



STATE OF FLORIDA
DEPARTMENT OF HEALTH
BUREAU OF RADIATION CONTROL



REGULATORY GUIDE

Regulatory Guide 1.20

Revision 2

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Instructions for Preparing Applications for Radioactive Materials Licenses Authorizing

USE OF SEALED SOURCES IN FIXED 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 | 4) Radioactive Waste |
| 2) Inspection and Enforcement | 5) Transportation |
| 3) General Health Physics | 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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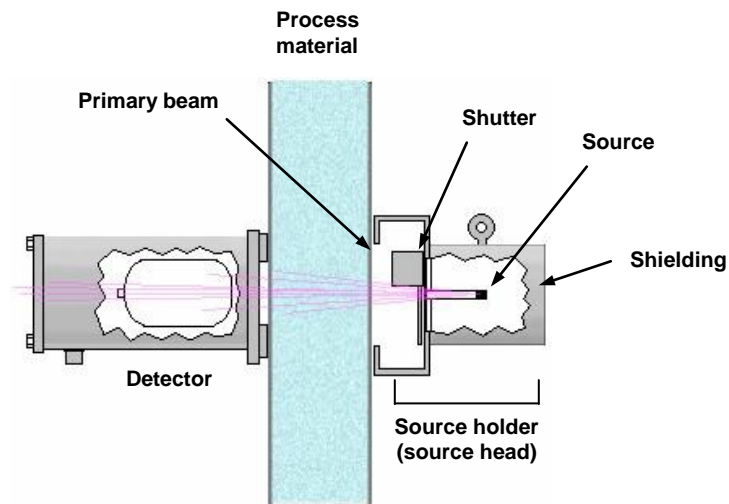
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I. INTRODUCTION

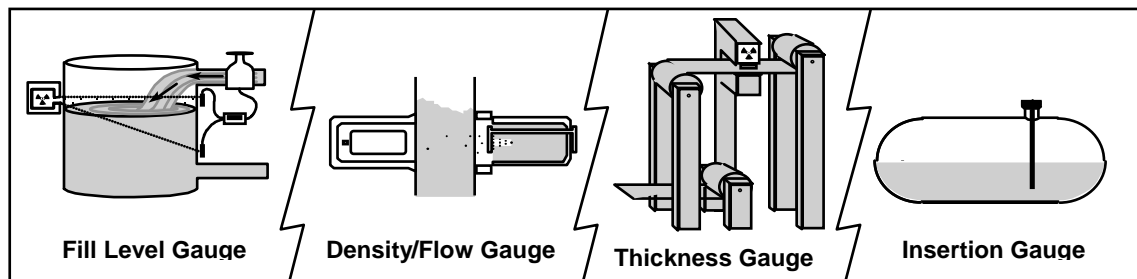
A. PURPOSE OF GUIDE

This guide provides instructions for preparing an application for a state of Florida radioactive materials license authorizing possession and use of sealed sources in fixed gauging devices – industrial gauging devices that use sealed radioactive sources, typically installed in fixed locations, as a process tool. This guide also contains additional information that may be used as a training resource. In addition, the model procedures are written to be stand-alone documents so several acronyms and abbreviation as well as other information may be repeated. Fixed gauging devices are designed and manufactured for the purpose of determining or controlling a process parameter such as thickness, density, level, interface location, particle size distribution, or qualitative or quantitative chemical composition. Nuclear gauging systems typically consist of:

- A sealed radioactive source – gamma, beta or neutron emitting isotope (e.g., cesium-137, cobalt-60, strontium-90, krypton-85, californium-252, etc.);
- A source holder (source head)* – the device used to support and retain the source, attenuate the primary radiation beam, and provide shielding to reduce scattered radiation;
- A radiation detector consisting of a sensor and amplifier that converts ionizing radiation into electrical impulses and amplifies the signal that is produced to provide parameter data; and
- An electronic component (usually computerized) that converts the amplified signal into a format that displays the data on a monitor or directly adjusts process parameters.



Typical Fixed Gauging Device Design



Common Types of Fixed Gauges

Only the source and source holder are subject to licensure and regulatory control.

* The terms *source holder* and *source head* are not always used as synonyms; *source holder* is also used to refer to the component inside the *source head* that holds the source in place within the head.

License Types: General and Specific

Possession and use of fixed gauging devices in Florida requires a radioactive materials license issued by the state. There are two license types: specific license and general license.

Gauging devices that present more significant health and safety hazards require a specific license. The specific license is a document issued to an applicant, authorizing a particular use of a gauge. The license describes the types of devices the licensee may possess and the limits imposed on their use. Applicants must demonstrate that they have personnel qualified to work with the devices, and appropriate facilities, equipment and procedures to ensure safe operations. The fees for a specific license are higher than for a general license. The specific license application process is detailed, requiring establishment and implementation of a detailed radiation protection program. The specific license application process is detailed, requiring establishment and implementation of a comprehensive radiation protection program. Personnel operating under a specific license may be approved to perform "advanced" activities such as installations and relocations that are not allowed under a general license.

A general license does not require the filing of an application with the department or the issuance of a licensing document. 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 example, installation and relocation of some generally licensed fixed gauging devices can only be performed by trained individuals authorized under a specific license. Some generally licensed fixed gauging devices may be mounted, but cannot be unlocked and put into use until a specifically licensed individual, such as a gauge manufacturer representative or an independent gauge services provider performs radiation measurements and tests the gauge's alignment with the detector to ensure that it will operate safely. Generally licensed gauges may also have restrictions on the types of non-routine maintenance that may be performed on them by the owner. The label on a generally licensed gauge describes the restrictions that apply to that model. 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.

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 guide 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, 2007.

This guide provides instructions for applicants seeking a fixed gauging device 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 safety 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 the adoption of the attached model procedures and forms provides for a radiation protection program that complies with regulatory requirements, applicants should 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 control of radiation hazard 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 parts of the regulations applicable to fixed gauging devices licensees are listed below, and should be used in conjunction with this guide. Chapter 64E-5, F.A.C., Part XIII, Subparts A and C include rules that specifically address fixed gauges.

- 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"

Fixed gauging device users 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 (904) 353-0569 or writing 100 West Bay Street, Suite 100, Jacksonville, FL 32202, 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

<u>Item No. and Title</u>	<u>Description</u>
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; (850/488-9000 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 gauges are used/stored. If the two addresses are different, the physical address must be listed in License Condition 10; if they are the same, Condition 10 references the address listed in License Item 2.
3. License Number	Lists the number assigned to the license by the bureau. The number should be referenced in all correspondence with the bureau.
4. Expiration Date	Lists the date the license will expire. A radioactive materials license is valid for 5 years from the date of issuance. Applications for renewal must be received 30 days prior to the expiration date for the license to be deemed "timely filed".
5. Category	Activities involving possession and use of radioactive materials are divided into license categories. Fixed gauging devices are covered under Category 3H. Conducting more than one category of licensed activity requires a separate license for each category of use. Section 64E-5.204, F.A.C., lists license categories and fees.
6. Radioactive Material	Describes the type (element and mass number) of radioactive material the license authorizes for possession and use.
7. Form	Describes the form of radioactive material the license authorizes for possession and use (i.e., source manufacturers and model numbers).
8. Possession Limit	Lists the maximum possession limit for radioactive sealed sources. Possession of more sources than authorized by the license is a 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. Unauthorized use of radioactive material is a violation and may result in enforcement actions.

License Conditions

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 3H licenses contain conditions addressing the following:

- ◆ Authorized location of use and storage
- ◆ Enforcement provisions
- ◆ Authorized User (AU) and 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's website: <http://www.doh.state.fl.us/environment/radiation>.

An application for a fixed gauge specific license 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 available at <http://www.doh.state.fl.us/environment/radiation/matform.htm#Forms>. 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:

Florida Department of Health
Bureau of Radiation Control
Radioactive Materials Program
4052 Bald Cypress Way, Bin C21
Tallahassee, FL 32399-1741

If using an overnight delivery service, use:

Florida Department of Health
Bureau of Radiation Control
Radioactive Materials Program
4042 Bald Cypress Way, Rm. 220.09
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 and mailing address of the individual or company to whom the license will be issued. An applicant corporation or other legal entity must be listed by the legal name 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 Division of Corporations. For example, "ABC Corporation d/b/a ABC Enterprises of Florida." Business registration may be verified by contacting the Division of Corporations at (850) 488-9000 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 the location where radioactive material will be used and/or stored and where license-related records will be maintained, if different that the address listed in Item 1.a. Non-contiguous locations of use and storage may require a separate license; refer to section 64E-5.213, F.A.C.

2.a. LICENSE FEE CATEGORY

Indicate the appropriate license fee category; for fixed nuclear gauges, list category 3H. Refer to section 64E-5.204, F.A.C., or to Regulatory Guide 6.20 for a listing of fees

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 in the space provided.

4. INDIVIDUAL USERS

List each individual to be designated as an authorized user (AU) of radioactive material (i.e., a gauge operator). A minimum of two AUs is required unless otherwise approved. Two types of AUs may be approved under a fixed gauge license, as described below.

- **Basic AUs** are individuals authorized to perform "basic services": routine operations such as shutter checks, maintenance, physical inspections/inventories, and leak tests. Such workers must complete at least 8 hours of training covering the subjects listed in subsection 64E-5.1307(1), F.A.C.
- **Advanced AUs** are individuals authorized to perform "advanced services": non-routine operations such as gauge installations, relocations, radiation surveys and limited maintenance and repairs. Such workers must complete at least 40 hours of training covering the subjects listed in subsection 64E-5.1313(2), F.A.C.

Item 4 should identify each listed individual user as either a basic AU or an advanced AU.

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 implementation of the radiation safety program and for ensuring compliance with the applicable regulations and license provisions. As a minimum, the RSO must have sufficient training and experience to be a basic authorized user of the requested radioactive materials. Additional training in administration of a radiation protection program is recommended for the RSO position.

6. TRAINING AND EXPERIENCE IN RADIATION SAFETY

a. FORMAL TRAINING IN RADIATION SAFETY

Submit documentation of radiation safety training for each individual listed in Items 4 and 5 of the application, demonstrating that the workers meet the training requirements for basic or advanced AUs, as applicable. 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 gauge manufacturers or other approved third parties are acceptable. Such certificates may need to be supplemented with documentation of completion of training in the applicant's operating and emergency (O&E) procedures to satisfy Chapter 64E-5, F.A.C., Part XIII training requirements, because third party trainers may not provide such training.

b. EXPERIENCE

Describe any additional relevant work experience with radiation and 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. Do not include individuals' birth dates or social security numbers.

7. RADIOACTIVE MATERIAL

a. ELEMENT AND MASS NUMBER

List each type of radioactive material requested; refer to the example provided below.

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; refer to the example provided below.

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 100 millicuries each

If authorization for generally licensed (GL) fixed gauges or other GL devices is sought, include a request for GL 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
2. Radioactive material distributed to a general licensee per 64E-5.206(1) & (4), F.A.C.	Sealed sources	No single source to exceed that quantity authorized for the general license

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

8. PURPOSE FOR WHICH RADIOACTIVE MATERIALS WILL BE USED

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

Example:

1. For use in XYZ Corporation Model 2000 source holders contained in XYZ Model 2003 gauges for level measurements.

If authorization for GL gauges or other GL sources/devices is requested, describe the intended use of the GL sources and devices.

Example:

2. 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., GL or SL). 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

Possession of a radiation detection instrument (survey meter) is recommended for all gauge licensees, but is not required for applicants seeking authorization to perform basic (routine) gauge-related activities. For such applicants, this item may be marked "not applicable" or "N/A." Applicants selecting this option must describe in their procedures how a suitable survey meter will be available for use in identifying and assessing radiological hazards. Access to a survey meter may be obtained by making arrangements with a local emergency responder (hazmat team, etc.) or with another licensee, such as a fixed gauge licensee, a testing lab, a hospital or outpatient clinic, a radiation safety consulting company, etc.

Applicants seeking authorization to perform advanced (non-routine) activities on fixed gauges are required to have at least one survey meter available with range detection capabilities suited to the gauge(s) possessed.

There are other situations where a survey meter is needed to determine whether the integrity of a gauge's shielding or source has been compromised (e.g., receipt of a damaged gauge or damage to a gauge as a result of an industrial accident). Such incidents necessitate seeking technical assistance to arrange for a timely evaluation of the gauge. Therefore, emergency procedures need to include instructions regarding access to a survey meter (Appendix J to this guide is a model emergency procedure).

10. CALIBRATION OF INSTRUMENTS

If radiation detection instruments will be used, mark the appropriate box to indicate who will perform calibrations.

a. CALIBRATED BY SERVICE COMPANY

If a service company will be used, list the vendor(s) name, address, license number and the government agency that issued the company's license (i.e., NRC or a state agency). Survey instruments must be calibrated at least annually per 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 BRC 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

If conducting personnel monitoring (PM), complete Items a., b., c. and d. and address PM procedures in the radiation protection program. If no PM program will be implemented, write "N/A."

Unless otherwise authorized, subsection 64E-5.1310(2), F.A.C., requires individuals performing advanced services on fixed gauges to wear a whole body PM badge. Applicants performing basic services only may elect not to conduct PM if able to demonstrate that workers are unlikely to exceed 500 millirem/year from gauging operations. Appendix G is a model procedure for documenting a decision not to perform PM.

Common PM badges include film badges, thermoluminescent dosimeters (TLDs) and optically stimulated luminescent dosimeters (OSLDs), which are described below. PM badges must be capable of detecting the type of radiation (e.g., beta, gamma, neutron) emitted by the gauges possessed by the licensee.

Badge 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 badge vendors is available at <http://ts.nist.gov/ts/htdocs/210/214/scopes/dosim.htm>. A list of commercial PM badge vendors is available from the bureau upon request.

Each order of badges includes a control badge for measuring the amount of background radiation the badges receive each monitoring period. This enables background radiation to be subtracted from the 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 in an environment protected from radiation, chemicals, excessive heat, light, moisture, etc. to ensure accurate dose records. The control badge must be returned with the other PM badges each monitoring period.

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 the film's optical density provides a measurement of the wearer's radiation exposure. Film badges must be exchanged monthly.

TLDs are PM badges that contain small crystals capable of storing some of the energy from radiation. Heating the crystals releases the stored energy as light. The amount of light released is proportional to the amount of radiation the TLD badge received, which is measured to determine the badge wearer's dose. TLDs must be exchanged at least every three months.

OSLDs measure radiation using 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.

12. FACILITIES AND EQUIPMENT

Facilities and equipment must be adequate to protect health and minimize danger to life and property. Fixed gauges must be secured to prevent unauthorized access or removal. (e.g., permanently mounted, located in a locked room, or chained and locked to a storage rack).

Fixed gauges may be located in harsh environments resulting from pressure, vibration, mounting height/method, temperature, humidity, air quality, corrosive atmospheres or chemicals, possible impact or puncture conditions, and fire, explosion and flooding potentials. Applicants should consult the gauge manufacturer's literature as well as the device's sealed source and device (SSD) certificate to determine their gauges' limitations and/or other considerations of use. If a proposed use conflicts with imposed by the manufacturer and/or SSD certificate, specific information must be provided to demonstrate that the proposed conditions of use will not impact the safety or integrity of the device. The National Sealed Source and Device Registry is available on the Internet at <http://www.hsr.d.gov/nrc/sources/index.cfm>.

Submit an annotated diagram of the facility identifying all areas where gauges will be installed, and where gauges are stored prior to installation or awaiting shipment for disposal or repair. In addition, identify all occupied workstations and areas adjacent to installed or stored gauges.

Describe the security measures in place to prevent unauthorized access or removal of radioactive materials. Describe the area where gauges in storage are secured and the security measures in place to prevent unauthorized access. Refer to section 64E-5.320, F.A.C., for regulations on security of radiation sources.

Describe any anticipated environmental conditions at the location of use that have the potential to adversely affect gauge operation and visibility (e.g., excessive temperature, vibration, caustic chemicals, airborne particulates), and describe what protective measures will be used to minimize the impact of the adverse conditions. Examples of mitigation methods include use of protective barriers and increased frequency of routine gauge inspections.

Describe any auxiliary shielding or barriers installed around source housings or gauging systems to limit access and/or reduce scattered radiation in occupied areas.

13. RADIATION PROTECTION PROGRAM

Submit a detailed description of the proposed radiation protection program, which must include the components described below. 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 are associated with fixed gauge operations, as described below.

- **Radiation awareness training** ("Instructions to Workers") must be provided to personnel engaged in licensed activities (AUs and workers under their supervision). This training is also recommended for individuals that work in the vicinity of gauges. 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 gauge 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.
- **Basic AU training** must be provided to workers independently performing basic (routine) gauge operations or supervising such activities by other workers. Basic AU training requirements are specified in subsection 64E-5.1313(1), F.A.C. Basic AUs must complete a minimum of 8 hours training covering the subjects listed in section 64E-5.1307, F.A.C.
- **Advanced AU training** must be provided to workers independently performing advanced gauge operations or supervising such activities by other workers. Advanced AUs must complete at least 40 hours of training that covers the subjects listed in subsection 64E-5.1313(2), 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 fixed gauge AU training, 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 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 and a sample exam.

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. Applicants seeking approval to perform advanced (non-routine) services must submit procedures addressing those activities.

- **Operating Procedure**

Appendix E

Due to the wide variety of gauges and gauging applications, it is not feasible to provide a model operating procedure that addresses every type of gauge and application. Applicants must refer to their gauge manufacturer operation/maintenance manuals to ensure that all necessary instructions are included.

Appendix E provides generic instructions on availability of personnel and procedures, general rules of use/ALARA principles, radiation surveys, security, and basic and advanced gauge services. Operating procedures must include instructions on those topics; additional guidance is provided below.

Availability of Personnel and Procedures

Section 64E-5.1313, F.A.C., requires an authorized user (basic or advanced AU) to be available at all times when fixed gauges are in use. "Available" means that as long as fixed gauges are on site (even if they are locked out), an AU must either be on-site or able to be on-site within an hour's notice.

Operating procedures must include a commitment that AUs will have access to the licensee's O&E procedures, as well as the manufacturer operation/maintenance manual for each type of gauge possessed.

General Rules of Use/ALARA Principles

Instructions on use of dose minimization techniques should be supplemented by any device-specific instructions provided by the gauge manufacturer.

Radiation Surveys

If damage to a gauge is suspected, a radiation detection instrument must be used to measure the radiation levels. If a survey meter is not on site, the RSO must be able to make arrangements for the gauge to be surveyed. Exhibit B is a generic form illustrating how radiation surveys performed on density gauges installed on piping may be documented. Applicants should contact their gauge manufacturer(s) to obtain model-specific survey report forms that are applicable to the gauges and configurations in use at their facility, and use those forms to document radiation surveys.

Security

Gauges must be stored and installed in a manner that secures them from unauthorized access or removal. Additional controls (e.g., cages, fencing, guards, surveillance monitoring systems) should be utilized as appropriate to enhance gauge security.

Basic and Advanced Services

Examples of basic gauge services include shutter checks, leak tests, physical inspections and inventories, and normal maintenance (e.g., removal of dirt and debris, rust removal, painting). Only AUs or workers under their supervision are authorized to perform basic gauge services, which must be performed in accordance with manufacturer instructions.

Advanced activities include gauge installations, advanced maintenance or service, relocations, and removal from service. Non-routine gauge maintenance or repair that requires removal of the source is prohibited. Only advanced AUs or workers under their direct supervision and in their physical presence are authorized to perform advanced activities. Assigned PM badges must be worn and a survey meter must be used when performing advanced services. Survey results must be documented and maintained. Manufacturer instructions must be strictly followed.

- **Personnel Monitoring Procedure**

Appendix F

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 F is a model PM procedure. Exhibits E, F and G are model forms for addressing declared pregnant female requirements.

If personnel monitoring will not be conducted, attach documentation that includes measurements and/or calculations demonstrating that personnel working with fixed nuclear gauges are not likely to exceed 500 millirem per year.

- **Posting and Labeling Procedure**

Appendix H

The posting/labeling procedure must address requirements for labeling gauges, posting areas where gauges are installed or stored, and posting documents specified in section 64E-5.901, F.A.C. Appendix H is a model posting/labeling procedure.

When appropriate instrumentation (a survey meter) is available, a radiation survey of ambient radiation levels around all gauges should be performed to verify compliance with area posting requirements. When such instrumentation is unavailable, information on gauge radiation levels provided by manufacturers should be used to ensure compliance.

- **Lock-out Procedure**

Appendix I

The procedure must provide instructions for when gauge lock-outs are required and how they are performed, and must comply with U.S. Occupational Safety and Health Administration standards for the control of hazardous energy, as specified in Title 29, Code of Federal Regulations, Part 1910, section 147. Appendix I is a model lock-out procedure.

- **Emergency Procedures**

Appendix J

The procedures must provide instructions for responding to the loss, theft or damage of a gauge, and must include emergency notification numbers for the RSO and bureau. Appendix J is a model emergency procedure.

- **Procedures for Ordering, Receiving, Opening and Shipping Packages Containing Radioactive Material**

**Appendix K
Exhibits C and D**

Procedures must address preparation and handling of incoming and outgoing shipments of radioactive material transported by common carriers, and if applicable, for gauges transported as private use shipments. The instructions must conform to current U.S. DOT regulations. Sample shipping papers and emergency response information must be provided. Appendix K is a model procedure, Exhibit C is a sample shipping paper for private use shipments, and Exhibit D is a model emergency response information sheet.

- **Leak Testing Procedure**

Appendix L

Sealed sources in gauges must be tested at regular intervals to ensure that the radioactive material is not leaking contamination. Leak test (LT) requirements are specified in section 64E-5.1303, F.A.C. The LT procedure must either specify the manufacturer name and model number of the LT kit used and the name of the vendor contracted to perform LT sample analysis, or provide a commitment to use licensed vendors and approved LT kits.

The procedure must specify the leak test interval and include instructions on collecting LT samples. Such information is available from gauge manufacturers. Appendix L is a model LT procedure.

If authorization to perform in-house leak test analysis is sought, additional procedures addressing sample analysis must be submitted. The procedure must describe the instrumentation used to perform the analysis and include step-by-step instructions for calculating instrument efficiency and performing sample counts. Additional guidance on in-house leak test analysis is available from the bureau.

- **Inventory Procedure**

Appendix M

The procedure must provide instructions for performing annual physical inventories and inspections of all generally and specifically licensed (GL and SL) sources. Inspections must evaluate the physical condition of each gauge and the gauge labels, posted warning signs, and the ambient environmental conditions impacting the gauges. A sample inventory form is also required. Appendix M is a model inventory procedure; Exhibit A is a model inventory form.

- **Record Retention Procedure**

Appendix N

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

- **Notification and Reporting Procedure**

Appendix O

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

- **Gauge Installation/Relocation/Removal Procedure**

A model procedure for gauge installations, relocations and removals is not included in this guide, because the instruction can vary significantly from model to model. Applicants seeking approval to conduct such activities must contact their gauge suppliers for guidance on developing procedures for these tasks.

14. WASTE DISPOSAL

Appendix P

Submit a procedure describing how radioactive sources contained in fixed gauges will be disposed. The procedure must include a commitment that sealed sources will be disposed of either by returning it to the manufacturer or by transferring it to a specifically licensed recipient. Indefinite storage is not a recommended disposal option. Appendix P is a model waste transfer/disposal procedure. Please note that low-level radioactive waste brokers and most gauge manufacturers require a fee to accept gauge sources for disposal.

15. CERTIFICATE

A radioactive materials license is a legal document. License applications and license-related correspondence must be signed and dated by an individual (certifying official) authorized to make legally binding statements for the applicant. Examples of positions that are recognized as certifying officials include owner, president, vice president, chief executive officer, chief operating officer, etc. Positions that are not recognized as certifying officials include RSO, environmental health & safety director, and plant manager.

A certifying official may delegate authority to make legally binding statements to specific individuals or positions (e.g., manager, director, RSO) by submitting a written statement authorizing the delegation. Exhibit H is a model form for documenting a delegation of authority.

16. * NEW - INCREASED SECURITY CONTROLS – IF APPLICABLE

The U.S. Nuclear Regulatory Commission (NRC) and its Agreement States have implemented increased controls for licensees that possess certain radioactive materials in quantities of concern. The NRC has determined that additional requirements need to be implemented to supplement existing regulatory requirements in 10 CFR Sections 20.1801-20.1802. The licensee shall comply with the requirements described in the document titled Bureau of Radiation Control – Increased Security Controls Requirements - October 14, 2005, and its attachments, which are incorporated by reference, titled "Increased Controls for Licensees that Possess Sources Containing Radioactive Material Quantities of Concern IF:

The total sources or devices that you wish to possess meet or exceed the activities listed below. Be advised that until proved otherwise all sources will be considered co-located and must be added together. Co-located is defined as breaching a common physical security barrier to allow unrestricted access to sources or devices. In other words multiple fixed gauges in a facility where all gauges are accessible after passing through a perimeter security check point, or by breaching a perimeter fence, would be considered co-located. However, if additional physical security barriers are present within the facility that would prevent access to quantities of radioactive material exceeding Table 1 quantity listed below, then the sources or devices are not considered aggregated or co-located and implementation of the Increased Controls (ICs) is not required. This can be accomplished by, but is not limited to, locked enclosures, tamper proof mounting bolts (one way threading), robust cables, chains with locks. Therefore, in order for a license to consider a physical barrier to be effective, the licensee must ensure the barrier cannot be bypassed or easily defeated by using commonly available tools.

Radionuclide	Quantity of Concern ¹ (TBq)	Quantity of Concern ² (Ci)	Radionuclide	Quantity of Concern ¹ (TBq)	Quantity of Concern ² (Ci)
Am-241 or Am-241:Be	0.6	16	Pm-147	400	11,000
Cf-252	0.2	5.4	Pu-238	0.6	16
Cm-244	0.5	14	Pu-239:Be	0.6	16
Co-60	0.3	8.1	Se-75	2	54
Cs-137	1	27	Sr-90 (Y-90)	10	270
Gd-153	10	270	Tm-170	200	5,400
Ir-192	0.8	22	Yb-169	3	81

¹ The aggregate activity of multiple, collocated sources of the same radionuclide should be included when the total activity equals or exceeds the quantity of concern.

² The primary values used for compliance with this Order are TBq. The curie (Ci) values are rounded to two significant figures for informational purposes only.

³ Radioactive materials are to be considered aggregated or collocated if breaching a common physical security barrier (e.g., a locked door at the entrance to a storage room) would allow access to the radioactive material or devices containing the radioactive material.

⁴ If several radionuclides are aggregated, the sum of the ratios of the activity of each source, i of radionuclide, n , $A_{(i,n)}$, to the quantity of concern for radionuclide n , $Q_{(n)}$, listed for that radionuclide equals or exceeds one. $[(\text{aggregated source activity for radionuclide A}) \div (\text{quantity of concern for radionuclide A})] + [(\text{aggregated source activity for radionuclide B}) \div (\text{quantity of concern for radionuclide B})] + \text{etc.} \geq 1$

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 submitted 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. 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. To prevent the potential for identity theft, do not 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" (Supplement A of this guide). Renewals require submittal of an entire new application, 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. To prevent the potential for identity theft, never submit documentation that lists individuals' social security numbers or birth dates.

VI. LICENSE TERMINATION

Prior to license termination, the licensee must properly dispose of all licensed radioactive material possessed. 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.

I. Introduction

Section 64E-5.312, Florida Administrative Code (F.A.C.), requires fixed gauge operations to be conducted so that the following dose limits are met:

- ◆ Radiation doses in unrestricted areas do not exceed **2 millirem (0.02 mSv) in any one hour;** and
- ◆ 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 Bureau of Radiation Control (BRC) for use by fixed gauge licensees conducting MOP studies.

The below marked box indicates how this procedure has been utilized:

- New license applicant:** the procedure describes the methodology that will be used to conduct the MOP study after licensed activities begin.
- Renewal application:** the procedure describes the methodology and results of the completed MOP study of existing operations.

II. Dose Limit for Unrestricted Areas

For fixed gauge operations, there are at least two, and sometimes, three situations that must be addressed in order to demonstrate compliance with the 2 millirem in any one hour dose limit for unrestricted areas:

- ◆ Mounted fixed gauges (in use, or out-of service but still mounted);
- ◆ Stored gauges (secured in approved storage area); and
- ◆ Gauges in transport (gauges being moved from one licensed location to another).

The first two situations are similar and can be addressed using the same methodology. Section II.A., Method 1 describes the procedure followed when a survey meter is available to conduct radiation measurements. Section II.A., Method 2 describes the procedure followed when a survey meter is unavailable. The marked box indicates the method selected for use in this study.

Compliance with the unrestricted area dose limit for transport of gauges can be demonstrated by using the methodology described in Section II.B.

A. Fixed Gauges – Installed or in Storage

- Method 1. Physical Surveys**

Procedures approved by the BRC limit public access to fixed gauges. Only authorized personnel have access to areas where gauges are installed or stored. Gauge shutters are kept locked and at least one additional lock is used to restrict access to source held in storage.

II. Dose Limit for Unrestricted Areas (contd.)

A. Fixed Gauges Installed or in Storage (contd.)

Method 1. Physical Surveys (contd.)

A radiation detection instrument was used to measure ambient radiation levels in the unrestricted areas around the gauge storage area. The survey should evaluate the “worst case scenario” – where radiation emitted by the gauge(s) is at the 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);
- ◆ Information about the type and number of gauges surveyed and a description of their placement within the storage area (e.g., mounted on tanks, piping, belts, etc.);
- ◆ Information about the gauge storage area (description of the room, cabinet, locker, etc., construction materials, shielding, locks, etc.);
- ◆ Diagram of the facility identifying the location of the gauge storage area and the location of each installed gauge, and for both the storage area and for each gauge, the boundary of the restricted area, adjacent unrestricted areas, nearby MOP workstations, and the locations where all recorded measurements were taken; and
- ◆ Results of survey(s) of unrestricted area radiation levels, with results keyed to facility diagram

Method 2. Calculations (Inverse Square Law)

Radiation levels in unrestricted areas can be calculated using gauge dose rate information (e.g., 5 millirem/hr at 30 cm from a gauge’s exterior surface). Gauge operation/maintenance manuals may list dose rate data. If not included in gauge manuals, manufacturers can provide dose rates for their products upon request. Dose rate information is also published in each gauge model’s sealed source and device certificate. Such certificates are maintained in the National Radioactive Sealed Source and Device Registry, which is available on the Internet at <http://www.hsrdo.ornl.gov/nrc/sources/index.cfm>.

II. Dose Limit for Unrestricted Areas (contd.)

A. Fixed Gauges Installed or in Storage (contd.)

Method 2. Calculations (contd.)
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The following information is attached:

- ◆ Information about the type and number of gauges installed and held in storage, and a description of their placement within the storage area;
- ◆ Information about the gauge storage area (description of the room, cabinet, locker, etc., construction materials, shielding, locks, etc.);
- ◆ Diagram of the facility identifying the location of the gauge storage area and the location of each installed gauge, and for both the storage area and for each gauge, the boundary of the restricted area, adjacent unrestricted areas, nearby MOP workstations, and the locations where all recorded measurements were taken;
- ◆ Copies of information provided by the manufacturer on gauge dose rates; and
- ◆ Results of calculations demonstrating estimated radiation levels in unrestricted areas, with results keyed to the facility diagram.

B. Transport Vehicles (for gauge relocations that require transport on public roads)

Procedures approved by the BRC and incorporated into the license describe measures to ensure that public access to gauges in transit is restricted. Adherence to transport procedures ensures compliance with the 2 mrem in any one hour public dose limit.

III. Annual Public Dose Limit

“Total effective dose equivalent” (TEDE) describes the dose from the summation of internal and external radiation doses. However, there is little possibility of internal exposures during routine gauging operations, so internal doses can be ignored for fixed gauge public dose compliance studies. Thus, for fixed gauge 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 marked box indicates the method selected for use in this study.

MOP DOSE LIMIT COMPLIANCE STUDY

III. Annual Public Dose Limit (contd.)

Method 1. Occupational Worker Dosimetry Data

If measurements show that all gauge users receive < 100 millirem annually, then by extrapolation, a MOP would not be likely to receive 100 millirem annually, because gauge users typically receive higher exposures from gauges than any MOP.

Because this method may have limited applicability at some facilities where no advanced gauge services are routinely performed, include documentation verifying that gauge users are likely to receive the highest exposures. This documentation should include an evaluation of the occupancy factors of gauge users and other personnel who work in areas where the gauges are used or stored.

If a review of monitored workers' dosimetry reports demonstrates that no gauge users have received annual doses exceeding 100 mrem, completion of Table 1 and attachment of the referenced monitoring report and occupancy factor comparison report completes 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.

Table 1. Occupational Worker Dosimetry Data					
<input type="checkbox"/>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; padding: 2px;">DDE = TEDE (millirem)</td> <td style="padding: 2px;">Monitoring Period (<i>dates</i>): _____ to _____</td> </tr> <tr> <td style="width: 15%;"></td> <td style="padding: 2px;">← 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.</td> </tr> </table>	DDE = TEDE (millirem)	Monitoring Period (<i>dates</i>): _____ 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.
DDE = TEDE (millirem)	Monitoring Period (<i>dates</i>): _____ 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 2. Dosimetry Data for the Maximally Exposed Individual MOP

The dosimetry data for the MOP who is likely to receive the highest dose from gauge operations may be used to demonstrate compliance with the annual public dose limit. The "maximally exposed individual MOP" should be a person that does not work with gauges but works in the vicinity where gauges are installed and/or stored, such as a management, clerical, or maintenance employee, or contract workers that routinely work in the vicinity of installed gauges.

Justification for how that the maximally exposed individual was identified must be documented; that is, 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 badge (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 workloads. If the badge 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 gauging activities is receiving < 100 millirem, then so are all other members of the public. As badge 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 monitoring is completed. The study can then be updated to reflect the results of a full year of monitoring. If this method is employed, complete Table 2 and attach the following:

MOP DOSE LIMIT COMPLIANCE STUDY

III. Annual Public Dose Limit (contd.)

- ◆ Description of the maximally exposed individual MOP (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; and
- ◆ Copies of the dosimetry reports used in the study (note: black out social security numbers, last names, and birth dates listed in the reports).

Table 2.		Dosimetry Data for the Maximally Exposed Individual MOP
<input type="checkbox"/>	DDE = TEDE (millirem)	Monitoring Period (<i>dates</i>): _____ to _____ Enter the highest individual cumulative external dose for the monitoring period in the space provided to the left. A dose \leq 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

A badge can be mounted at the maximally exposed individual MOP's work station to record radiation levels, which can then be related to the dose received by the person working in the area. If monitoring data demonstrates that continuous exposure to the ambient radiation levels in the workplace for a year results in doses < 100 mrem, then no MOP is likely to exceed the 100 mrem annual public dose limit due to licensed operations. If monitoring indicates that continuous occupancy would exceed the public dose limit, then occupancy factors may 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: Badges used for environmental monitoring may differ from the types of badges used for personnel monitoring, so it is important to specify to the badge supplier what type of monitoring is planned (i.e., indoor area monitoring) when ordering badges. Posted badges must be protected from adverse environmental conditions such as excessive heat, light, moisture and chemicals.

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 workweek occupancy factor to calculate the TEDE.

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:

$$280 \text{ mrem} / 8,766 \text{ hrs} = .032 \text{ mrem/hr} \times 2,000 \text{ hrs} = 64 \text{ mrem}$$

Note: 24 hours/day, 365.25 days/year = 8,766 hours

MOP DOSE LIMIT COMPLIANCE STUDY

III. Annual Public Dose Limit (contd.)

Method 3: Use of Environmental Monitoring Data (contd.)

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

Example: $438 \text{ mrem} / 8,766 \text{ hrs} = .049 \text{ mrem/hr} \times 2,000 \text{ hrs} = 99.9 \text{ mrem}$

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.

$$680 \text{ mrem} / 8,766 \text{ hrs} = .078 \text{ mrem/hr} \times 1,250 \text{ hrs} = 97 \text{ mrem}$$

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					
<input type="checkbox"/>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; padding: 5px; text-align: center;">DDE = TEDE (millirem)</td> <td style="padding: 5px;"> <p>Monitoring Period (<i>dates</i>): _____ to _____</p> <p><input type="checkbox"/> A. Check if calculations are based on continuous year-round occupancy (8,766 hours) in unrestricted areas</p> <p><input type="checkbox"/> B. Check if calculations are adjusted for workplace occupancy factors (e.g., 2,000 hours for a work year) in unrestricted areas</p> <p>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.</p> </td> </tr> <tr> <td style="width: 15%; height: 40px;"></td> <td style="padding: 5px;"> <p>←</p> </td> </tr> </table>	DDE = TEDE (millirem)	<p>Monitoring Period (<i>dates</i>): _____ to _____</p> <p><input type="checkbox"/> A. Check if calculations are based on continuous year-round occupancy (8,766 hours) in unrestricted areas</p> <p><input type="checkbox"/> B. Check if calculations are adjusted for workplace occupancy factors (e.g., 2,000 hours for a work year) in unrestricted areas</p> <p>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.</p>		<p>←</p>
DDE = TEDE (millirem)	<p>Monitoring Period (<i>dates</i>): _____ to _____</p> <p><input type="checkbox"/> A. Check if calculations are based on continuous year-round occupancy (8,766 hours) in unrestricted areas</p> <p><input type="checkbox"/> B. Check if calculations are adjusted for workplace occupancy factors (e.g., 2,000 hours for a work year) in unrestricted areas</p> <p>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.</p>				
	<p>←</p>				

Method 4. 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 radioactive material (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.

In Table 4, check to indicate use of either radiation 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.

MOP DOSE LIMIT COMPLIANCE STUDY

III. Annual Public Dose Limit (contd.)

Method 4. Radiation Level Data (contd.)

The issue of occupancy factors is addressed by selecting one of two options provided in Table 4. 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 = 8,766 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.
 - C. In multi-story facilities, the distance to the nearest unrestricted area or MOP workstation may be directly above or below the sources.

Example of an Inverse Square Law Calculation Using Survey Meter Measurements

A storage room contains a variety of fixed gauges containing 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, shielded behind lead brick corral, 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	$I_2 = \frac{0.1 \times (60)^2}{(120)^2}$	A 2,000 hour occupancy factor yields:
$I_2 = ?$ mR/hr	$I_2 = .025$ mR/hr	.025 mR/hr x 2,000 hours
$R_1 = 60$ in. (5 x 12 in.)	$I_2 = .025$ mR/hr	= 50 mrem = DDE
$R_2 = 120$ in. (10 ft.)		

MOP DOSE LIMIT COMPLIANCE STUDY

III. Annual Public Dose Limit (contd.)

Method 4. Radiation Level Data (contd.)

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

A shipping case used to store a fixed nuclear density gauge bears a "Radioactive Yellow II" label that shows its TI = 1.2. The nearest MOP workstation is located 24 feet away.

$I_1 = 1.2 \text{ mR/hr}$	$I_2 = \frac{1.2 \times (3.3)^2}{(24)^2}$	A 2,000 hour occupancy factor yields:
$I_2 = ? \text{ mR/hr}$	$I_2 = .023 \text{ mR/hr}$.023 mR/hr x 2,000 hours
$R_1 = 3.3 \text{ ft. (1 meter)}$		= 46 mrem = DDE
$R_2 = 24 \text{ ft.}$		

Table 4. Radiation Level Data				
<input style="width: 100%; height: 100%;" type="checkbox"/>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; text-align: center; vertical-align: top; padding: 5px;"> <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 5px;">DDE (millirem)</td> </tr> </table> </td> <td style="padding: 5px;"> <input type="checkbox"/> A-1. Check to indicate use of radiation survey instrument measurements and the inverse square law to calculate the DDE OR <input type="checkbox"/> 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 ***** <input type="checkbox"/> A-2. Check if dose is based on continuous year-round occupancy (8,766 hours) in unrestricted areas OR <input type="checkbox"/> B-2. Check if dose has been adjusted for workplace occupancy factors (e.g., 2,000 hours for a work year) in unrestricted areas ***** <input type="checkbox"/> Check to indicate that documentation of all calculations is attached, along with instrument identification, specifications and calibration information <input type="checkbox"/> Check to indicate a facility diagram showing restricted and unrestricted areas is attached <input type="checkbox"/> ← Enter the calculated DDE in the space provided to the left; use this value in App. A </td> </tr> </table>	<table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 5px;">DDE (millirem)</td> </tr> </table>	DDE (millirem)	<input type="checkbox"/> A-1. Check to indicate use of radiation survey instrument measurements and the inverse square law to calculate the DDE OR <input type="checkbox"/> 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 ***** <input type="checkbox"/> A-2. Check if dose is based on continuous year-round occupancy (8,766 hours) in unrestricted areas OR <input type="checkbox"/> B-2. Check if dose has been adjusted for workplace occupancy factors (e.g., 2,000 hours for a work year) in unrestricted areas ***** <input type="checkbox"/> Check to indicate that documentation of all calculations is attached, along with instrument identification, specifications and calibration information <input type="checkbox"/> Check to indicate a facility diagram showing restricted and unrestricted areas is attached <input type="checkbox"/> ← Enter the calculated DDE in the space provided to the left; use this value in App. A
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DDE (millirem)				

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 injury. 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 nuclear gauges 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 sources of radiation will adhere strictly to policies and procedures applicable to activities involving 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

The radiation safety officer (RSO) is responsible for ensuring compliance with license terms and conditions and the applicable requirements of Chapter 64E-5, Florida Administrative Code (F.A.C.). Management has delegated to the RSO authority to fulfill the duties and responsibilities described below.

1. Ensure that radioactive material usage conforms to license authorizations;
2. Ensure that work involving gauges and any other devices containing radioactive material are used only by, or under the supervision of qualified individuals authorized by the license, and that all workers wear personnel monitoring badges when required;
3. Ensure that all users read and understand the procedures described in the radiation protection program;
4. Ensure that personnel monitoring (PM) badges are properly used and stored, exchanged at required intervals, and that PM reports are accurate and reviewed in a timely manner;
5. Ensure that gauges and all other devices containing radioactive material are properly secured against unauthorized access or removal;
6. Ensure that radioactive materials are shipped in compliance with applicable U.S. Dept. of Transportation regulations;
7. Ensure that all sealed sources of radioactive material are leak tested on a timely basis and as prescribed by the manufacturer or by the license;
8. Ensure that all sealed sources of radioactive material are physically inspected and inventoried on a timely basis and as prescribed by the license;
9. Maintain all records required by the license and the regulations. These include, but are not limited to documentation related to personnel monitoring, leak tests, inventories, training, and receipt, transfer and disposal records;
10. Ensure that the proper authorities are notified promptly in case of gauge loss, theft or damage, and serve as a contact for such events;
11. Ensure compliance with the ALARA policy by emphasizing the ALARA philosophy to all personnel; and
12. Ensure that a review of the radiation protection program's content and implementation is conducted annually as required by subsection 64E-5.303(3), F.A.C. The review will include an evaluation of equipment, procedures, personnel monitoring records, inspection findings, and any incidents. The RSO will assess trends in occupational exposures as an index of the program's success and to 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 of the review's scope, findings and recommendations (if any) will be maintained for 3 years, in accordance with section 64E-5.335, F.A.C.

RADIATION SAFETY TRAINING PROGRAM

I. Introduction

Operation of fixed nuclear gauges is restricted to trained personnel. Individuals working with a gauge will either be an Authorized User (AU) -- an individual that has completed formal radiation safety training -- or a worker who is supervised by an AU.

There are multiple training components for fixed gauge operations, which are described below. Sections II - IV describe the applicability of and regulatory requirements for each type of training. Radiation awareness training (instructions to workers) will be provided to each worker handling or operating gauges, and to any other worker determined by the RSO to be likely to exceed 100 millirem/year from the company's gauge operations. Basic AU training will be provided to workers independently performing basic gauge operations or supervising such activities by other workers. Advanced AU training will be provided to workers independently performing advanced gauge operations or supervising such activities by other workers. Hazmat employee training will be provided to any worker associated with the shipment or receipt of gauges. Sections II – IV provide additional details for each type of training.

<u>Training Requirement</u>	<u>Regulations</u>
◆ Radiation awareness training (instructions to workers)	64E-5.902, F.A.C.
◆ Hazmat employee training	64E-5.1501 & 64E-5.1502, F.A.C., 49 CFR 172.700 – 172.704
◆ Basic Authorized User (AU) training	64E-5.1307 & 64E-5.1313(1), F.A.C.
◆ Advanced AU training	64E-5.1307 & 64E-5.1313(2), F.A.C.

II. Radiation Awareness Training/Instructions to Workers

A. Prior to working with fixed nuclear gauges, workers will receive the general radiation awareness training (“instructions to workers”) specified in section 64E-5.902, F.A.C. The following instructions will be provided:

- ◆ Information on the company’s storage, transfer, and use of fixed gauges;
- ◆ The health protection problems associated with exposure to radiation and radioactive material;
- ◆ Precautions and procedures used to minimize radiation exposures;
- ◆ Applicable provisions of Florida’s radiation control regulations and the company’s radioactive materials license;
- ◆ Workers’ responsibility to report any unsafe conditions in the workplace;
- ◆ Appropriate responses to warnings made in the event of incidents having the potential for radiation exposure; and
- ◆ Reporting requirements for occupational radiation exposures described in section 64E-5.903, F.A.C.

II. Radiation Awareness Training (contd.)

- B.** Subsection 64E-5.902(2), F.A.C., states that the extent of the instructions must be commensurate with the potential radiation hazard present in the workplace. Formal training typically lasts 2 – 4 hours. The duration of the course may vary based on the instructor’s determination of the 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 or after the presentation.
- C.** Documentation of the training will be maintained to demonstrate compliance.

III. Hazmat Employee Training

- A.** Radioactive material contained in fixed 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 includes general awareness/familiarization, function specific, safety, and security awareness training. It will be provided in-house or by qualified third party trainers. The training may also be conducted concurrently with other radiation safety training (i.e., radiation awareness training and/or AU training).
- 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 the 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.

IV. Authorized User Training

Chapter 64E-5, F.A.C., Part XIII, describes the training requirements for fixed gauge AUs. General requirements are specified in section 64E-5.1307, F.A.C., and requirements specific to fixed gauge users are provided in section 64E-5.1313, F.A.C.

A. Basic Authorized User Training

A basic AU is an individual qualified to perform and supervise routine tasks that present minimal health and safety risks; e.g., preventive maintenance, lock-outs, inspections, shutter checks, and leak tests. Basic AUs are prohibited from performing “advanced” activities (gauge installations, relocations, non-routine maintenance, etc.) that present an increased risk of radiation exposure and therefore require additional training.

IV. Authorized User Training (contd.)

A. Basic Authorized User Training (contd.)

A minimum of 8 hours of formal radiation safety training covering the subjects listed in subsection 64E-5.1307(1), F.A.C., is required to qualify as a basic fixed gauge AU. All training, whether provided in-house or by a third party, must be approved by the Bureau of Radiation Control (BRC). Instructions must include operating and emergency (O&E) procedures and a supervised hands-on training session with gauges. If not provided by the a third party, O&E procedures and practical training may be conducted by the RSO or another experienced gauge AU. Workers will read the O&E procedures, review them with the instructor, and then complete a written exam to verify that the worker is knowledgeable in the procedures. Individuals that fail the exam will be provided additional training (duration left to the discretion of the instructor) and will be retested using a new, comparable exam with different questions.

Documentation of compliance with Chapter 64E-5, F.A.C., Part XIII requirements of basic fixed gauge radiation safety training for each AU will be maintained on file until termination of the license.

B. Advanced Authorized User Training

An advanced AU is an individual qualified to perform and supervise a full range of gauge-related activities. Examples of advanced gauge operations include radiation measurements, installations, relocations, removals, routine maintenance, and service not involving source installation, replacement or disposal. Use of radiation detection instrumentation is required during all advanced fixed gauge operations. Work involving sealed sources in gauges can be performed only by specifically licensed persons (e.g., a manufacturer's representative or qualified consultant).

A minimum of 40 hours of formal radiation safety training covering the subjects listed in subsection 64E-5.1313(2), F.A.C., is required to qualify as a advanced fixed gauge AU. Advanced fixed gauge training will be provided by a qualified third party, and must be accepted by the BRC. Instructions must cover procedures for performing advanced operations, supervised hands-on advanced gauge work, and use of radiation detection instrumentation.

Documentation of compliance with Chapter 64E-5, F.A.C., Part XIII requirements of advanced fixed gauge radiation safety training for each AU will be maintained on file until termination of the license.

OPERATING PROCEDURES

I. Availability of Personnel and Procedures

- A. At least one authorized gauge user must be available at all times when fixed gauges are in use. "Available" means that as long as fixed gauges are installed (even if they are locked out), an authorized gauge user must either be on site or able to be on site within an hour's notice.
- B. A complete and current copy of Bureau of Radiation Control (BRC)-approved operating and emergency procedures are available to fixed gauge users at all times.
- C. Copies of the manufacturer operation/maintenance manual for each gauge model authorized by the license are kept on file by the Radiation Safety Officer (RSO), and will be referenced as necessary to ensure gauges are operated and maintained in accordance with manufacturer instructions and recommendations.

II. General Rules of Use

- A. All gauge-related operations, including routine cleaning and maintenance, must be in accordance with the gauge manufacturer's instructions and recommendations.
- B. **ALARA Philosophy.** All personnel working with fixed gauges 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. The following methods are used to minimize radiation exposures:
 - Minimize the **TIME** spent in close proximity to the gauge (the shorter the time, the lower the dose);
 - Maximize the **DISTANCE** from the gauge (doubling the distance reduces radiation intensity by one quarter); and
 - Make use of available **SHIELDING** to block out radiation.
- C. **Radiation Surveys.** If damage to a gauge is suspected, immediately notify the RSO, who will arrange to have a radiation survey of the gauge performed as soon as possible. Refer to the emergency procedures for further instructions.
- D. Personnel are prohibited from entering any hopper, vessel, conveyor system, or other area where a radiation levels exceed 2 mR/hr until the source holder has been locked out in accordance with the gauge lock-out/tag-out procedure.
- E. Personnel performing shutter checks should use an inspection mirror or other techniques that limit their proximity to the primary radiation beam during the inspection.
- F. Opening or removing a source from its housing is prohibited.

III. Security

- A. Gauges must be installed in a manner that secures them from unauthorized access or removal. Additional controls (e.g., fencing, guards, surveillance monitoring systems) will be utilized as appropriate to enhance gauge security.
- B. When performing advanced services on fixed gauges, maintain constant surveillance and immediate control, and keep unauthorized personnel away.
- C. Upon removal of an installed gauge, lock the source holder and store it in a locked room or container, where it is secured from unauthorized access or removal. If required by subsection 64E-5.323(5), F.A.C., post the storage area with a “Caution – Radioactive Material(s)” sign bearing a radiation symbol.

IV. Basic and Advanced Services

A. Basic Services

- 1. Basic services are routine maintenance (e.g., removal of dirt and debris, rust removal, painting), shutter checks, leak tests, physical inspections and inventories.
- 2. Only basic authorized users (individuals that have completed at least 8 hours of BRC-approved training), advanced AUs, or workers under their supervision are authorized to perform basic gauge services.
- 3. A copy of the appropriate manufacturer’s operation manual must be available, and the maintenance instructions strictly followed. Any tools recommended by the manufacturer will be used as instructed.
- 4. Non-routine gauge maintenance or repair (e.g., welding) is prohibited.

B. Advanced Services

- 1. Advanced activities are gauge installations, non-routine maintenance or service, relocations, and removal from service. Gauge maintenance or repair that requires removal of the source is prohibited. Only advanced authorized users (individuals that have completed at least 40 hours of BRC-approved training), or workers under their direct supervision and in their physical presence are authorized to perform advanced activities. Assigned personnel monitoring badges must be worn when performing advanced services.
- 2. Gauge installations and relocations will include radiation surveys. Surveys will be taken at 1 foot around the source holder and detector to verify that the source is properly shielded and aligned with the detector. Measurements will also be performed to establish the 5 mR/hr boundary (to determine if “Caution – Radiation Area” signs must be posted) and the 2 mR/hr boundary (to determine the restricted area perimeter). Radiation surveys will be documented and maintained on file.
- 3. A copy of the appropriate manufacturer’s operation manual must be on hand, and the applicable instructions strictly followed. If recommended, use remote handling tools as instructed.

PERSONNEL MONITORING PROCEDURES

I. Instructions for Using PM Badges

A. General Instructions

Whole body personnel monitoring (PM) badges will be assigned by the Radiation Safety Officer (RSO) to workers when the RSO determines use of badges is appropriate.

If assigned, PM badges are to be worn during any activities where occupational radiation exposures may be received. Badges are worn on the front of the torso, at or above the waist and below the shoulder. Badges must be returned to the RSO at the end of each monitoring period to ensure rapid processing. The RSO must be notified immediately if a PM badge is lost or damaged.

PM badges are individually assigned and cannot be shared. If a spare badge is used, it must be marked with the name, initials and/or identification number of the individual designated to wear it. Badges cannot be worn during non-occupational radiation exposures (e.g., medical or dental x-rays, etc.).

If a badge is lost or damaged, an estimate of the worker's dose for the period covered by the badge must be provided to the badge vendor and kept on file. If a spare badge is used for the remainder of the monitoring period, the dose recorded on the spare badge must be added to the estimated dose to obtain the worker's total occupational dose for the monitoring period.

Recommended Work Practices for Personnel Monitoring

- ◆ Never leave PM badges in close proximity to a source of radiation.
- ◆ Protect badges from moisture, chemicals, intense heat or light.
- ◆ When not in use, store badges with the control badge in a low background radiation area.

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

A spare badge may be assigned to a new employee until the badge vendor can be notified to issue a badge bearing the worker's name for the next monitoring period. 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 using 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 badge processor if the individual's dose record needs to be revised.

II. PM Record Requirements

A. Records of Prior Occupational Dose

Every reasonable effort will be made to obtain the lifetime cumulative occupational radiation dose from each monitored worker. If an individual is unable to provide their lifetime cumulative exposure records, records will be obtained from their previous employer. The records must include all of the information required by section 64E-5.308, F.A.C., using Form DH-1623 or an equivalent form.

II. PM Record Requirements (contd.)

B. Records of Personnel Monitoring Results

Records of doses received by each monitored worker will be reviewed by the RSO within 30 days of receipt to determine if unnecessary exposures are being received. The RSO will sign and date each report reviewed and will investigate within 30 days the cause of any personnel exposure 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 documented and maintained for inspection purposes.

PM records will be maintained as long as the license remains in effect. The records will be kept on Form DH-1622 or an equivalent form and will contain all of the information required by section 64E-5.339, F.A.C. These records will be updated annually.

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 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 showing reports have been furnished to monitored workers will be retained for at least 3 years.

E. Records for Female Workers and Declared Pregnancies

Upon hiring, female personnel assigned to work with gauges 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 sign an *Instructions for Women Working With Radiation* form (Exhibit F or equivalent) to document receipt of the instructions.

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 G 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. The Bureau of Radiation Control (BRC) recommends that an embryo/fetus not receive more than 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.

II. PM Record Requirements (contd.)

F. Occupational Dose Limits for Minors

Minors are not allowed to receive an annual occupational dose exceeding 500 millirem. Dose records to minors will be documented with the *Cumulative Occupational Radiation Dose Record* (Form DH-1623 or equivalent) and *Occupational Radiation Dose Record* (Form DH-1622 or equivalent) as appropriate, and the records will be retained until license termination.

G. Worker Overexposure Reports

When a report of an individual's exposure must be sent to the BRC 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.

**PROCEDURE FOR RELEASE FROM
PERSONNEL MONITORING REQUIREMENTS**

I. Introduction

Section 64E-5.315, Florida Administrative Code (F.A.C.) requires radioactive materials licensees to monitor exposures from sources of radiation at levels sufficient to demonstrate compliance with the occupational dose limits specified in subsection 64E-5.304(1), F.A.C.

Fixed gauges containing radioactive sealed sources represent an external radiation hazard, so the occupational dose limit of concern to workers involved in gauging operations is the 5,000 millirem per year limit specified in paragraph 64E-5.304(1)(a)1., F.A.C.

Paragraph 64E-5.315(1)(a), F.A.C., requires licensees to monitor occupational radiation exposures by supplying and requiring use of personnel monitoring (PM) badges to workers likely to receive radiation doses in excess of 10 percent of the occupational dose limits specified in section 64E-5.304, F.A.C. Thus, if PM is not going to be performed, a fixed gauge licensee must demonstrate by measurements and/or calculations that its workers are unlikely to receive greater than 500 millirem per year.

II. Method Used To Demonstrate Exposures Less than 500 mrem/yr

Note: Methods A and D are the only options for new license applicants. However, applicants that elect to perform PM may use Method B after 12 months, or Method C after acquiring their gauges and a radiation survey meter.

Personnel monitoring of workers will not be performed based on the below information.

Method A: Indirect Measurement Data and Calculations

Attached are calculations based on occupancy factors and gauge radiation data provided by gauge manufacturers and/or from the National Sealed Source and Device Registry at <http://www.hsrdoorn.gov/nrc/sources/index.cfm>. These calculations of estimated doses demonstrate that worker doses are not likely to exceed 500 millirem per year.

Method B: PM Badge Measurements

Attached is PM badge data demonstrating that individuals working with fixed gauges have been monitored for at least 12 months, and that the workers' doses were less than 500 millirem per year.

Method C: Direct Measurement Data and Calculations

Attached is data collected by direct measurements of gauge radiation levels and calculations of estimated doses based on occupancy factors, demonstrating that worker doses are not likely to exceed 500 millirem per year.

Method D: Alternate: _____

Attached are measurements and/or calculations demonstrating that PM is not required for workers involved in fixed gauge operations.

POSTING PROCEDURE

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

When required, areas or rooms where fixed gauges 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 (BRC) must be conspicuously posted for quick reference in the event of an emergency. The BRC radiological notification poster may also be posted.

III. Lockout Procedures 64E-5.1315, F.A.C.

BRC approved procedures describing instructions for locking out fixed gauges will be conspicuously posted for quick reference in order to prevent workers from entering a gauge's radiation beam during work in, on or around installed gauges.

IV. "Notice to Employees" Form 64E-5.901, F.A.C.

A current BRC "Notice to Employees" form 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.

V. Other Required Documents 64E-5.901, F.A.C.

The documents listed will be conspicuously posted, unless the "Notice to Employees" form 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
- ◆ Operating procedures

VI. Notices of Violations and Related Documents 64E-5.901, F.A.C.

Notices of violations, proposed imposition of administrative penalties, or BRC issued orders will be posted within 5 working days after receipt. Responses to such BRC 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.

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LOCK-OUT PROCEDURE

I. Scope and Purpose

This procedure establishes the minimum requirements for locking out fixed nuclear gauges when maintenance or servicing is performed on or near gauges such that workers could be exposed to the gauge's primary radiation beam or scattered radiation. Compliance with this procedure is required to ensure that gauges are properly locked and/or tagged out before personnel perform any work where installed gauges could cause unnecessary radiation exposures.

As used in this procedure, "lock-out/tag-out" refers to methods used to safeguard workers from exposure to ionizing radiation emitted by radioactive sources contained in fixed gauges installed on process or other equipment. Lock-out devices provide protection by serving as positive restraints that no one can remove without a key or other unlocking mechanism, or through extraordinary means, such as bolt cutters. Tag-out devices, by contrast, are prominent warning devices used to warn workers not to open a gauge shutter or otherwise expose a gauge source while the service or maintenance activity is being performed. Tag-out devices are easier to remove and, by themselves, provide workers with less protection than do lock-out devices.

All workers are required to comply with the restrictions and limitations imposed upon them when conditions require gauge lock-out/tag-out.

II. Conditions Requiring Lock-Out

A gauge source holder will be locked-out by locking the on/off or shutter mechanism into a safe position – the "off" or closed position:

- ◆ Prior to any work being performed in the immediate vicinity of a gauge radiation beam when a distance or gap exists between a gauge's radioactive source and the radiation detector that permits entry of all or a portion of a person's body into the primary radiation beam;
- ◆ During any manipulation of a gauge, including the source holder or the detector, which involves physical movement of the device or separation from a pipe, vessel, etc. including installation, relocation or storage;
- ◆ When individuals are working on or adjacent to a gauge during periods of shutdown;
- ◆ Whenever an individual enters a vessel in which such a gauge is located; and
- ◆ Whenever a vessel with such a gauge is empty and an individual is working around the exterior of the vessel.

III. Lock-out/Tag-out Specifications

Lock-out and tag-out devices will be singularly identified, will be the only devices used for lock-outs/tag-outs, will not be used for other purposes, and will satisfy the specifications described below.

Lock-out devices will consist of either a key or combination lock capable of holding the gauge in the safe (closed) position such that the gauge cannot operate until the lock-out device is removed. Lock-out devices will be substantial enough to prevent removal without the use of excessive force or unusual techniques.

III. Lock-out/Tag-out Specifications (contd.)

Tag-out devices will consist of a durable tag and a means of attachment that can be securely fastened to the gauge to indicate that the gauge may not be operated until the tag-out device is removed. Tag-out devices will be substantial enough to prevent inadvertent or accidental removal, and able to withstand the ambient environment for the maximum period of time that exposure is expected. Tag-out device attachments will be of the non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds, with the general design and basic characteristics at least equivalent to a one-piece, all-environment-tolerant nylon cable tie. Tag-out devices will warn against hazardous conditions if the gauge is operated and must include a legend such as *Do Not Open* or *Do Not Operate*. Tags shall be legible and understandable to all personnel who may be in the area.

Lock-out and/or tag-out devices will indicate the identity of the individual applying the device(s). Lock-out and/or tag-out devices will be standardized in at least one of the following criteria: color; shape; or size, and the print and format of tag-out devices will be standardized.

IV. Lock-out/Tag-out Sequence

Only the Radiation Safety Officer (RSO) or RSO designees are authorized to lock-out/tag-out a gauge. All workers, upon observing a gauge that is locked and tagged, shall not attempt to operate the gauge or remove the lock and tag.

- A. When work is required on or near a gauge, notify all affected personnel that the gauge shutter must be closed, locked-out, and tagged prior to initiating the work.
- B. The RSO or another authorized fixed gauge user (AU) will lock and tag the gauge in accordance with manufacturer recommendations, using lock-out/tag-out devices meeting the specifications described in this procedure.
- C. When locking out a gauge, the on/off or shutter mechanism will be tagged to indicate that the gauge is locked out. If a gauge is incapable of being locked out, a tag-out device must still be used.
- D. The RSO or RSO designee will verify that the gauge has been effectively locked out. Verification may include a physical inspection of the shutter mechanism and/or ON/OFF indicator, an inspection of the data display, and performance of a radiation survey (if a survey meter is available).
- E. A warning sign will be posted at each entryway to areas where it is possible to be exposed to the primary radiation beam from the gauge. Such warning signs will include safety instructions (e.g., "Contact the Radiation Safety Officer Before Entering Vessel").

EMERGENCY PROCEDURES

- I. In the event of a stolen, lost or missing gauge, immediately notify the Radiation Safety Officer (RSO) and the Bureau of Radiation Control (BRC).

- II. Implement the following procedure in the event of physical damage to a gauge or any other emergency or unusual situation:
 - A. Immediately secure the area around the gauge and keep people at least 30 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 30 feet from the damaged gauge until they can be surveyed for contamination.

 - C. If any equipment is involved, isolate the equipment until it can be surveyed for possible contamination.

 - D. As soon as possible, notify the RSO and the BRC using the numbers listed below. Follow the directions provided by the RSO and the BRC. Refer to notification and reporting procedures for additional instructions.

 - E. Wait for technical assistance prior to approaching or moving the gauge or any other involved equipment until the extent of contamination has been determined. A survey meter must be used to determine the presence of contamination in the area or on personnel. Special precautions and protective clothing/equipment must be used to perform decontamination and disposal of any contaminated materials.

 - F. Arrange for a radiation survey to be conducted as soon as possible by a qualified person using appropriate radiation detection instrumentation. To accurately assess the radiation danger, it is essential that the person performing the survey be competent in the use of the survey meter.

 - G. If radiation levels permit it, perform a leak test on the source holder to determine if the sealed source is leaking. If a leak test kit is unavailable, use a Q-tip (with one end cut off), to perform the test, and place the Q-tip in a zip-lock bag before sending it off for expedited analysis.

<p>Radiation Safety Officer: _____</p> <p>RSO Phone No.: (W): _____ (H): _____</p> <p style="text-align: center;">Florida Bureau of Radiation Control 24-Hour Radiological Emergency Notification No.: (407) 297-2095</p>
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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 gauge 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 gauge 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 gauge in the designated storage area until it can be installed by qualified personnel.

III. Transportation

- A. **Markings and labels** on gauge 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**



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

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.



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.

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

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 gauge being shipped)
- ◆ *Date of shipment*

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

2. **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 gauges. 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 gauge or package found to be defective and ensure their repair or replacement.

D. Blocking and bracing

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

LEAK TESTING PROCEDURE

Sealed sources contained in fixed gauges 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

The frequency for testing a gauge for leakage can vary from model to model; typical intervals are 1 or 3 years. Listed below are the gauge models currently in use, and their required test intervals.

- ◆ Gauge models that will be leak tested at least every 12 months:

- ◆ Gauge models that will be leak tested at least every 36 months:

- ◆ Gauge models that will be leak tested at least every ____ months:

II. Leak Test Kit

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

III. Taking the Leak Test Sample

LT samples will be taken by an Authorized User (AU) or other trained individuals authorized to perform the procedure. If the AU has been assigned a personnel monitoring badge, the assigned badge will be worn when collecting the LT sample. Samples will be taken in accordance with the written instructions provided by the supplier of the LT kit and/or the gauge manufacturer. Leak test samples should be collected at the most accessible area where contamination would accumulate if the sealed source were leaking. If available, use a survey meter to monitor radiation levels. Prepare a separate wipe sample (e.g., cotton swab or filter paper) for each source. For each source tested, list identifying information (gauge model and serial number, radionuclide, activity, etc.), and number each wipe to correlate the LT sample to the source being tested.

IV. Leak Test Sample Analysis

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

V. Leak Test Records

If a test indicates a gauge's sealed source is contaminated, the gauge will be removed from service and the BRC will be notified immediately (407/297-2095). A written report on the leaking source will be submitted to the BRC within 5 days. The report will describe the equipment involved, the test results, and the corrective actions taken (i.e., gauge 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 for inspection purposes. 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 millicuries (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

Annual inventories are required to account for the sealed sources contained in fixed gauges possessed under a radioactive materials license. To ensure accountability of radioactive material, the procedure described below will be followed.

I. Physical Inspection

At intervals not to exceed 12 months, physically inspect each gauge as described below

- Evaluate the gauge's general condition to determine if any damage to the source housing, shielding, shutter mechanism, or supports has occurred.
- Verify that all of the identification and warning labels remain attached and legible, and match prior inventory records. Gauge labels will differ depending on whether they are distributed under General License (GL) provisions or Specific License (SL) provisions.
- If a survey meter is available, perform a survey of radiation levels around gauges to verify the integrity of gauge shielding, proper alignment of primary radiation beams, and the ambient radiation levels around gauges to ensure that the levels do not exceed regulatory limits. Results of measurements taken at 12 inches around gauges and detectors, and the 2 mR/hr isodose line around installed gauge/detector configurations, should be documented in a survey report.
- Evaluate the environmental conditions around the gauges to assess whether there are any conditions present that could adversely impact the gauge (vibrations, caustic chemicals, particulates, etc.)

If the inspection reveals missing labels, evidence of damage, or adverse environmental conditions immediately report the problem(s) to the Radiation Safety Officer (RSO). If warranted, arrange to have the gauge's radiation levels measured. If excessive radiation levels are discovered, notify the Bureau of Radiation Control (407/297-2095).

II. Inventory Records

Retain 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 Radiation Safety Officer (or the RSO's designee)

RECORD RETENTION PROCEDURE

Records pertaining to fixed gauge operations will be maintained in accordance with the requirements specified in Chapter 64E-5, Florida Administrative Code, as summarized 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)
Records demonstrating compliance with public dose limits	Until termination of license	64E-5.313(5)
Annual radiation protection program reviews	3 years after records are made	64E-5.335(2)
Radiation safety training and test records	Until worker's termination or 5 years, whichever is greater	64E-5.1307(3)
Hazmat employee training records	90 days after worker's termination	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 results for each authorized gauge model	1 year beyond last gauge shipment	64E-5.1501(2) 49 CFR 173.415(a)
Copy of manufacturer operation/maintenance manual for each authorized gauge model	As long as the gauge model is possessed	64E-5.212(2)
Receipt records	Until disposal is authorized	64E-5.103
Transfer & disposal records	Until termination of license	64E-5.340(2)
Survey instrument calibration records	3 years beyond the calibration date	64E-5.336(1)
Records of surveys performed to evaluate radiation levels or radiation hazards	3 years after records are made	64E-5.336(1)
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 reports	3 years after reports are made	64E-5.903(2)
Individual PM reports following termination	3 years after reports are made	64E-5.903(3)
Records of surveys/measurements used to determine external/internal doses	Until termination of license	64E-5.336(2)

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 Bureau of Radiation Control (BRC) in writing within 30 days of a change of RSO. Include evidence 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 a basic authorized user; additional training in administration of a radiation protection program is recommended.

B. Vacating Premises 64E-5.349, F.A.C.

Notify the BRC in writing no less than 30 days before vacating or relinquishing possession or control of the permanent storage facility listed in the license. 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 BRC in writing, and submit an application for a new license within 30 – 45 days. 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 BRC 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 BRC 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 BRC by phone (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 BRC 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 BRC 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 BRC 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 BRC 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 (contd.)

Notify the BRC 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 BRC 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 BRC 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 BRC 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 (contd.)

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 BRC, also provide a copy to the exposed individual(s), no later than when submitting it to the BRC, 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 BRC upon learning of any leaking or contaminated sealed source. Submit a follow up written report to the BRC 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 BRC 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. Fixed gauges and other licensed radioactive material will be transferred only to companies or individuals specifically licensed to possess them, in accordance with the below procedure.

I. Verification

Prior to initiating the purchase, sale, transfer or disposal of a fixed gauge or other device containing radioactive material, obtain documentation of the transferor's or transferee's authorization to possess the radioactive material. Retain either a copy of the other entity's radioactive materials license, or one of the other verification methods listed in subsection 64E-5.215(4), F.A.C., as evidence of an authorized transfer.

II. Documentation

As a minimum, documentation of the transfer includes 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 gauge.

Form DH-1059 "Certificate – Disposition of Radioactive Materials" may be used to document the transfer/disposal of radioactive material; the form is available on the Bureau of Radiation Control website at <http://www.doh.state.fl.us/environment/radiation>. All transfer and disposal records are retained on file until license termination.

INVENTORY OF RADIOACTIVE SEALED SOURCES & DEVICES

Licensee: _____

License No.: _____

Date of Inventory: _____

Radiation Safety Officer (or designee) Signature: _____

#	GL or SL	GAUGE MANUFACTURER & MODEL NO.	GAUGE SERIAL NO.	SOURCE MANUFACTURER & MODEL NO.	SOURCE SERIAL NO.	ISOTOPE & ACTIVITY	LOCATION	CONDITION
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

Note: Listing "IN STORAGE" in the CONDITON column identifies sources/devices held in secured storage with no use anticipated prior to transfer/disposal.

FIXED GAUGE SURVEY FORM

Date: _____ Individual Performing Survey: _____

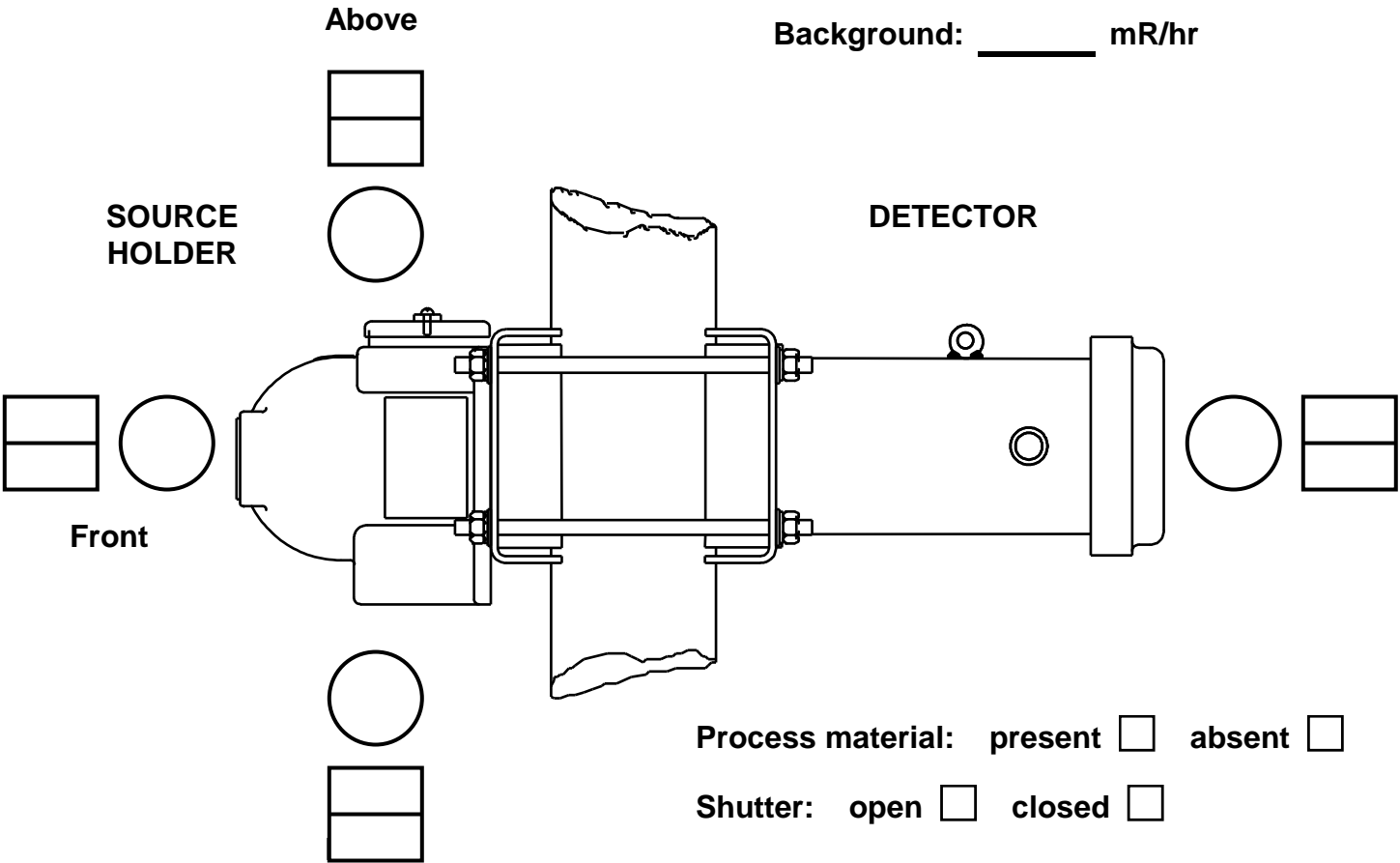
Survey Meter Manufacturer & Model No.: _____

Survey Meter Serial No.: _____ Survey Meter Calibration Date: _____

Gauge Make & Model No.: _____ Gauge Serial No.: _____

Source Make & Model No.: _____ Source Serial No.: _____

Source Isotope: _____ Source Estimated Activity: _____



SYMBOL KEY

- 12 inches - _____ mR/hr
- 5 mR/hr at _____ ft.
- 2 mR/hr at _____ ft.

Gauge diagram used with permission of Ohmart/Vega Corp., Cincinnati, OH

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)

RADIOACTIVE YELLOW II Label
Transport Index (TI) = _____

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

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 gauge 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, CO₂, 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.

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

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

DECLARATION OF PREGNANCY

To: _____

In accordance with Florida regulations, section 64E-5.311, Florida 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

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

Form DH-1054

**Application for Radioactive Materials License
– Non-Human Use**

**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: _____

Florida Bureau of Radiation Control - Application For Radioactive Materials License
NON-HUMAN USE

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

Florida Bureau of Radiation Control - Application For Radioactive Materials License
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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
<input type="checkbox"/> SEE ATTACHED LIST				

Florida Bureau of Radiation Control - Application For Radioactive Materials License
NON-HUMAN USE

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

Florida Bureau of Radiation Control - Application For Radioactive Materials License
NON-HUMAN USE

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	Operating Procedure			
App. F	Personnel Monitoring Procedures			
App. G	Procedure for Release From Personnel Monitoring Requirements			
App. H	Posting Procedure			
App. I	Lock-out Procedure			
App. J	Emergency Procedures			
App. K	Procedure for Ordering, Receiving, Opening and Shipping Packages Containing Radioactive Material			
App. L	Leak Testing Procedure			
App. M	Inventory Procedure			
App. N	Record Retention Procedure			
App. O	Notification and Reporting Procedure			
App. P	Transfer/Disposal Procedure			

TABLE 2. EXHIBITS

Exhibit	Title	Attached	Equivalent	N/A
Ex. A	Inventory Form			
Ex. B	Survey Form			
Ex. C	Shipping Paper – Private Use Shipment			
Ex. D	Emergency Response Information			
Ex. E	Instructions for Women Working With Radiation			
Ex. F	Instructions for Declared Pregnant Women			
Ex. G	Declared Pregnancy Form			
Ex. H	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	Fixed Gauge License Application Checklist			X

FIXED GAUGE LICENSE APPLICATION CHECKLIST

Use this checklist to verify completeness of Form DH-1054 when applying for or renewing a category 3L(I) radioactive materials license authorizing possession and use of fixed nuclear gauges. If additional assistance is needed, call the BRC Radioactive Materials Program at (850) 245-4545 or access the bureau's website at <http://www.doh.state.fl.us/environment/radiation/>.

U.S. Dept. of Transportation regulations (49 CFR) are available on the Internet at <http://www.access.gpo.gov/nara/cfr/index.html>.

CHECK OFF IF ADDRESSED	APPLICATION ITEM	NOTES
<input type="checkbox"/>	1.a. Name/Mailing Address	<ul style="list-style-type: none"> - List business name registered with the FL Dept. of State, Div. of Corporations; verify name registration by phone (850/488-9000) or online at http://www.sunbiz.org/corpweb/inquiry/search.html - List business' Federal Employer Identification (FEI) or Document No. - If doing business under a fictitious name, verify the name's registration & include it in Item 1 as a d/b/a name; if the fictitious name is not registered, include as a/k/a as part of the mailing address - List the mailing address for license-related correspondence
<input type="checkbox"/>	1.b. Location of Use and/or Storage	<ul style="list-style-type: none"> - List the street address of the facility where gauges will be used & stored, & where license-related records will be available for inspection; 64E-5.208(2), .213(5) - Indicate if any facilities are non-contiguous
<input type="checkbox"/>	2. License Category/Fee	<ul style="list-style-type: none"> - Category: 3L(1); a non-refundable application fee required for new applications; no fee for renewal applications; annual/reclamation fees are due within 60 days of license issuance & annually thereafter; license fees listed in 64E-5.204
<input type="checkbox"/>	3. Purpose of Application	<ul style="list-style-type: none"> - Check appropriate box; if applying to renew a license, list the license no.
<input type="checkbox"/>	4. Individual Users	<ul style="list-style-type: none"> - List all authorized users (AUs), including the RSO; 64E-5.208(2) - Minimum of two AUs is required to satisfy 64E-5.1313(4) - Identify each AU as either a: <ul style="list-style-type: none"> • Basic AU (qualified to perform inventories, shutter checks, leak tests & routine maintenance) • Advanced AU (qualified to perform basic activities, plus gauge installations, relocations, surveys & non-routine maintenance/service)
<input type="checkbox"/>	5. Rad. Safety Officer (RSO)	<ul style="list-style-type: none"> - List the name of the RSO; 64E-5.1305(1)
<input type="checkbox"/>	6. Training and Experience in Radiation Safety	<ul style="list-style-type: none"> - Submit rad. safety training documentation for the RSO & each AU; do not include workers' SSNs or birth dates; 64E-5.208(1), .1305(2), .1307, .1313 • Basic AUs: documentation of at least 8 hrs. of BRC-approved training covering 64E-5.1307(1) subjects; may need to include additional documentation of training in O&E procedures; 64E-5.1313(1) • Advanced AUs: documentation of at least 40 hrs. of BRC-approved training by covering 64E-5.1313(2) subjects; may need to include additional documentation of training in O&E procedures; 64E-5.1313(2)
<input type="checkbox"/>	7. Radioactive Material (RAM)	<ul style="list-style-type: none"> - List the element, source manufacturer & model no., max. activity & max. possession limit for each specifically licensed (SL) source requested - If seeking authorization to possess generally licensed (GL) sources/devices, under 7.a., add: "Radioactive material distributed to a general licensee per 64E-5.206(1), and (4), FAC"; under 7.b., add: "Sealed sources" & under 7.c., add: "No single source to exceed that quantity authorized for the general license"
<input type="checkbox"/>	8. Use	<ul style="list-style-type: none"> - List the manufacturer, model no. & intended use for each source/device - If seeking authorization to possess GL devices, add: "Radioactive material distributed to a general licensee per 64E-5.206(1), and (4), FAC"

FIXED GAUGE LICENSE APPLICATION CHECKLIST

CHECK OFF IF ADDRESSED	APPLICATION ITEM	NOTES
<input type="checkbox"/>	* Current RAM Inventory	– For renewal applications, include current inventory of <u>all</u> RAM, including exempt, GL & SL sources/devices & indicate their status (exempt, GL or SL); 64E-5.212(2)
<input type="checkbox"/>	9. Rad. Detection Instruments	– Survey meter required if performing advanced services; 64E-5.212(2) – If applicable, list the manufacturer, model no., detection capability, range & probe specifications (if equipped w/ a probe); 64E-5.208(2), .1314
<input type="checkbox"/>	10. Calibration of Radiation Detection Instruments	– If applicable, list name & address of instrument calibration vendor (may include option of using other licensed vendors) & confirm annual cal. frequency; if performing in-house calibrations, submit procedures; 64E-5.208(2), .314, .1314
<input type="checkbox"/>	11. Personnel Monitoring (PM) Devices	– If applicable, list PM badge type (whole body FB/OSLD/TLD), supplier & exchange frequency (monthly/bimonthly/quarterly); 64E-5.208(2), .314 – PM is required if seeking authorization for advanced activities; if restricted to basic activities only, PM is not required if able to demonstrate workers are unlikely to exceed 500 mrem/yr (documentation required); model: App. G ; 64E-5.315, .1310(2)
<input type="checkbox"/>	12. Facilities & Equipment	– Facility diagram shows locations of installed gauges & gauge storage area, adjacent areas, & proximity to occupied work stations; 64E-5.208(2) – Description of gauge storage area/container; 64E-5.208(2) – Description of security controls for stored & installed gauges; 64E-5.208(2), .320 – Description of any environmental conditions w/ potential to adversely affect gauges (excessive temperature, vibration, caustic chemicals, etc.); 64E-5.208(2) – Description of any protective equipment or barriers installed to protect gauges from harsh environmental conditions or to shield radiation; 64E-5.208(2), .1315
<input type="checkbox"/>	13. Rad. Protection Program	– Program must address all below items; 64E-5.303
<input type="checkbox"/>	A. Member of Public (MOP) Dose Compliance Study	– <u>New applicant</u> : submit procedure for demonstrating compliance w/ MOP dose limits (2 mrem in any 1 hr. & 100 mrem/year); App. A ; 64E-5.208(2), .313 – <u>License renewal</u> : submit completed MOP study); App. A ; 64E-5.208(2), .313
<input type="checkbox"/>	B. ALARA Policy	– Policy describes a) management's commitment to ALARA philosophy, & b) commitments of management & workers for implementing the policy; App. B ; 64E-5.208(2), .303
<input type="checkbox"/>	C. RSO Duties	– Description of RSO duties equivalent to duties listed in 64E-5.1305; App. C
<input type="checkbox"/>	D. Radiation Safety Training Program	– Program addresses all training requirements; model program: App. D <ul style="list-style-type: none"> • Instructions to workers; 64E-5.902, .208(2) • Hazmat employee training; 49 CFR Part 172, Subpart H • Basic AU training; 64E-5.1307, .1313(1) • Advanced AU training (if applicable); 64E-5.1307, .1313(2) – Third party training must be BRC-approved; contact BRC to verify status of training programs; 64E-5.208(2), .212(2) • Approval of in-house training requires submittal of description of instructor qualifications, course outline & duration, method of testing (w/ sample exam) & retesting; .208(2), .1307
<input type="checkbox"/>	E. Operating Procedures	– Procedures address all required components; 64E-5.208(2), .1302, App. E, Ex. B <ul style="list-style-type: none"> • Availability of personnel & procedures • General rules of use (including rad. surveys) • Security (for installed & stored gauges) • Basic & advanced services

FIXED GAUGE LICENSE APPLICATION CHECKLIST

CHECK OFF IF
ADDRESSED

APPLICATION ITEM

NOTES

CHECK OFF IF ADDRESSED	APPLICATION ITEM	NOTES
	13. Rad. Protection Program (contd.)	
<input type="checkbox"/>	(F) Personnel Monitoring (PM) Procedures	- If applicable, instructions on use; spare badges; dealing with lost/damaged badges; PM records & reports; App. F, Ex. E – G ; 64E-5.208(2), Part III, .1302(4), .1310(1)
<input type="checkbox"/>	(G) Posting Procedures	- Instructions on posting per Parts III, IX & XIII; App. H <ul style="list-style-type: none"> • Radiation warning signs (Caution-Rad. Materials, Caution-Rad. Area); 64E-5.323 • Emergency procedures; 64E-5.901(1)(f) • Lock-out procedures; 64E-5.1315 • “Notice to Employees” form; 64E-5.901(3) • Other required documents, including Notices of Violations, Orders & related correspondence; 64E-5.901(1)
<input type="checkbox"/>	(H) Lock-Out Procedure	- Instructions for gauge lock-out/tag-out conforming to OSHA requirements; App. I ; 64E-5.320, .321, .1302(3); .1311, 29 CFR 1910.147
<input type="checkbox"/>	(I) Emergency Procedures	- Instructions for handling gauge loss, theft or damage; include rad. emergency notification numbers for RSO & BRC; App. J ; 64E-5.208(2), .1302
<input type="checkbox"/>	(J) Ordering, Receiving, Opening & Shipping Pro.	- Instructions for preparation & handling of incoming & outgoing RAM shipments; - Sample private use shipping paper & ERI provided; App. K, Ex. C, Ex. D ; 64E-5.208(2), .327, .1501, .1502, 49 CFR
	(K) Leak Testing (LT)	- Man. name & model no. of LT kit used, & name of vendor contracted to perform LT sample analysis (may include option of using other licensed vendors); App. L ; 64E-5.208(2), .1303 - Instructions specify LT interval & LT sample collection - If LT analysis conducted in-house, detailed procedures submitted
<input type="checkbox"/>	(L) Inventory Procedure	- Instructions for performing & documenting inventories; App. M ; 64E-5.1304 - Sample inventory form provided & equivalent to model form; Ex. A ; 64E-5.208(2)
<input type="checkbox"/>	(M) Record Retention Pro.	- Procedure addresses records requirements; App. N ; .208(2), .1302
<input type="checkbox"/>	(N) Notification/Reporting Pro.	- Procedure addresses notification and reporting requirements; App. O ; .208(2)
<input type="checkbox"/>	14. Waste Disposal Procedure	- Procedure addresses RAM disposal; App. P ; 64E-5.208(2), .328
<input type="checkbox"/>	15. Certificate	- Application signed & dated by a certifying official (person authorized to make legally binding statements on behalf of the applicant/licensee); model delegation of authority form: Ex. H