Code
- Radioactive materials license (i.e., the license, conditions or documents incorporated into the license by reference and subsequent amendments)
- Operating procedures

## V. ***Notices of Violations and Related Documents*** 64E-5.901, F.A.C.

Notices of violations, proposed imposition of administrative penalties, or bureau issued orders will be posted within 5 working days after receipt. Responses to such bureau documents will be posted within 5 working days after dispatch. These documents will remain posted for a minimum of 5 working days or until action correcting the violation(s) has been completed, whichever is later.

# *RECORD RETENTION PROCEDURE*

Records pertaining to portable gauging operations will be maintained in accordance with the requirements specified in Chapter 64E-5, Florida Administrative Code, which is described below.

| DOCUMENT | RETENTION INTERVAL | REFERENCE |
|---|---|---|
| Chapter 64E-5, Florida Administrative Code | Until termination of license | 64E-5.901 |
| Radioactive materials license (with all active amendments and supporting documents) | Until termination of license | 64E-5.901 |
| Provisions of radiation protection program | Until termination of license | 64E-5.335(2) |
| Rad. protection program/ALARA reviews | 3 years after records are made | 64E-5.335(2) |
| Training and testing records | Until worker's termination or 5 years, whichever is greater | 64E-5.1307(3) |
| Hazmat employee training records | 90 days from last day of employment | 49 CFR 172.704(d) |
| Leak test records | 3 years after records are made | 64E-5.337 |
| Inventory records | 3 years after records are made | 64E-5.1304 |
| Copies of "IAEA Certificate of Competent Authority" for each gauge's source(s) (Special Form Source Certificate) | 1 year beyond last gauge shipment | 64E-5.1502(2) 49 CFR 173.476(a) |
| Records of Type A package test methods & results for each package used | 1 year beyond last package shipment | 64E-5.1502(2) 49 CFR 173.415(a) |
| Copies of radioactive material shipping papers | 3 years after package shipment | 64E-5.1502(2) 49 CFR 172.201(e) |
| Copies of manufacturer's operation/safety manual for each authorized device model | As long as each gauge model is authorized by the license | 64E-5.212(2) |
| Receipt records | Until disposal is authorized | 64E-5.103 |
| Transfer & disposal records | Until termination of license | 64E-5.340(2) |
| Prior occupational dose histories | 3 years after records are made | 64E-5.308(7) |
| Personnel monitoring (PM) results | Until termination of license | 64E-5.339(5) |
| Annual PM exposure notification reports | 3 years after reports are made | 64E-5.903(2) |
| Individual PM reports following employee termination | 3 years after reports are made | 64E-5.903(3) |
| Records demonstrating compliance with individual members of the public dose limits | Until termination of license | 64E-5.313(5) |
| Records of surveys/measurements used to determine external/internal doses | 3 years beyond the calibration date | 64E-5.336(1) |
| Records of surveys performed to evaluate radiation levels or radiation hazards | Until termination of license | 64E-5.336(2) |
| Survey instrument calibration records | 3 years beyond the calibration date | 64E-5.336(1) |

# LEAK TESTING PROCEDURE

Each sealed source contained in a portable gauging device must be tested at regular intervals to ensure that the radioactive material is secure within its capsule and not leaking contamination. Leak test (LT) requirements are specified in section 64E-5.1303, Florida Administrative Code.

## I. Leak Test Frequency

- CPN International, Inc. gauges will be leak tested at least every 12 months.
- Troxler Electronic Laboratories, Inc., Model 3216, 3241-C, 3241-G, 3242, 3430, 3430-M, 3440, 3440-M, 3450, 3451, 4232, 4301, 4302, 4430, 4640, 4640-B gauges will be leak tested at least every 12 months.
- All other portable gauges will be leak tested at least every 6 months.

## II. Leak Test Kit

Only LT kits provided by licensed vendors will be used to sample (smear) sealed sources contained in portable gauging devices.

## III. Taking the Leak Test Sample

LT samples will be taken only by Authorized Users, wearing their assigned personnel monitoring badges. LT samples will be taken in accordance with the written instructions provided by the supplier of the LT kit and the portable gauging device manufacturer.

## IV. Leak Test Sample Analysis

LT sample analysis will be performed only by vendors specifically licensed to provide the service by the Florida Bureau of Radiation Control, the U.S. Nuclear Regulatory Commission, or other state radiation control agencies.

## V. Leak Test Records

If a test indicates a device's sealed source is contaminated, the portable gauging device will be removed from service and the Florida Bureau of Radiation Control will be notified immediately at (407) 297-2095. A written report on the leaking source will be submitted to the bureau within 5 days (mailing address: Florida Bureau of Radiation Control, Radioactive Materials Program, Bin C21, 4052 Bald Cypress Way, Tallahassee, FL 32399-1741). The report will describe the equipment involved, the test results, and the corrective actions taken (i.e., device removed from service until repaired; radiation surveys conducted to determine presence of contamination; decontamination as necessary).

Leak test records will be retained for 3 years. The records will include the following information:

- Each source's manufacturer name, model, and serial number;
- The identity of each sealed source radionuclide and its estimated activity, expressed in microcuries (or becquerels);
- The measured activity of each leak test sample, in microcuries (or Bq);
- The date the sample was collected; and
- The signature of the Radiation Safety Officer (or the RSO's designee).

# *INVENTORY PROCEDURE*

Semiannual inventories are required to account for the sealed sources contained in portable gauging devices possessed under a radioactive materials license, per section 64E-5.1304, Florida Administrative Code (F.A.C.). To ensure accountability of radioactive material, the procedure described below will be followed.

## A. *Physical Inspection*

At least every 6 months, evaluate the general condition of each gauge to determine if any damage to the source housing or shielding has occurred. In addition, verify that all of the identification and warning labels remain attached and are legible.

If the inspection reveals missing labels or apparent damage, immediately return the device to its transportation case and remove it from service until the problem can be corrected. Immediately report all problems to the Radiation Safety Officer (RSO). If warranted, coordinate with the RSO to have the gauge's radiation levels measured. If excessive radiation levels are discovered, notify the Florida Bureau of Radiation Control (refer to the emergency procedures for the bureau's 24-hour telephone number).

## B. *Inventory Records*

Retain semiannual inventory records for 3 years from the date of the inventory. The attached inventory form (or equivalent) must be used. Relevant inventory information includes:

- Device manufacturer, model number and serial number
- Source manufacturer, model number and serial number
- Source identity and estimated activity
- Location
- Condition
- Date of inventory
- Signature of the RSO (or the RSO's designee)

# NOTIFICATION AND REPORTING PROCEDURE

## I. PURPOSE AND SCOPE

Notification and reporting requirements are found in multiple parts of Chapter 64E-5, Florida Administrative Code (F.A.C.). Additional notifications and reports may be described or repeated in other procedures (e.g., personnel monitoring procedures, emergency procedures). Also, some notification/reporting requirements overlap. The Radiation Safety Officer (RSO) has primary responsibility for completing all required notifications and reports. If there is any doubt about whether a situation requires notification, DON'T HESITATE – MAKE THE CALL.

## II. LICENSE-RELATED NOTIFICATIONS

### A. Change of RSO

64E-5.213(7), F.A.C.

Notify the Florida Bureau of Radiation Control (bureau) in writing within 30 days of a change of RSO. Include documentation of the new RSO's qualifications for the position. Subsection 64E-5.1305(2), F.A.C., lists the minimum qualifications for an RSO. As a minimum, the RSO must have sufficient training to qualify as an authorized user; additional training and experience in administration of a radiation protection program is recommended.

### B. Vacating Premises

64E-5.349, F.A.C.

Notify the bureau in writing no less than 30 days before vacating or relinquishing possession or control of the permanent location of use and storage of radioactive materials. Have the notification dated and signed by a certifying official, and describe the relocation of all radioactive material previously located at the facility. Documentation of transferred material may be required, and radiation surveys of storage facilities may also be required.

### C. Change of Ownership

64E-5.213(2), F.A.C.

A license is only valid for the legal entity to whom it was issued; it may not be transferred, directly or indirectly. Should a change of ownership or a change in majority of controlling interests occur, immediately notify the bureau in writing, and submit an application for a new license. A certifying official representing the original licensee must submit a separate request to terminate the old license upon issuance of the new license replacing it.

### D. Bankruptcy

64E-5.213(3), F.A.C.

Immediately notify the bureau in writing following the filing of a voluntary or involuntary petition for bankruptcy under any chapter of Title 11 of the U.S. Code by or against the licensee, a controlling entity, or an affiliate of the licensee. Identify the bankruptcy court and the date of the petition's filing in the notification.

### E. License Termination

64E-5.214, F.A.C.

Immediately notify the bureau in writing of a decision to terminate licensed activities. Form DH-1059 (Certificate – Disposition of Radioactive Materials) should be used when submitting a termination request. The notification must be dated and signed by a certifying official, and must describe the disposition of all radioactive material possessed under the license. Documentation of radioactive material transfers may be required, and radiation surveys of storage facilities may also be required.

## III. REPORTS OF STOLEN, LOST OR MISSING SOURCES OF RADIATION

### A. Telephone Reports — 64E-5.343(1), F.A.C.

Immediately after its occurrence becomes known, report to the bureau by phone at (407) 297-2095, a stolen, lost or missing radiation source, if it appears that an exposure could result to individuals in unrestricted areas.

### B. Written Reports — 64E-5.343(2), F.A.C.

Follow telephone reports of stolen, lost or missing radiation sources with a written report to the bureau within 30 days after making the report. Include the information specified below.

- A description of the radiation source; for radioactive material, the kind, quantity, and chemical and physical form.
- A description of the circumstances under which the loss or theft occurred.
- A statement of disposition or probable disposition of the radiation source involved.
- Exposures of individuals to radiation, circumstances under which the exposures occurred, and the possible doses received by persons in unrestricted areas.
- Actions that have been or will be taken to recover the source.
- Procedures or measures that have been or will be implemented to prevent recurrence.

## IV. *INCIDENT NOTIFICATIONS*

Incidents involving radiation sources require different types of notifications. Reports may be made by phone or fax; names of individuals who have received radiation exposures must be stated in a separate and detachable portion of the report.

### A. Immediate Notifications — 64E-5.344(1) & (6), F.A.C.

Immediately notify the bureau of any event involving a source of radiation that might have caused or threatens to cause any of the following: an individual to receive a total dose of 25 rem or more, a lens dose of 75 rem or more, or a skin, extremity or total organ dose of 250 rad.

Notify the bureau as soon as possible, but not later than 4 hours after the discovery of an event, such as a fire, explosion, or toxic gas release.

### B. 24-Hour Notifications — 64E-5.344(2) & (7), F.A.C.

Notify the bureau within 24 hours of discovery of an event involving loss of control of a radiation source that might have caused or threatens to cause any of the following: an individual to receive in a period of 24 hours a dose greater than 5 rem, a lens dose greater than 15 rem, or a skin, extremity or total organ dose greater than 50 rem.

## IV. *INCIDENT NOTIFICATIONS*

**B. 24 Hour Notifications** (Continued)

Notify the bureau within 24 hours of discovery of:

- An unplanned contamination event that requires access to the contaminated area to be restricted for more than 24 hours;
- An event in which equipment is disabled or fails to function as designed when the equipment is required to prevent exposures exceeding regulatory limits or to mitigate the consequences of an accident, the equipment is required to be available and operable when it is disabled or fails to function, and no redundant equipment is available and operable to perform the required safety function;
- An event that requires unplanned medical treatment at a medical facility of an individual with radioactive contamination on the individual's clothing or body; or
- An unplanned fire or explosion damaging radioactive material or the device, container or equipment containing radioactive material when the damage affects the integrity of the radioactive material or its container.

**C. Information Required for Immediate/24-Hour Notifications** 64E-5.344(8), F.A.C.

Make reports to the bureau of events requiring immediate or 24-hour notification as described above by phone, and if available at the time of notification, include the following information:

- The caller's name and call back phone number;
- A description of the event, including date and time;
- The exact location of the event;
- The isotopes, quantities and chemical/physical forms of the radioactive material involved; and
- Any personnel radiation exposure data available.

## V. *REPORTABLE EVENTS* 64E-5.345, F.A.C.

**A.** All events requiring immediate or 24-hour notification are classified as reportable events, and require a written report to be submitted to the bureau within 30 days after learning of the event's occurrence. The following occurrences are also classified as reportable events and require written reports to the bureau within 30 days:

- Dose exceeding the occupational dose limits for adults (total dose > 5 rem, organ dose > 50 rem, lens dose > 15 rem, or shallow dose > 50 rem);
- Dose exceeding the occupational dose limits for minors (total dose > 500 mrem, organ dose > 5 rem, lens dose > 1.5 rem, or shallow dose > 5 rem);
- Dose exceeding limit for an embryo or fetus of a declared pregnant woman (500 mrem);
- Dose exceeding limits for members of the public (2 mrem in any one hour or 100 mrem in one year); or
- Radiation levels greater than 20 mrem/hr in unrestricted areas.

## V. REPORTABLE EVENTS (Continued)

**B.** Reports must describe the extent of exposure of individuals, including:

- Estimates of each individual's dose;
- The levels of radiation and activities of radioactive material involved;
- The causes of the elevated exposures or dose rates; and
- The corrective steps taken or planned to prevent recurrence, including a schedule for achieving conformance with applicable limits, ALARA constraints, and license conditions.

Include for each occupational overexposed individual, the person's name, social security number and date of birth. For events involving an embryo/fetus, this information applies to the declared pregnant woman. Prepare reports so that the information on exposed individuals is stated in a separate and detachable portion of the report. When submitting a report to the bureau, also provide a copy to the exposed individual(s), no later than when submitting it to the bureau, in accordance with the provisions of Part IX of Chapter 64E-5, F.A.C. (i.e., include this statement: "This report is furnished to you under the provisions of the Florida Department of Health regulation entitled Chapter 64E-5, Control of Radiation Hazards. You should preserve this record for future reference.").

## VI. REPORTS OF LEAKING/CONTAMINATED SOURCES 64E-5.348, F.A.C.

Immediately notify the bureau upon learning of any leaking or contaminated sealed source. Submit a follow up written report to the bureau within 5 days, and identify the equipment involved, the test results and the corrective action taken.

## VII. REPORTS OF HIGH RAD. LEVELS ON PACKAGES 64E-5.327(4), F.A.C.

Immediately notify the bureau and the final delivery carrier by phone or fax upon learning of external radiation levels exceeding 200 mrem/hr at any exterior surface, or 10 mrem/hr at one meter from any exterior surface of an incoming package containing radioactive material. These limits are specified in 49 CFR 173.441, which is referenced in subsections 64E-5.1505(9) and 64E-5.327(5), F.A.C.

# TRANSFER/DISPOSAL PROCEDURE

Sections 64E-5.103, .215, .328, and .340, Florida Administrative Code (F.A.C.), address transfer and disposal of radioactive material. Portable gauging devices will be transferred only to companies or individuals specifically licensed to possess them, in accordance with the below procedure.

## I. *Verification*

If a portable gauging device containing radioactive material is bought, sold or transferred for disposal, verification of the transferor's and transferee's authorization to possess the radioactive material will be documented. Either a copy of each other's radioactive materials license will be exchanged, and the transferor's license will be retained on file as evidence of an authorized transfer, or one of the other verification methods listed in subsection 64E-5.215(4), F.A.C., will be used.

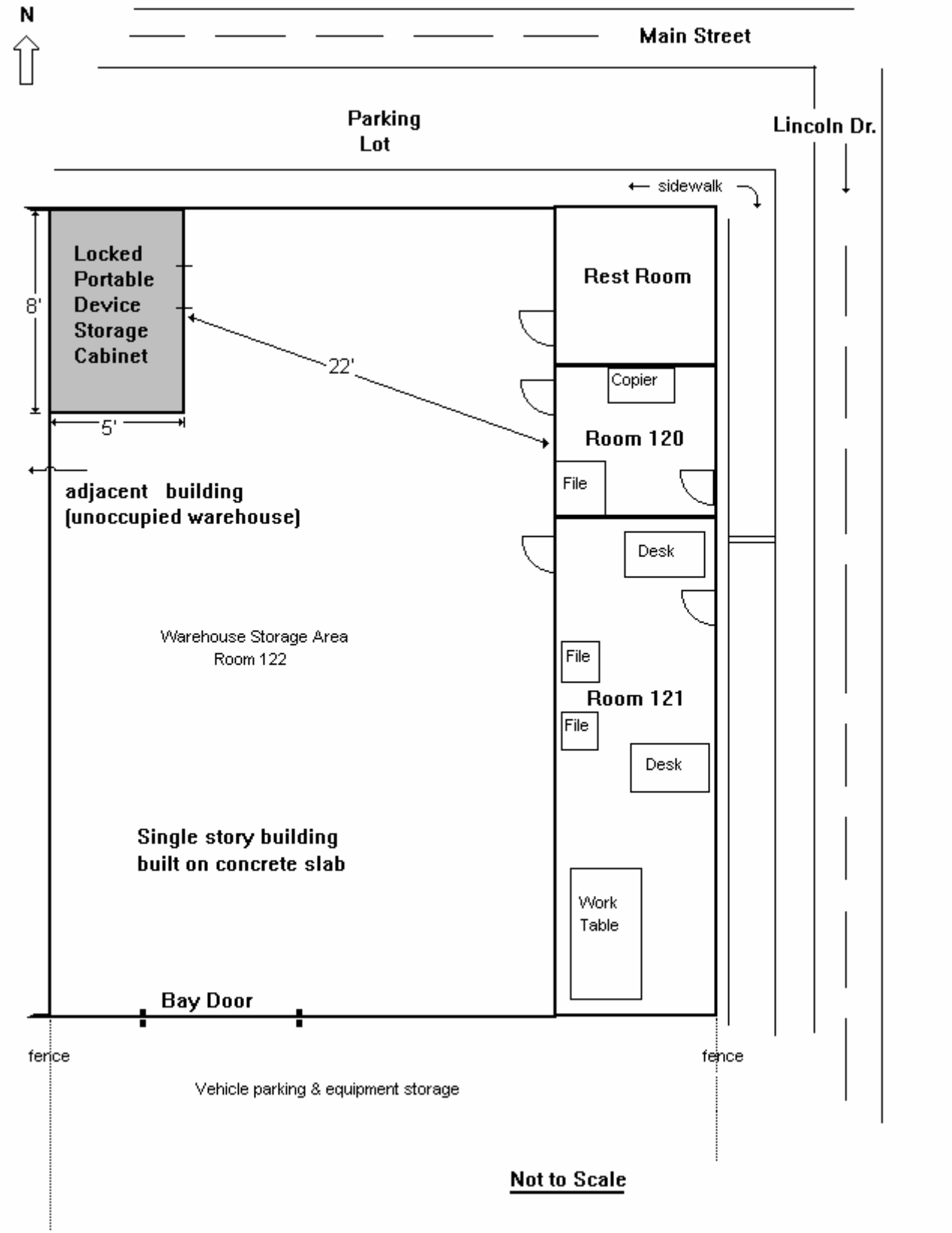
## II. *Documentation*

As a minimum, documentation of the transfer will include the following:

- The material being transferred (gauge manufacturer name, model and serial number, type and activity of radioactive material, and source manufacturer name and model number);
- The date of the transfer;
- The name, address, and license number of the transferor and transferee; and
- The signatures of the individuals shipping and/or receiving the device.

All transfer and disposal records will be retained on file for inspection purposes until license termination.

# *SAMPLE FACILITY DIAGRAM*



# *INVENTORY OF RADIOACTIVE SEALED SOURCES & DEVICES*

**Company:** _____ **FL Rad. Materials License No.** _____

**Date of Inventory:** _____ **Radiation Safety Officer (or designee) Signature:** _____

| # | GL or SL | DEVICE MANUFACTURER & MODEL NO. | DEVICE SERIAL NO. | SOURCE MANUFACTURER & MODEL NO. | SOURCE SERIAL NO. | SOURCE TYPE & EST. ACTIVITY | LOCATION | CONDITION |
|---|---|---|---|---|---|---|---|---|
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**Notes:** **(1)** Listing "In Storage" under the CONDITION column identifies a source held in secured storage with no use anticipated prior to transfer/disposal.
**(2)** GL = Generally Licensed Source/Device; SL = Specifically Licensed Source/Device; Refer to section 64E-5.204, F.A.C.

Page _____ of _____

# *PORTABLE GAUGING DEVICE UTILIZATION LOG*

## DEVICE IDENTIFICATION

MANUFACTURER: _____

MODEL NUMBER: _____ SERIAL NUMBER: _____

| DATE REMOVED FROM STORAGE | DEVICE SIGNED OUT BY (NAME) | JOB SITE (LOCATION OF USE) | DATE RETURNED TO STORAGE | DEVICE RETURNED BY (NAME) |
|---|---|---|---|---|
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LICENSE NAME: _____ LICENSE NO: _____

**Date:** _____

# BILL OF LADING

**Shipper:** _____

**Address:** _____

_____

_____

**Phone No.:** _____

**RQ, Radioactive material, Type A package, special form**
**Hazard Class 7, UN3332**

**Package contains:**

**Cs-137, _____GBq ( _____ mCi)**

**Am-241:Be, _____GBq ( _____ mCi)**

**RADIOACTIVE YELLOW II Label**

**Transport Index (TI) = _____**

**24-HR. EMERGENCY RESPONSE INFORMATION NO.:**

**(  )**

# BILL OF LADING

**Shipper:** _____ **Date:** _____

**Address:** _____

_____

_____

**Phone No.:** _____

## RQ, Radioactive material, Type A package, special form
## Hazard Class 7, UN3332

**Package contains:**

**Cs-137, _____GBq ( _____mCi)**

**Am-241:Be, _____GBq ( _____mCi)**

**RADIOACTIVE YELLOW II Label**

**Transport Index (TI) = _____**

**24-HR. EMERGENCY RESPONSE**
**INFORMATION NO.: ( )**

**This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the U.S. Department of Transportation.**

**Shipper:** _____
**(Signature)**

# *PORTABLE GAUGING DEVICE EMERGENCY RESPONSE INFORMATION*

# POTENTIAL HAZARDS

## IMMEDIATE HAZARDS TO HEALTH

- External radiation hazard from unshielded radioactive material.
- Low-level radioactive material; little personal radiation hazard when shielded.
- Materials in special form are not expected to cause contamination in accidents.
- Some radioactive materials cannot be detected by commonly available instruments.
- Potential internal radiation hazard from inhalation, ingestion, or breaks in skin, only if special form capsule is breached.

## FIRE OR EXPLOSION

- No risk of fire or explosion.
- Radioactivity does not change flammability or other properties of the materials.

# EMERGENCY PROCEDURES

## IMMEDIATE PRECAUTIONS

- Isolate hazard area to within a 10-15 foot radius of the device and restrict access.
- Emergency response actions may be performed prior to any measurement of radiation; limit entry to shortest time possible.
- Notify local authorities and Radiation Control Authority of accident conditions.
- Detain uninjured persons, isolate equipment with suspected contamination, and delay cleanup until receiving instruction from Radiation Control Authority.

## FIRE

- Do not move damaged containers; move undamaged containers out of fire zone.
- Small Fires: Dry chemical, $CO_2$, water spray, or regular foam.
- Large Fires: Water spray, fog (flooding amounts).

## SPILL OR LEAK

- Do not touch damaged containers or exposed contents.
- Damage to outer container may not affect primary inner container.
- Special form capsules are not expected to leak as a result of an accident or fire.

## FIRST AID

- Use first aid treatment according to the nature of the injury.
- Advise medical personnel that victim may be contaminated with low-level radioactive material.
- Except for the injured, detain persons exposed to radioactive material until arrival or instruction of Radiation Control Authority.

# *RADIATION PROTECTION PROGRAM AUDIT CHECKLIST*

## I. *INTRODUCTION*

This form documents performance of the annual radiation protection program audit required by subsection 64E-5.303(3), Florida Administrative Code (F.A.C.). The audit consists of a review of the program's content and implementation, evaluating it's effectiveness in complying with regulatory requirements and keeping radiation exposures to workers and the general public as low as reasonably achievable (ALARA). Records of annual audits must be available for inspection by the Florida Bureau of Radiation Control (FL BRC).

License Name: _____

License No.: _____ Date of Audit: _____

Auditor: _____
(name, title)

_____
(signature)

Management Review: _____
(name, title)

_____
(signature)

## II. *AUDIT HISTORY*

**A.** Last audit conducted on (date): _____

**B.** Any deficiencies noted?…… Yes No

**C.** Were corrective actions taken?……Yes No N/A
(look for signs of recurrence)

**D.** Brief description of prior deficiencies, corrective actions taken: _____

_____

_____

_____

_____

_____

## III. ***ORGANIZATION AND SCOPE OF PROGRAM***

**A.** If the mailing address or permanent address changed, has the license been amended to reflect the change? ..... N/A Yes No

**B.** If ownership has changed or bankruptcy has been filed, was the FL BRC notified? ..... N/A Yes No

**C.** Does the license authorize all sources & devices possessed? ..... Yes No

**D.** Do all temporary job sites meet regulatory definition (serve only one contract, open for less than 18 months)? ..... Yes No

**E.** If no to A., has the FL BRC been notified? ..... Yes No

**F.** If the RSO has changed, has the license been amended to identify the new RSO? ..... N/A Yes No

**G.** Is the RSO meeting the duties & responsibilities for the position? ..... Yes No

**H.** Is company management appropriately involved with the radiation protection program & oversight of the RSO's activities? ..... Yes No

**I.** Does RSO have sufficient time to perform all duties/responsibilities? ..... Yes No

**J.** Staffing sufficient to support to rad. protection program? ..... Yes No

## IV. ***MEMBER OF PUBLIC (MOP) DOSE LIMITS***

**A.** Has a MOP dose compliance study been developed, submitted & approved by the FL BRC? ..... Yes No

**B.** Have licensed activities changed during the year to increase likelihood of public dose limits being exceeded? ..... Yes No

**C.** If yes to B., has a new MOP study been performed to demonstrate compliance with MOP dose limits is still being achieved? ..... N/A Yes No

## V. ***TRAINING PROGRAM***

**A.** All workers likely to exceed 100 mrem/yr provided radiation awareness training per 64E-5.902? ..... Yes No

**B.** All gauge Authorized Users (AUs) completed 8 hrs of FL BRC approved training (or are supervised by trained AUs)? ..... Yes No

**C.** Hazmat employee training provided to workers per 49 CFR Part 172? ..... Yes No

**D.** Field observations of operators demonstrate use of safe work practices & compliance with regulatory requirements? ..... N/A Yes No

# VI. *PERSONNEL MONITORING (PM)*

## A. If PM is conducted:

**1.** PM badges worn properly & protected from heat, light, moisture & chemicals when not being worn? ..... Yes No

**2.** PM badges consistently stored with the control badge in a protected location when not in use? ..... Yes No

**3.** Are badges exchanged in a timely fashion to ensure accurate dosimetry reports? ..... Yes No

**4.** Any badges lost or damaged? ..... Yes No

**5.** If yes to 4., was RSO immediately notified & record of worker's estimated dose provided to badge vendor and kept on file? ..... Yes No

**6.** Any spare badges assigned to workers? ..... Yes No

**7.** If yes to 6., were spare badges marked to identify worker it was assigned to, & vendor notified to add spare badge dose to worker's occupational exposure total? ..... Yes No

**8.** Are dosimetry reports reviewed by the RSO upon receipt? ..... Yes No

**9.** Are PM records maintained on DH-issued or equivalent forms? ..... Yes No

**(a)** Form DH 1623 "Cumulative Occupational Exposure History" or equivalent completed for each monitored worker? ..... Yes No

**(b)** Form DH 1622 "Occupational Exposure Record for a Monitoring Period" or equivalent completed for each monitored worker? ..... Yes No

**10.** Upon hiring, female workers provided instructions regarding radiation risk to embryo/fetus and procedure for declared pregnancies, and documentation of receipt of instructions maintained on file? ..... N/A Yes No

**11.** Female workers declaring pregnancy document their declaration, are provided instructions regarding monitoring and limiting the dose to the embryo/fetus, and receipt of instructions documented? ..... N/A Yes No

**12.** For workers that have declared pregnancies, records kept demonstrating embryo/fetus dose < 50 mrem for gestation period? .... N/A Yes No

**13.** Annual & termination reports provided to workers per 64E-5.903? ..... Yes No

**14.** PM records reviewed from (*dates*): _____ to _____

**15.** Highest annual dose: _____mR Date: _____

**16.** Occupational exposures within limits? ..... Yes No

**17.** Do PM records indicate that worker doses are being kept ALARA? ..... Yes No

## VI. ***PERSONNEL MONITORING (PM)***

**B. <u>If PM is not conducted</u>:**

**1.** Has a request for an exemption from 64E-5.1310(1) been submitted & approved by the FL BRC? ..... Yes No

**2.** Have licensed activities changed during the year to increase workers' radiation exposures (i.e., expanded work load)? ..... Yes No

**3.** If yes to 2., has a new evaluation been performed to demonstrate workers' doses are likely to remain <u>≤</u> 500 mrem/yr? ..... Yes No

## VII. ***POSTING AND LABELING***

**A.** Following documented posted at permanent facility:

**1.** Emergency procedures ..... Yes No

**2.** "Notice to Employees" (3/01 edition) ..... Yes No

**3.** Any notice of violations, proposed imposition of administrative penalties, and Florida Bureau of Radiation Control-issued orders and responses to the cited violations ..... Yes No

**3.** Parts III and IX of Chapter 64E-5, F.A.C., company radioactive materials license, and company operating procedures unless a notice (such as the "Notice to Employees" form) is posted that identifies the documents and where they can be viewed ..... Yes No

**B.** Above documents posted in conspicuous location(s) to permit workers to observe them on way to/from work? ..... Yes No

**C.** Radiation signs:

**1.** "Caution (or Danger), Radioactive Material" signs: posted at permanent facility & job sites where portable gauging devices are stored [unless documentation kept describing eligibility for exception described in 64E-5.324(3)]? ..... Yes No

**2.** "Caution (or Danger), Radiation Area" signs: Is manufacturers' information kept on file to demonstrate that device's radiation levels are too low to require posting of radiation area signs around storage areas? ..... Yes No

**D.** Portable gauging devices bear durable, clearly visible labels w/ radiation symbol, "Caution (or Danger), Radioactive Material" warning, & sufficient information to permit individuals to avoid/minimize exposures? ..... Yes No

## VIII. ***SECURITY***

**A.** Each portable gauging device is provided a storage/transport container equipped w/ lock/seal? ..... Yes No

**B.** Minimum of two independent physical controls used to prevent access to portable gauging devices during transport and temporary storage? ..... Yes No

## VIII. ***SECURITY*** (Continued)

**C.** Portable gauging devices kept secured against unauthorized access/removal when not under direct surveillance? ..... Yes No

**D.** Extra precautions used to deter theft (e.g., concealing devices from view during transport/storage, maintaining elevated level of awareness in high crime areas? ..... Yes No

## IX. ***OPERATING AND EMERGENCY (O&E) PROCEDURES***

**A.** Any revisions to O&E procedures made that have not been reviewed & approved by the FL BRC? ..... Yes No

**B.** O&E procedures list correct phone numbers for RSO & FL BRC? ..... Yes No

**C.** O&E procedures accompany portable gauges at all times? ..... Yes No

## X. ***TRANSPORTATION***

**A.** Portable gauging devices transported to job sites are prepared & transported in same manner as when offered to third party for shipment? ..... Yes No

**B.** Only DOT-7A or other authorized packages used to transport devices? ..... Yes No

**C.** Packages used to ship devices properly marked & labeled per 49 CFR Part 172, Subparts D & E? ..... Yes No

**D.** Shipping containers properly locked, blocked & braced prior to transport? ..... Yes No

**E.** Prior to shipment, transport containers inspected to ensure proper packaging, unimpaired physical condition of container & closure devices? ..... Yes No

**F.** Properly completed bill of lading & emergency response information provided for each device shipment? ..... Yes No

**G.** Shipping papers & emergency response information immediately accessible to driver during shipment of devices? ..... Yes No

**H.** Devices classified as excepted instruments/articles (e.g., XRF analyzers) have notice included w/ package listing consignor/consignee name & conformity statement per 49 CFR 173.422? ..... Yes No

## XI. ***GENERAL RULES OF USE***

**A.** Management & RSO emphasize to workers importance of maintaining doses ALARA? ..... Yes No

**B.** Field observations of workers conducted to evaluate performance? ..... Yes No

**C.** Good work practices used by workers to minimize doses (i.e., time, distance, shielding, general use rules)? ..... Yes No

## XII. *LEAK TESTS*

**A.** Sealed sources leak tested at required intervals? ..... Yes No

**B.** Leak tests conducted by authorized personnel following procedures approved by the FL BRC? ..... Yes No

**C.** Leak test records include all information required by 64E-5.1303? ..... Yes No

**D.** Any sources found leaking, & if so, was the FL BRC notified? ..... Yes No

## XIII. *GAUGE INVENTORY*

**A.** Receipt & transfer/disposal records maintained? ..... Yes No

**B.** Portable gauging devices physically inventoried at 6-month intervals? ..... Yes No

**C.** Inventory records document all necessary information? ..... Yes No

## XIV. *GAUGE MAINTENANCE*

**A.** Copies of the manufacturer's operation/maintenance manuals maintained on file for reference? ..... Yes No

**B.** Manufacturer's procedures referenced & followed for routine cleaning & lubrication of portable gauging devices? ..... Yes No

**C.** Non-routine device maintenance performed in-house? ..... Yes No

**D.** If yes to C., is non-routine device maintenance conducted by authorized personnel following procedures approved by the FL BRC? ..... Yes No

## XV. *RADIATION SURVEY INSTRUMENTS*

**A.** If a survey meter is not possessed, are specific plans in place to have one available when needed? ..... N/A Yes No

**B.** If a survey meter is possessed:

**1.** Has the meter been approved by the FL BRC? ..... Yes No

**2.** Is there access to an equivalent back-up meter when the primary meter is out for calibration/repair? ..... Yes No

**3.** Is the meter calibrated annually & after repair by a licensed vendor, & are calibration records maintained? ..... Yes No

## XVI. *RECORD KEEPING, NOTIFICATIONS & REPORTS*

**A.** All required documents maintained on file at permanent facility for duration specified by 64E-5 (refer to record keeping procedure)? ..... Yes No

**B.** Did any incidents/emergencies occur since last audit? ..... Yes No

## XVI. *RECORD KEEPING, NOTIFICATIONS & REPORTS* (Continued)

**C.** If yes to B., was the response appropriate? (i.e., operator followed emergency procedures, required notifications/reports timely filed, cause of incident investigated, corrective actions taken & documented? ..... Yes No

## XVII. *INDEPENDENT AUDITS/INSPECTIONS*

**A.** Any independent audits/inspections conducted since last internal audit (e.g., consultant or FL BRC inspection)?..... Yes No

**B.** If yes to A., summary of deficiencies identified & corrective actions taken: _____

## XVIII. *AUDIT DEFICIENCIES & CORRECTIVE ACTIONS*

**A.** Summary of problems/deficiencies identified during this audit: _____

## XVIII. ***AUDIT DEFICIENCIES & CORRECTIVE ACTIONS*** (Continued)

**B.** Description of corrective actions planned or taken: _____

**C.** Description of other recommendations for improvement: _____

# *INSTRUCTIONS FOR WOMEN WORKING WITH RADIATION*

I have received verbal instructions concerning the potential risks involved for pregnant women exposed to radiation, including a copy of U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure" (Rev. 3, 6/99).

The radiation safety officer (RSO) has encouraged me to ask for additional information if needed, and I am aware that the RSO is available to answer any questions I may have regarding the issue of radiation exposure to an embryo/fetus.

_____

Signature

_____

Printed Name

_____

Date

_____ _____

RSO Signature Date

# *DECLARATION OF PREGNANCY*

To: _____

In accordance with Florida regulations, section 64E-5.311, Fla. Administrative Code ("Dose to an Embryo or Fetus"), I am declaring that I am pregnant. I believe that I became pregnant in

_____ _____
Month Year

I understand that the radiation dose to my embryo/fetus during my entire pregnancy will not be allowed to exceed 500 millirem (unless that dose has already been exceeded between the time of conception and submitting this declaration). I also understand that meeting the lower dose limit may require a change in job or job responsibilities during my pregnancy.

_____
Signature

_____
Printed Name

_____
Date

# *INSTRUCTIONS FOR DECLARED PREGNANT WOMEN*

I have received verbal instructions on personnel monitoring (PM) requirements for declared pregnant women conducting activities involving sources of radiation, in accordance with the requirements of my employer's radiation safety program, the terms and conditions of my employer's radioactive materials license (and/or certification of registration, as applicable), and Chapter 64E-5, Florida Administrative Code.

I have been instructed to wear my assigned PM badge at waist level to estimate the embryo/fetus dose. I am aware that the fetal dose is not allowed to exceed 500 millirem during the entire pregnancy as a result of occupational radiation exposures (unless that dose has already been exceeded between the time of conception and submitting my declaration of pregnancy), and that meeting the lower dose limit may require a change in job or job responsibilities during my pregnancy. I must make every effort to maintain the fetal dose as low as reasonably achievable (ALARA), and I am also aware that the Florida Bureau of Radiation Control recommends that an embryo/fetus not receive more than 50 millirem in any one month. I understand that records of fetal dose are maintained with my dose records.

The radiation safety officer has encouraged me to ask for additional information if needed, and to review information on the potential risks involved for pregnant women exposed to radiation, particularly U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 8.13.

_____

Signature

_____

Printed Name

_____

Date

_____ _____

RSO Signature Date

# *DELEGATION OF AUTHORITY TO MAKE LEGALLY BINDING STATEMENTS*

Memo To: All Employees and the Florida Bureau of Radiation Control

From: Chief Executive Officer/President/Vice President/COO/CFO

Subject: Delegation of Authority to Make Legally Binding Statements

_____ has been delegated authority to make legally binding statements on behalf of our company in matters related to our Florida radioactive materials license.

_____

Certifying Official Signature

_____

Name (Typed or Printed)

_____

Title

_____

Date

**FLORIDA DEPARTMENT OF HEALTH**
**RADIOACTIVE MATERIALS PROGRAM**
**APPLICATION FOR RADIOACTIVE MATERIALS LICENSE**
**NON-HUMAN USE**

INSTRUCTIONS - Complete Items 1 – 15 as applicable. Item 15 must be completed on all applications. Use supplemental sheets where necessary. **Mail the original and one copy to:** Department of Health, Bureau of Radiation Control, Radioactive Materials Program, 4052 Bald Cypress Way, Bin #C21, Tallahassee, FL 32399-1741. *Regulatory Guidance Documents are available from the Bureau of Radiation Control to assist in completing this application.*

**1.a. LEGAL NAME, MAILING ADDRESS** (Include ZIP code), FEI #, Phone & Fax Numbers:

FEI #_____

Telephone # _____

Fax # _____

**1.b. STREET ADDRESS WHERE RADIOACTIVE MATERIALS WILL BE USED OR STORED** (Include ZIP Code)

☐ Same as 1.a.

**2.a. LICENSE APPLICATION FEE CATEGORY**
(See 64E-5.204, F.A.C., for license descriptions)

_____

**b.** LICENSE FEE ENCLOSED: $_____

**3. THIS IS AN APPLICATION FOR:**

☐ **a.** New License

☐ **b.** Amendment To License Number:_____

☐ **c.** Renewal Of License Number:_____

**4. INDIVIDUAL USERS & REQUESTED USES**
(Name all individuals who may receive, possess, prepare, use or transfer radioactive materials or directly supervise others in these activities.)

☐ SEE ATTACHED LIST

**5.a. RADIATION SAFETY OFFICER (RSO):**
(Name and Contact Information)

Name: _____

RSO Phone #:_____

RSO E-Mail: _____

**5.b. ALTERNATE EMERGENCY CONTACT:**

Name: _____

Contact Phone #: _____

Contact E-Mail: _____

## 6. TRAINING AND EXPERIENCE IN RADIATION SAFETY

**a. FORMAL TRAINING IN RADIATION SAFETY**: Describe the formal training for each individual named in Items 4 and 5, including principles and practices of radiation protection, radioactivity measurement, monitoring techniques and the use of instruments, mathematics and calculations basic to the use and measurement of radioactivity, and biological effects of radiation. Include the name of the person or institution providing the training, duration of training and when training was received. Attach a copy of any training certificate received if applicable.

☐ **SEE ATTACHED LIST**

**b. EXPERIENCE:** Describe the radiation work experience for each individual named in Items 4 and 5, including where the experience was obtained or attach a copy of a radioactive materials license that identifies them by name as an authorized user. Include a list of radioisotopes and the maximum activity of each use. Work experience or on-the-job training should be commensurate with the proposed use.

☐ **SEE ATTACHED LIST**

## 7. RADIOACTIVE MATERIAL

| a. Isotope | b. Chemical or Physical Form (If sealed sources, include manufacturer name and model numbers) | c. Maximum Amount Or Activity Possessed At Any One Time. (If sealed source, state the number of sources, maximum activity per source and total activity) |
|---|---|---|
| Ex. Co-60 | Sealed source XYZ Corp. Model XYZ for use in XYZ Corp Model AAA therapy device or liquid/gas/powder. | 30 sources, 2 curies each for a total of 60 curies. |
| ☐ SEE ATTACHED LIST | | |
| | | |
| | | |
| | | |
| | | |

**8. DESCRIBE THE PURPOSE FOR WHICH EACH RADIOACTIVE MATERIAL LISTED IN ITEM 7, ABOVE WILL BE USED.**

(For each sealed source, include the manufacturer's name and model number of the device, gauge or storage container where the source will be used or stored. List a line item for each different type of use for the same or different isotopes.

Ex. Co-60 to be used in a xyz corporation model AAA device in a BBB source holder for the measuring of density of materials in a process vessel.

☐ SEE ATTACHED LIST

**9. LIST EACH TYPE OF RADIATION DETECTION INSTRUMENT (i.e., survey meters, counters, etc.)**

| **TYPE OF INSTRUMENTS** (include manufacturer and model number of each) | **USE** (e.g., monitoring, surveying, measuring) | **RADIATION DETECTED** (beta, gamma, alpha, neutrons) | **SENSITIVITY RANGE Low –High** (mR/hr) | **NUMBER AVAILABLE** |
|---|---|---|---|---|
| Ex. XYX Co. Model 1 survey meter with Model 33 probe | Monitoring & surveying for removable contamination | Beta & Gamma | 0.1 mR/hr – 1 R/hr | 2 |
| ☐ SEE ATTACHED LIST | | | | |
| | | | | |
| | | | | |

**10. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 9 ABOVE.**

**a.** ☐ **Calibration by Licensed Service Company**
Calibration Frequency will be at Intervals Not to Exceed: _____ months

**b.** ☐ **Calibration by Applicant** (Attached is a separate sheet describing procedures, frequency and standards used for calibration of instruments.)

**11. PERSONNEL MONITORING DEVICES. Complete Items a, b, & c.** (Check all that are applicable)

**a.** ☐ Film ☐ OSLD ☐ TLD ☐ Other (See attached) (Provider Must be NVLAP Certified)

**b.** ☐ Whole Body: Exchange Frequency Not to Exceed: _____ Months
☐ Extremity: Exchange Frequency Not to Exceed: _____ Months

**c.** Radiation Detected: ☐ Beta ☐ Gamma ☐ Neutron

**12. FACILITIES AND EQUIPMENT.** Attach a description of facilities where radioactive material, including waste, will be used or stored. **Attach an annotated diagram of the areas of use and/or storage, including adjacent areas.** Describe equipment such as remote handling devices, storage containers, shielding, fume hoods, etc. Describe security at your facility such as locks, chains, alarms, security camera, security services, etc.

☐ Description of facilities and equipment also attached with annotated diagram of the areas of use or storage, including adjacent areas.

☐ Attached is a description of security at facilities of the areas of radioactive materials are used or stored to prevent theft or unauthorized access to radioactive materials.

**13. RADIATION PROTECTION PROGRAM.** Attach a radiation protection program as appropriate for the material to be used, including general radiation safety procedures, emergency procedures, security, and bioassay procedures, etc. (Note that possession of large quantities of certain isotopes, such as those used in fixed gauges, industrial radiography, or irradiators for use in research or blood products, may require additional increased controls for security measures or national source tracking as required by 64E-5.350 and 64E-5.351, FAC.)

☐ Radiation Protection Program Details Attached

**14. WASTE DISPOSAL.** Describe the procedures for handling, storing and disposing of radioactive wastes (solid, liquid and/or gas). Name the commercial waste disposal service employed, if applicable. If sealed sources and/or devices will be returned to the manufacturer, so state.

☐ See Attached for Details on Radioactive Waste Disposal

**15. CERTIFICATE**

The applicant and any official executing this certificate on behalf of the applicant named in Item 1, certify that this application has been prepared in accordance with Chapter 64E-5, Florida Administrative Code, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief. *In addition, the applicant or executing official is acknowledging that they are aware that knowingly making false statements to a public servant is a violation of section 837.06, Florida Statutes, and is punishable by fine or imprisonment*

Certifying Official (Signature)

Name (typed or printed)

Title

Date

Warning: KNOWINGLY MAKING FALSE STATEMENTS TO A PUBLIC SERANT IS A VIOLATION OF SECTION 837.06, FLORIDA STATUTES, AND IS PUNISHABLE BY FINE OR IMPRISONMENT

# *LIST OF ATTACHMENTS PROVIDED WITH APPLICATION*

## TABLE 1. APPENDICES

| Appendix | Title | Attached | Equivalent | N/A |
|---|---|---|---|---|
| App. A | Member of the Public (MOP) Dose Limit Compliance Study | | | |
| App. B | ALARA Policy | | | |
| App. C | Duties and Responsibilities of the Radiation Safety Officer | | | |
| App. D | Radiation Safety Training Program | | | |
| App. E | Personnel Monitoring Procedures | | | |
| App. F | Operating Procedures | | | |
| App. G | Emergency Procedures | | | |
| App. H | Procedures for Ordering, Receiving, Opening and Shipping Portable Gauging Devices | | | |
| App. I | Posting Procedure | | | |
| App. J | Record Retention Procedure | | | |
| App. K | Leak Test Procedure | | | |
| App. L | Inventory Procedure | | | |
| App. M | Notification and Reporting Procedure | | | |
| App. N | Transfer/Disposal Procedure | | | |

## TABLE 2. EXHIBITS

| Exhibit | Title | Attached | Equivalent | N/A |
|---|---|---|---|---|
| Ex. A | Sample Facility Diagram | | **X** | |
| Ex. B | Model Inventory Sheet | | | |
| Ex. C | Model Utilization Log | | | |
| Ex. D-1 | Model Shipping Paper – Private Use Shipment | | | |
| Ex. D-2 | Model Shipping Paper – Common Carrier Shipment | | | |
| Ex. E | Model Emergency Response Information | | | |
| Ex. F | Model Radiation Protection Program Audit Document | | | |
| Ex. G | Model Instructions to Female Workers | | | |
| Ex. H | Model Declared Pregnancy Document | | | |
| Ex. I | Model Instructions for Declared Pregnant Women | | | |
| Ex. J | Delegation of Authority to Make Legally Binding Statements | | | |

## TABLE 3. SUPPLEMENTS

| Supplement | Title | Attached | Equivalent | N/A |
|---|---|---|---|---|
| Supp. A | Form DH-1054 "Application for Radioactive Materials License – Non-Human Use" | **X** | | |
| Supp. B | Attachments Table | **X** | | |
| Supp. C | Portable Gauging Device License Application Checklist | | | **X** |
| Supp. D | Guide to SI Units for Radiation Protection | | | **X** |
| Supp. E | Course Outline for Portable Gauging Device Radiation Safety Training Program | | | |

# PORTABLE GAUGING DEVICE LICENSE APPLICATION CHECKLIST

- This checklist is for applicants using DOH Form DH-1054 to apply for or renew a category 3L(I) radioactive materials license authorizing possession and use of portable gauging devices. DOH Regulatory Guide 1.10 provides detailed instructions for preparing the application. Appendices, exhibits and supplements referenced below are found in the guide, which is available on the Internet at <http://www.doh.state.fl.us/environment/radiation/> or by calling the Florida Bureau of Radiation Control (bureau) at (850) 245-4545.
- U.S. DOT regulations (49 CFR) are available on the Internet at < http://www.access.gpo.gov/nara/cfr/cfr-table-search.html#page1>.
- To prevent the potential for identity theft, never submit documentation that lists individuals' social security numbers or birth dates.

| CHECK WHEN ADDRESSED | APPLICATION ITEM | NOTES |
|---|---|---|
| ☐ 1.a. | **Name/Mailing Address** | – Unless applying as an individual, list the business name registered with the Florida Division of Corporations; name registration may be verified by phone at (800) 755-5111 or online at <http://www.sunbiz.org/>; list the Federal Employer Identification (FEI) number if applicable; if doing business as (d/b/a) a fictitious name, add "d/b/a *Fictitious Name*"<br>– Under "Mailing Address," list address to be used for license-related correspondence |
| ☐ 1.b. | **Location of Use and/or Storage** | – For location of use, list "temporary job sites"; for location of storage, list the street address of the permanent facility where portable gauging devices will be stored & where records will be available for inspection; if gauges will also be stored overnight at temporary job sites, add "& at temporary job sites"; 64E-5.208(2), .213(5) |
| ☐ 2. | **License Category/Fee** | – The license category is 3L(I); a non-refundable application fee ($726.00 as of 8/07) is required for new license applications; there is no fee for license renewal applications; annual/reclamation fees ($1,216.95 as of 8/07) are due within 60 days of license issuance & annually thereafter; 64E-5.204 |
| ☐ 3. | **Purpose of Application** | – Check the appropriate box; if applying to renew a license, list the license number |
| ☐ 4. | **Individual Users** | – List the name of the RSO & all authorized users (AUs) – individuals trained to use or supervise the use of portable gauging devices; 64E-5.208(2) |
| ☐ 5. | **Rad. Safety Officer (RSO)** | – List the name of the RSO (must be an AU); 64E-5.208(2), .1305(1) |
| ☐ 6. | **Training and Experience in Radiation Safety** | – Enclose relevant documentation on training for the RSO & each AU (i.e., training certificates, not resumes); min. of 8 hrs training covering 64E-5.1307(1) subjects; if training provided by a third party, it may be necessary to submit a separate record of training on in-house O&E procedures; a description of experience not required unless seeking approval to be an instructor for in-house training; 64E-5.208(1), .1305, .1307 |
| ☐ 7. | **Radioactive Material** | – List the element, source manufacturer & model no., maximum activity for each source & no. of sources requested; 64E-5.208(2) |
| ☐ 8. | **Use** | – List the manufacturer, model no. & intended use for each device, & brief description of the intended use(s); 64E-5.208(2) |
| ☐ * | **Current RAM Inventory** | – For renewal applications, submit current inventory of all radioactive material, including exempt, generally & specifically licensed sources/devices; 64E-5.212(2) |
| ☐ 9. | **Radiation Detection Instruments** | – A survey meter is not typically required, but if used, list the manufacturer, model no., detection capability & range of each instrument; 64E-5.208(2)<br>– If using a survey meter, confirm access to an equivalent backup instrument when the primary meter is unavailable due to calibration or repair; 64E-5.208(2)<br>– If not using a survey meter, confirm that arrangements have been made to obtain a calibrated survey meter for use in conducting radiation surveys in the event of an accident or to assess suspected damage to a portable gauging device; 64E-5.208(2) |

# PORTABLE GAUGING DEVICE LICENSE APPLICATION CHECKLIST

| CHECK WHEN ADDRESSED | | APPLICATION ITEM | NOTES |
|---|---|---|---|
| ☐ | **10.** | **Calibration of Radiation Detection Instruments** | – If applicable, list the name, license no. & address of the instrument calibration vendor (may include option of using other licensed vendors) & confirm annual calibration frequency; if seeking to conduct in-house calibrations, submit detailed procedures (additional guidance is available from the bureau); 64E-5.208(2), .314 |
| ☐ | **11.** | **Personnel Monitoring (PM) Devices** | – List the type of whole body PM badge (e.g., FB, OSLD, TLD) used, the supplier, & exchange frequency (at least quarterly); if using gauges containing Am-241 sources, PM badges must be capable of detecting neutrons; a list of approved suppliers is available from the bureau; 64E-5.208(2), .314, .315 |
| ☐ | **12.** | **Facilities & Equipment** | – Submit a diagram of the permanent facility showing the portable gauging device storage location & all adjacent areas; indicate the storage area's proximity to work stations (see **Exhibit A** for a sample facility diagram); 64E-5.208(2)<br>– Describe the storage area (e.g., cabinet, locker, closet) demonstrates adequate capacity for maximum number of devices authorized by license; 64E-5.208(2)<br>Describe security at the perm. facility to prevent access to stored devices (minimum of 2 independent physical controls representing tangible barriers must be used to secure the devices from unauthorized access or removal); 64E-5.208(2), .320, .1311 |
| | **13.** | **Rad. Protection Program** | 64E-5. 208(2), .303 |
| ☐ | **A.** | **Member of Public (MOP) Dose Study** | – Refer to **Appendix A** for guidance; 64E-5.208(2), .303, .313<br>– <u>New license applicants</u>: submit procedures for demonstrating compliance with MOP dose limits (< 2 mrem in any 1 hr in unrestricted areas, < 100 mrem/yr)<br>– <u>Renewals</u>: submit completed study demonstrating compliance with public dose limits |
| ☐ | **B.** | **ALARA Policy** | – Submit policy describing management's commitment to ALARA principles & to performance of an annual rad. protection program review/ALARA audit; **App. B** is a model ALARA policy; **Ex. F** is a model audit form; 64E-5.208(2), .303 |
| | **C.** | **Radiation Safety Officer** | 64E-5.208(2), .1305 |
| ☐ | **(1)** | **RSO Duties** | – Describe the RSO's duties, equivalent to the duties listed in 64E-5.1305(3); **App. C** is a model procedure |
| ☐ | **(2)** | **Notification of RSO Change** | – Submit a statement confirming that written notification will be submitted to the BRC within 30 days of a change of RSO or other safety positions (**App. C** includes this commitment); 64E-5.213(7) |
| | **D.** | **Radiation Safety Training Program** | – Submit a program that addresses all training components described below; **App. D** is a model program; 64E-5.208(2), .1307(2); .1312, .1313, .1501, .1502, 49 CFR |
| ☐ | **(1)** | **Instructions to Workers** | – Describe how "Instructions to Workers" (radiation awareness) training will be provided to occupational radiation workers per 64E-5.902 |
| ☐ | **(2)** | **AU Training** | – Describe how AU training will be provided to all operators per 64E-5.1307 & .1312 [min. of 8 hrs. formal training covering .1307(1) subjects]; identify any third parties used to provide rad. safety training<br>– If seeking to conduct AU training in-house, describe the proposed course per 64E-5.1307(2), including instructor qualifications, course description, method of testing (w/ sample exam) & retesting; **Supp. E** is a model training course outline |

# PORTABLE GAUGING DEVICE LICENSE APPLICATION CHECKLIST

| CHECK WHEN ADDRESSED | APPLICATION ITEM | NOTES |
|---|---|---|
| | **13. Rad. Protection Program** | (contd.) |
| ☐ | **D.(3) Hazmat Employee Training** | – Describe hazmat employee training provided to satisfy 49 CFR Part 172; training may be done in-house or by third parties, & may be part of rad. awareness/AU training; address record-keeping requirements per 49 CFR 172.704 |
| ☐ | **E. PM Program** | – Submit instructions for administration of the PM program; **App. E** is a model procedure; 64E-5.208(2), .315, .339, .903, .1302 |
| ☐ | **F. Operating & Emergency (O&E) Procedures** | Procedures must address all applicable subjects identified in 64E-5.1302 |
| ☐ | **(1) Operating Procedure** | – Provide general instructions for maintaining exposures ALARA, use of personnel monitoring devices, methods and occasions for conducting radiation surveys, securing portable gauging devices from unauthorized access or removal, and routine maintenance and availability of procedures; **App. F** provides model O&E procedures; 64E-5.208(2), .1302 |
| ☐ | **(a) Procedure Availability** | – Refer to **Sec. II of App. F**; 64E-5.208(2), .1302 |
| | **(i) O&E Procedures** | – Provide instructions to have a copy of the O&E procedures accompany portable gauging devices at all times |
| | **(ii) Gauge Manuals** | – Provide a commitment to maintain copies of the manufacturer's operation/maintenance manuals for each device model authorized by the license on file for reference |
| ☐ | **(b) PM Procedures** | – Submit instructions for use of PM badges; **Sec. III of App. F** is a model procedure; 64E-5.303(2), .1302(1) |
| ☐ | **(c) General Rules of Use** | – **Sec. IV of App. F** provides model procedures; 64E-5.208(2), .303(2), .1302(1) |
| | **(i) ALARA Principles** | – Provide instructions on proper handling & use of devices to minimize exposures |
| | **(ii) Precautions** | – Provide instructions to: (a) use devices in accordance w/ manufacturer's instructions; (b) not open/remove sources from source holders; (c) prohibit contact with or direct viewing of source rod or placement of hands, etc. in radiation field |
| | **(iii) Radiation Surveys** | – Provide instructions to have the RSO arrange for a survey to be performed if damage to a portable gauging device is suspected |
| ☐ | **(d) Security** | – Provide instructions on securing portable gauging devices to prevent unauthorized access, including a commitment to maintain direct surveillance when not in storage, & to provide two locks between a stored device & the public; refer to **Sec. V of App. F** for model procedures & **Ex. C** for a model utilization log (recommended for users of multiple gauges); 64E-5.320, .321, .1302(3), .1311 |
| ☐ | **(e) Routine Maintenance** | – Provide instructions to: (a) restrict performance of routine maintenance & cleaning to AUs in accordance w/ manufacturer's instructions; & (b) prohibit non-routine maintenance or repair requiring removal of the source/source rod; **Sec. VI of App. F** is a model procedure; 64E-5.208(2) |
| ☐ | **(f) Special Procedures for Depth Probes** | – If requesting authorization for depth probes (devices capable of extending to depths > 3'), include O&E procedures providing instructions specific to those devices (e.g., CPN Model 501, 503, Troxler Model 4300 Series); 64E-5.208(8), .212(2), .1302 |
| ☐ | **(2) Emergency Procedures** | – Provide instructions for handling portable gauging device loss, theft or damage; include emergency notification numbers for the RSO & FL BRC; **App. G** is a model procedure; 64E-5.208(2), .1302 |

# PORTABLE GAUGING DEVICE LICENSE APPLICATION CHECKLIST

| CHECK WHEN ADDRESSED | APPLICATION ITEM | NOTES |
|---|---|---|
| | **13. Rad. Protection Program** | (contd.) |
| ☐ | **F.(3) Ordering, Receiving, Opening & Shipping** | – Provide instructions for ordering, receiving and opening shipments; **Sections I and II of App. G**; 64E-5.208(2), .327, .1302, .1501, .1502, 49 CFR<br>– Provide instructions for transport of portable gauging devices per DOT regs (inspection, packaging, marking, labeling, blocking/bracing, security); **Section III of App. G**; 64E-5.321, .1302, .1311, .1501, .1502, 49 CFR<br>– Provide sample shipping papers & an emergency response information (ERI) sheet; **Ex. D-1 and D-2** are model shipping papers; **Ex. E.** is a model ERI sheet; 64E-5.208(2), .1302, .1501, .1502, 49 CFR |
| ☐ | **(4) Posting** | – Provide instructions to address posting requirements specified in 64E-5 Parts III, IX & XIII; **App. I** is a model procedure; 64E-5.208(2), .323, .901, .1302 |
| ☐ | **(5) Record Retention Procedure** | – Submit procedure addressing record-keeping requirements specified in 64E-5; **App. J** is a model procedure; 64E-5.208(2), .1302<br>– Provide commitment to maintain on file, for at least 1 year after the last shipment, copies of the testing methods & results for each Type A package in use (contact device manufacturers for the documentation); 64E-5.1502(2), 49 CFR 173.415(a) |
| | **G. Leak Testing (LT)** | – **App. K** is a model procedure; 64E-5.208(2), .1303 |
| ☐ | **(1) LT Kit & Vendor** | – List: (a) manufacturer name & model no. of LT kit used, & (b) name & license no. of vendor contracted to perform LT sample analysis (may include option of using other licensed vendors) |
| ☐ | **(2) LT Procedure** | – Provide instructions for: (a) the interval LTs will be performed (6/12 months) & (b) collecting LT samples |
| ☐ | **H. Inventory** | – Submit procedure for performance of semi-annual physical inventories, including sample inventory form; **App. L** provides a model procedure; **Ex. B** is a model inventory sheet; 64E-5.208(2), .1304 |
| ☐ | **I. Notification and Reporting Procedure** | – Submit procedure addressing applicable notification and reporting requirements; **App. M** is a model procedure; .64E-5.208(2) and Part III |
| ☐ | **14. Waste Disposal** | – Submit procedure with a commitment that portable gauging devices will be transferred only to licensed recipients (e.g., manufacturer, waste broker); **App. K** is a model procedure; 64E-5.208(2), Part III, .1302 |
| ☐ | **15. Certificate** | – Have application signed & dated by a certifying official – a person authorized to make legally binding statements on behalf of the applicant; e.g., president, CEO, etc. |

**Notes:**

# GUIDE TO SI UNITS FOR RADIATION PROTECTION

## I. *Introduction to SI Units*

SI (Systeme International) units comprise the primary measurement system for most countries. The system is also finding increasing use in the United States. State and federal regulatory agencies, including the Florida Bureau of Radiation Control and the U.S. Nuclear Regulatory Commission, have adopted SI units for radiation measurements; other agencies (e.g., the U.S. Department of Transportation) require their use.

## II. *Common Radiological Unit Prefixes*

| Submultiples | | | | Multiples | | | |
|---|---|---|---|---|---|---|---|
| m | milli | $10^{-3}$ | thousandth | k | kilo | $10^{3}$ | thousand |
| μ | micro | $10^{-6}$ | millionth | M | mega | $10^{6}$ | million |
| n | nano | $10^{-9}$ | thousand millionth | G | giga | $10^{9}$ | thousand million |
| p | pico | $10^{-12}$ | million millionth | T | tera | $10^{12}$ | million million |

## III. *Length*

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 centimeter (cm) | = | 0.3937 in | = | .03287 ft | | |
| 1 meter (m) | = | 100 cm | = | 39.37 in | = | 3.281 ft |
| 1 inch (in) | = | 2.54 cm | = | 0.0254 m | | |
| 1 foot (ft) | = | 30.48 cm | = | 0.3048 m | | |

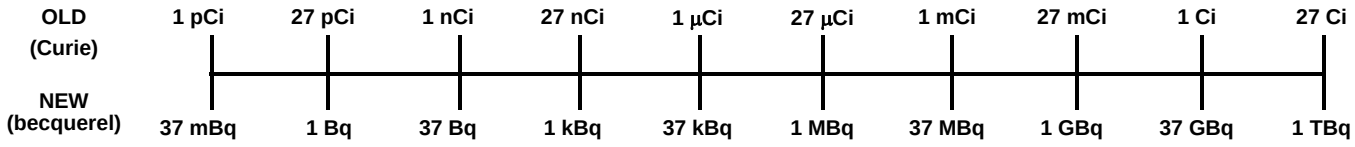
## IV. *Activity*

**The traditional unit is the Curie (Ci); the SI unit is the Becquerel (Bq)**

**1 Ci = 3.7 x $10^{10}$ Bq = 37 GBq  1 Bq = 1 disintegration per second = 2.7027 x $10^{-11}$ Ci or ≅ 27 pCi**

**To convert Bq to Ci, divide the Bq figure by 37 x $10^{9}$ (or multiply the Bq figure by 2.7027 x $10^{-11}$)**

**To convert Ci to Bq, multiply the Ci figure by 37 x $10^{9}$**




**Examples:**

**9 mCi = 333 MBq = 0.333 GBq**
**10 mCi = 370 MBq = 0.37 GBq**
**44 mCi = 1628 MBq = 1.63 GBq**
**50 mCi = 1850 MBq = 1.85 GBq**

## IV. *Activity* (continued)

**Table A**

| Curie Units | Becquerel Units |
|---|---|
| μCi | kBq |
| mCi | MBq |
| Ci | GBq |
| 0.1 | 3.7 |
| 0.25 | 9.25 |
| 0.5 | 18.5 |
| 0.75 | 27.75 |
| 1 | 37 |
| 2 | 74 |
| 3 | 111 |
| 5 | 185 |
| 7 | 259 |
| 10 | 370 |
| 20 | 740 |
| 25 | 925. |

From Table A: 0.1 mCi = 3.7 MBq
0.1 Ci = 3.7 GBq

**Table B**

| Curie Units | Becquerel Units |
|---|---|
| μCi | MBq |
| mCi | GBq |
| Ci | TBq |
| 50 | 1.85 |
| 60 | 2.22 |
| 100 | 3.7 |
| 200 | 7.4 |
| 250 | 9.25 |
| 500 | 18.5 |
| 800 | 29.6 |
| 1000 | 37 |

From Table B: 50 mCi = 1.85 GBq
3.7 MBq = 100 μCi

**To convert from one unit to another, read across from one column to the other, ensuring the units are in the same line of the column headings.**

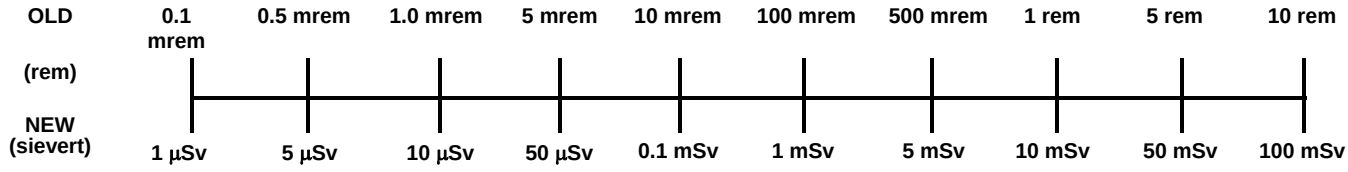
## V. *Radiation Dose Equivalent*

**The traditional unit is the rem; the SI unit is the sievert (Sv).**

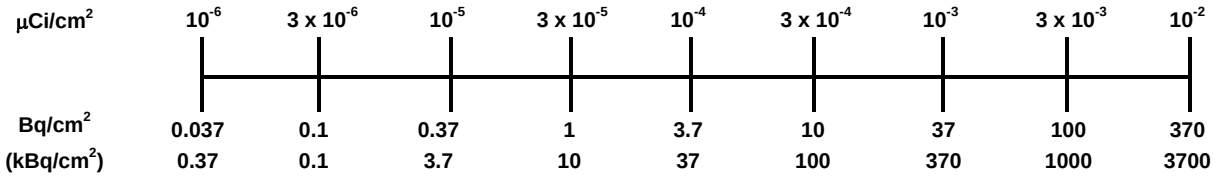
**1 rem = 0.01 sievert (Sv) = 10 mSv** **100 rem = 1 Sv** **500 rem = 5 Sv**

**1 rad = 0.01 gray (Gy) = 10 mGy** **100 rads = 1 Gy** **500 rads = 5 Gy**

**The working SI unit is the sievert (Sv)**




## IV. *Surface Activity*



# *COURSE OUTLINE FOR PORTABLE GAUGING DEVICE RADIATION SAFETY TRAINING PROGRAM*

## I. *PRINCIPLES AND FUNDAMENTALS OF RADIATION SAFETY*

### A. Types and Characteristics of Radiation

1. Model of the Atom
2. Alpha, Beta, Gamma, X-ray and Neutron Radiation
3. Exposure: Natural versus Man-made Radiation
4. Irradiation versus Contamination/Internal vs. External Exposure
5. Radioactive Material Used in Portable Gauging Devices

### B. Units of Radiation Dose and Quantities of Radioactivity

1. Curie, Rad, Rem and Roentgen
2. Prefixes
3. SI Units

### C. Basic Math and Calculations Related to Radioactivity

1. Radioactive Decay
2. Dose Rates
3. Inverse Square Law
4. Half-value Layers

### D. Biological Effects of Radiation

1. Acute, Chronic and Genetic Effects of Exposure
2. Radiation Protection Standards
3. The ALARA Philosophy

### E. Radiation Levels From Radioactive Sealed Sources

### F. Methods of Controlling Radiation Dose

1. Time
2. Distance
3. Shielding

## II. *RADIATION DETECTION INSTRUMENTS*

**A.** Types of Radiation Survey Meters

**B.** Operation, Calibration and Limitations

**C.** Monitoring Techniques

## III. *STATE AND FEDERAL REGULATIONS*

**A.** Chapter 404, Florida Statutes (F.S.)

**B.** Chapter 64E-5, Florida Administrative Code (F.A.C.)

**C.** Title 10, Code of Federal Regulations (10 CFR)

**D.** Title 49, Code of Federal Regulations (49 CFR)

**IV.** ***LICENSING AND INSPECTION***

- **A.** License Items and Conditions
- **B.** Notices, Instructions and Reports to Workers
- **C.** Inspections

**V.** ***OPERATING AND EMERGENCY PROCEDURES***

**A. Operating Procedures**

1. Training and Supervision
2. Personnel Monitoring
3. Availability of Procedures
4. Security
5. ALARA Philosophy
6. Transportation
7. General Rules of Use
8. Posting Requirements
9. Routine Maintenance
10. Radiation Surveys

**B. Emergency Procedures**

1. Preventive Measures
2. Emergency Response
3. Notification Requirements
4. Case Histories

**VI.** ***TRANSFER/DISPOSAL REQUIREMENTS***

**VII.** ***PRACTICAL TRAINING***

- **A.** Types of Portable Gauging Devices
  1. Moisture/Density Gauges
  2. Asphalt Content Gauges
  3. Depth Probe Gauges
  4. X-ray Fluorescence Analyzers (XRFs)
- **B.** Transport/Storage Containers
- **C.** Remote Handling Equipment
- **D.** Hands-on Training

**VIII.** ***Q&A SESSION***

**IX.** ***WRITTEN EXAM***

**X.** ***EXAM REVIEW***