Florida Department of Transportation

Radiation Safety Manual

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Chapter 1 - Introduction

1.1 Purpose

This manual describes the Department's radiation safety program (RSP) established to address nuclear gauging operations authorized under Florida Radioactive Materials License Number 109-1. It describes facilities, equipment, procedures, and qualification of personnel operating nuclear gauges or administering the RSP.

This manual provides information and instructions for safe and proper use of equipment containing regulated sources of radioactive material (i.e., portable nuclear gauges) and compliance with state and federal regulations applicable to the Department's nuclear gauging operations.

1.2 Authority

This manual conforms to requirements for a written RSP specified in Part III (Standards for Protection Against Radiation) of Chapter 64E-5, Florida Administrative Code (FAC), titled Control of Radiation Hazards Regulations.

1.3 Scope

The principal users of this manual are:

- Department and consultant personnel operating portable nuclear gauges possessed under Florida Radioactive Materials License Number 109-1; and
- Department personnel responsible for administration of the FDOT RSP. These personnel are the State Radiation Safety Officer (SRSO), District RSOs (DRSOs), and Alternate DRSOs (ADRSOs).

1.4 Training

The training requirements described in Table 1 below are mandatory for the Department's portable gauge operators and RSOs, which is covered in FDOT Course Number ST-06-0001, Safety and Control of Equipment with Radioactive Materials. Chapter 3 of this manual describes the Department's training program.

Table 1: Training Requirements

Training Requirement	Regulation(s)
Radiation awareness training	Sec. 64E-5.902, FAC
Gauge operator training	Sec. 64E-5.1307 and .1312, FAC
Hazmat employee training	Sec. 64E-5.1501 and .1502, FAC, 49 CFR 172.700 - 172.704

1.5 Acronyms and Abbreviations

Table 2: Acronyms and Abbreviations

Acronym	Abbreviation
ALARA	As low as reasonably achievable
BRC	Bureau of Radiation Control
CFR	Code of Federal Regulations
FDOH	Florida Department of Health
DME	District Materials Engineer
DRSO	District Radiation Safety Officer
ERI	Emergency Response Information
FAC	Florida Administrative Code
FDOT	Florida Department of Transportation
NRC	Nuclear Regulatory Commission
RSC	Radiation Safety Consultant
HMR	Hazardous Materials Regulations
RSM	Radiation Safety Manual
RSP	Radiation Safety Program
RSO	Radiation Safety Officer
SMO	State Materials Office
USDOT	U.S. Department of Transportation

1.6 Posters and Forms

Poster notification and forms referenced in this manual are available in Appendices A and B.

Chapter 2 - Administrative Procedures

2.1 Purpose

This chapter provides information and instructions on administration of the Department's radiation safety program (RSP) addressing portable nuclear gauges authorized by Florida Radioactive Materials License No. 109-1.

2.2 Authority

This manual conforms to requirements for a written RSP specified in Florida Radioactive Materials License No. 109-1 and in Parts III and XIII of Chapter 64E-5, Florida Administrative Code (FAC).

2.3 Scope

The principal users of this chapter are FDOT personnel responsible for administration of the Department's RSP for portable nuclear density gauges. These personnel are the State Radiation Safety Officer (SRSO), District RSOs (DRSOs), and Alternate DRSOs.

2.4 Training

Department RSOs are subject to the same training requirements as nuclear gauge operators, which are listed in Table 1. Chapter 3 of this manual describes the Department's training program.

2.5 Posters and Forms

Posters and forms referenced in this chapter are available in this manual's Appendices A and B.

2.6 FDOT Radiation Safety Program and Manual

2.6.1 General

The Department possesses portable nuclear gauges containing radioactive materials, authorized by Florida Radioactive Materials License No. 109-1. Authorization to possess and use radiation sources requires the Department to establish and implement a formal RSP. The program is described in the FDOT Radiation Safety Manual (RSM). The RSM describes the administrative and operational aspects of the program in conformance with applicable state and federal regulations. Changes to the manual must be submitted to FDOH for review and approval.

2.6.2 Organizational Structure

The organizational structure of the RSP is described below. The program is led by the State RSO, based at the State Materials Office (SMO) in Gainesville, and administered at the district level by the District RSOs. The SRSO also serves as the DRSO for program-related operations at the SMO (also known as District 8). The contract consultant position is optional.

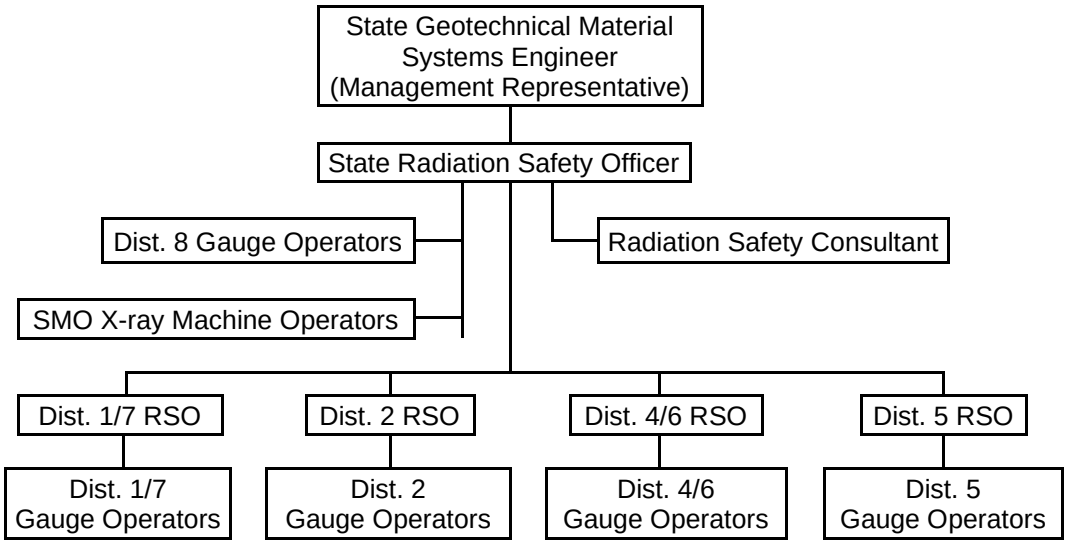


Figure 1: Radiation Safety Program Organizational Chart

2.6.3 Compliance

Department personnel are required to comply with all applicable provisions of the RSM. Personnel with repeated instances of noncompliance with RSM requirements may be denied the privilege of working with nuclear gauges by the SRSO, their DRSO and/or their District Materials Engineer (DME). A denial shall be accomplished by written notice to the district's Director of Operations with copies to appropriate parties. Sections 112.311 – 112.326, of Chapter 112, FAC (Code of Ethics for Public Officers and Employees) describe conduct standards and the actions that may be taken for violations of the standards.

2.6.4 Format

The RSM is formatted in accordance with the Standard Operating System (Topic No. 025-020-002) established by the Department's Forms and Procedures Office. The RSM is available on the Department's Internet and SharePoint websites:

Internet:
http://www.fdot.gov/materials/administration/resources/library/publications/rsamanual/index.shtm

SharePoint Site:

https://fldot.sharepoint.com/sites/SM-GEO/SitePages/Radiation-Safety.aspx

To receive updates on the RSM, personnel can submit their email address through the SMO Publication RSM webpage on the Internet using the following URL: http://www.fdot.gov/materials/administration/resources/library/publications/rsamanual/registration.shtm

2.7 Regulations

2.7.1 Chapter 64E-5, Florida Administrative Code

Possession and use of sources of ionizing radiation is regulated by the Florida Department of Health (FDOH), Bureau of Radiation Control (BRC) under the authority of Chapter 404, Florida Statutes, and implemented through Chapter 64E-5, Florida Administrative Code (FAC) – the Florida Radiation Control Regulations. These regulations are available on the agency's website:

http://www.floridahealth.gov/environmental-health/radiation-control/_documents/regs/64e-5tab.html

The parts listed in Table 3 below apply to the Department's nuclear gauges.

Table 3: Regulations Applying to the Department

Part #	Description
I	General Provisions
II	Licensing of Radioactive Materials
III	Standards for Protection Against Radiation
IX	Notices, Instructions and Reports to Workers; Inspections
XIII	Radiation Safety Requirements for Possession and Use of Sealed or Unsealed Sources of Radioactive Materials
XV	Transportation of Radioactive Materials

2.7.2 Title 49, Code of Federal Regulations

In accordance with sections 64E-5.1501 and 64E-5.1502, FAC, the Department is required to comply with applicable hazardous materials regulations (HMR) of the U.S. Department of Transportation (USDOT), Title 49, Code of Federal Regulations (49 CFR). Chapter I, Subchapter C of the 49 CFR (Parts 171 – 185) addresses the transportation of radioactive material. Some of the commonly referenced parts are listed below in Table 4. The HMR are available online at:

https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title49/49tab_02.tpl

Table 4: 49 CFR, Subchapter C - Hazardous Materials Regulations

Part	Title
171	General Information, Regulations, and Definitions
172	Hazmat Table, Special Provisions, Hazmat Communications, Emergency Response Information, Training Requirements, and Security Plans
173	Shippers – General Requirements for Shipments and Packaging
177	Carriage by Public Highway

2.8 License Requirements and Restrictions

FDOT is required to confine use and possession of radioactive material to the locations and purposes authorized by the Department's 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. The Department's license currently has eleven conditions (10-20).

2.8.1 License Items

Table 5: License Requirement Items

Item	Item Name	Description
1	Name	The legal name of the licensee.
2	Address	The mailing address, which in the Department's case, is also the physical address where required records are maintained – the SMO in Gainesville.
3	License No.	The license number assigned by FDOH BRC: No. 109-1, which should be listed in all correspondence.
4	Expiration Date	The date the license will expire. The license is valid for 5 years from the date of issuance. A renewal application must be received by FDOH at least 30 days prior to the expiration date to remain valid. Reminder notices are sent out as the license nears its expiration.
5	Category	The license category: 3L(I) – portable gauging devices. Section 64E-5.204, FAC lists license types and fees.
6	Radioactive Material	The type of radioactive material the license authorizes for possession and use: sealed sources. Many gauges contain dual sources, so one gauge may list its two sources as separate subitems.
7	Form	The radioactive material form authorized for possession and use. The authorized devices use sealed sources, so source manufacturers and model numbers are listed.

Item	Item Name	Description
8	Possession Limit	The possession limits for authorized radioactive sources. A license may authorize a possession limit higher than the number of sources possessed, but possession of more sources than authorized is not allowed. The limit is tied to Condition 18, which restricts possession to a total 15.9 Ci of Am-241 or Am-241:Be and 26.9 Ci of Cs-137.
9	Use	Approved uses for the sources and devices: measurement of properties of construction materials/soils.

2.8.2 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. The FDOT license currently has eleven conditions, numbered 10 – 20, which is summarized below.

Table 6: License Requirement Conditions

Condition	Condition Description
10	Authorized locations of use and storage
11	Enforcement provisions
12	Authorized user and RSO designations
13	Part III and Part IX provisions
14	Radioactive material transfer limitations
15	Radioactive material transportation requirements
16	Leak test requirements
17	Inventory requirements
18	Possession limitations
19	Personnel monitoring exception
20	Licensee commitments

2.9 Licensing Procedures

2.9.1 Compliance with Public Dose Limits

Florida regulations (64E-5.312, FAC) require the Department to conduct its operations in compliance with the public dose limits listed below:

- Doses in unrestricted areas do not exceed 2 mrem in any one hour.
- Doses to members of the public do not exceed 100 mrem in a year.

Anyone who is not a qualified gauge operator or operator trainee is a member of the public, and subject to the public dose limits.

The RSOs are responsible for establishing restricted areas and verifying radiation levels are within regulatory limits. Gauge operators are responsible for keeping the public at a safe distance from their gauges.

The Department demonstrates compliance with the public dose limits by conducting compliance studies on locations where radiation sources are used and stored. The studies use radiation surveys, calculations and/or environmental monitoring to demonstrate compliance with the dose limits. The studies are also used to document that radiation levels at gauge storage areas are too low for them to be classified as radiation areas.

Any changes to FDOT operations involving radiation sources that could impact the Department's ability to comply with public dose limits may necessitate revisions to existing studies and/or drafting additional ones. The RSOs are responsible for ensuring that all public dose limits compliance studies are performed and updated as necessary and submitted to FDOH for review.

2.9.2 License Amendments

Prior to implementing any change in licensed activities, a request to amend the Department's radioactive materials license must be submitted to and approved by the FDOH BRC Radioactive Materials Program [see 64E-5.207(4), FAC]. Examples of changes that require a license amendment are gauge storage area relocations, procedure changes, gauge possession limits, and adding a new gauge model. Amendment requests should reference the license number and must be dated and signed by a *certifying official* (a person authorized to make legally binding statements on behalf of the licensee).

2.9.3 Change of the State RSO

FDOH must be notified in writing within 30 days of a change of the State RSO [see 64E-5.213(7), FAC]. The notification will include evidence of the new RSO's qualifications (the same training requirements that apply to gauge operators). FDOH should also be notified of a District RSO change and other changes to the RSP organization, but there is no deadline for submitting such notifications.

2.9.4 License Renewal

The Department's radioactive materials license is valid for 5 years from the last day of the issuance month. Provided an application for license renewal is received by FDOH 30 days prior to the expiration date, the terms and conditions of the existing license are extended until the renewed license is issued. Six months prior to the license expiration date, FDOH may mail a notice to the Department regarding the need to renew the license. There are two approaches to the renewal process: a standard renewal, and an "attestation renewal." A standard renewal

requires submittal of a completed Form DH-1054 (“Application for a Radioactive Materials License – Non-human Use”) and a full description of all relevant facilities, equipment, procedures, and personnel. In other words, the renewal application must be prepared as if the license was being requested for the first time.

In lieu of a complete application, an attestation renewal allows FDOT to attest that all commitments and procedures currently in place will be followed. An attestation renewal requires submittal of three documents: 1) a completed Florida Radioactive Materials License Renewal Attestation form; 2) a completed Form DH-1054, but without all the supplemental information required for a full application (unless changes have been made since the last license amendment). FDOH also recommends that a third document be submitted – a completed “Designation of an Alternate Contact for the Licensee” form. All forms are available on the FDOH BRC website. An attestation renewal is allowed every other renewal period.

2.9.5 Vacating Premises

FDOH must be notified in writing no less than 30 days before vacating or relinquishing possession or control of a permanent storage facility listed in the license (see 64E-5.349, FAC). The notification must be dated and signed by a certifying official and must describe the relocation of all radioactive material previously located at the facility. Transfer documentation may be required.

2.9.6 Exemption Requests

FDOH may, upon application or its own initiative, grant exemptions or exceptions from regulatory requirements. The process for submitting an exemption request is described in 120.542, Florida Statutes, and 28-104.001 – 28-104.006, FAC.

2.9.7 FDOH Inspections

The Department is subject to routine inspections of its activities conducted under the FDOT radioactive materials license at 3-year intervals. Additional inspections may be conducted as FDOH deems necessary, or if prompted by an incident or allegation. Inspections may be announced or unannounced and may take place at any location where licensed activities occur.

All components of the Department’s RSP (facilities, equipment, personnel qualifications, procedures, and records) are subject to review.

2.9.8 FDOH License Fees

The Department is invoiced by FDOH annually for the dual license/reclamation fund fees applicable to License No. 109-1; the fees are paid by the SRSO. There are no fees for inspections or for license amendments and renewals.

2.10 Posting Procedures

Each location where nuclear gauges are stored must be posted with the documents listed below.

- Appendix A.1, FDOH Notice to Employees, filled in to indicate where other required documents are maintained for review.
- Appendix A.2, FDOT Emergency Notification Poster.
- FDOT emergency procedures (RSM Chapter 4).

In addition, any FDOH BRC enforcement correspondence and FDOT responses must be posted within 5 working days after dispatch and must be kept posted for at least 5 working days or until corrective actions are completed.

2.11 Records Management Procedures

2.11.1 General Information

State and federal regulations mandate generation of numerous records relating to the Department's RSP, which must be maintained for specified intervals. Due to their importance from a legal perspective, some records are retained beyond required retention intervals.

Records can be originals or reproductions, hardcopy or digital, and must be legible for the specified retention period. When stored in electronic media, records with handwritten information, dates, signatures, and/or initials must be scanned to include that data, in a format capable of producing clear copies.

Records with limited retention intervals (e.g., 3 years) and no long-term value are typically not scanned, unless doing so facilitates their access by the SRSO. All records classified as "permanent" are scanned and stored on the Department's digital network at the State Materials Office Geotechnical network drive.

To safeguard against tampering and/or loss, access to RSP records should be restricted to authorized personnel. File cabinets or rooms used to store RSP records should be kept locked when unattended. Measures to restrict access to computer directories containing RSP records should also be in place.

2.11.2 Records Retention Procedure – State Materials Office

Table 7: SMO Radiation Safety Program Records

Document	Retention Interval/Rule	Format
Current copy of applicable parts of Chapter 64E-5, FAC (FL radiation control regulations)	Permanent [64E-5.901]	Electronic
FL Rad. Materials License No. 109-1 (active amendments, supporting docs)	Permanent [64E-5.901]	Hard copy and electronic
Provisions of RSP (i.e., FDOT RS Manual)	Permanent [64E-5.335(2)]	Electronic
RSP annual reviews	Permanent (FDOT policy) [64E-5.335(2)]	Hard copy and electronic
Completed Notification to Authorities forms	Permanent (FDOT policy) [no rule]	Hard copy and electronic

Table 8: SMO Training Records

Document	Retention Interval/Rule	Format
Radiation safety training and test records	Permanent (FDOT policy [64E-5.1307(3)]	Electronic
USDOT hazmat employee training records	Permanent (FDOT policy) [49 CFR 172.704(d)]	Electronic

Table 9: SMO Equipment Records

Document	Retention Interval/Rule	Format
Gauge receipt, transfer, and disposal records	Permanent [64E-5.103, .340(2)]	Electronic
IAEA Certificate of Competent Authority for each gauge source model (Special Form Source Certificate)	1 year past last gauge shipment [49 CFR 173.476(a)]	Electronic
Test records for Type A packages	1 year past last shipment [49 CFR 173.415(a)]	Electronic
Gauge mfr. operation/maintenance manuals	As long as models are possessed [64E-5.212(2)]	Electronic

Document	Retention Interval/Rule	Format
Radiation detection instrument calibration records	3 years [64E-5.336(1)]	Hard copy
Gauge leak test records	3 years [64E-5.337]	Hard copy
Shipping papers (dated FDOT Bill of Lading)	3 years [49 CFR 172.201(e)]	Hard copy

Table 10: SMO Radiation Monitoring Records

Document	Retention Interval/Rule	Format
Declared pregnancy (DP) forms, monitoring records for DPs	Permanent [64E-5.339(4), (5)]	Electronic
Records showing compliance with public dose limits	Permanent [64E-5.313(5)]	Electronic

2.11.3 Records Retention Procedure – District Materials Offices

Table 11: DMO Radiation Safety Records

Document	Retention Interval/Rule	Format
Current copy of applicable parts of Chapter 64E-5, FAC	Permanent [64E-5.901]	SharePoint
FL Rad. Materials License No. 109-1 (active amendments, supporting docs)	Permanent [64E-5.901]	SharePoint
Provisions of RSP (i.e., FDOT RS Manual)	Permanent [64E-5.335(2)]	SharePoint
District RSP annual reviews	Permanent (FDOT policy) [64E-5.335(2)]	SharePoint
Completed Notification to Authorities forms	Permanent (FDOT policy) [no rule reference]	SharePoint

Table 12: DMO Training Records

Document	Retention Interval/Rule	Format
District radiation safety training and test records	Permanent (FDOT policy) [64E-5.1307(3)]	Electronic
District hazmat employee training records	Permanent (FDOT policy) [49 CFR 172.704(d)]	Electronic

Table 13: DMO Radiation Monitoring Records

Document	Retention Interval/Rule	Format
District declared pregnancy (DP) forms, monitoring records for DPs	Permanent [64E-5.339(4), (5)]	SharePoint
District records showing compliance with public dose limits	Permanent [64E-5.313(5)]	SharePoint

2.12 Notification and Reporting Procedures

2.12.1 Notifications to Local Authorities of Gauge Storage Areas

DRSOs are responsible for keeping their local fire department informed of all long-term gauge storage locations. Appendix B.1 is used to document the notifications.

2.12.2 Reports of Stolen, Lost, or Missing Radiation Sources

Telephone Reports. A stolen, lost, or missing portable gauge must be reported by phone (407-297-2095) to FDOH BRC immediately after its occurrence becomes known.

Written Reports. Telephone reports of stolen, lost, or missing gauges must be followed by a written report to FDOH BRC within 30 days after making the telephone report. Written reports must include the below information.

- Description of the radiation source(s) (isotope, form, quantity).
- Description of the circumstances under which the loss/theft occurred.
- Statement of disposition/probable disposition of the gauge.
- Exposures of individuals to radiation, circumstances under which the exposures occurred, and possible doses received.
- Actions that have been or will be taken to recover the source.
- Procedures or measures that have been or will be adopted to prevent recurrence.

2.12.3 Incident Notifications

Reports may be made by phone or fax; names of individuals who have received radiation exposure must be stated in a separate and detachable portion of the report. Social security numbers and birth dates should not be included.

Immediate Notification. Required for any event that might have caused or threatens to cause a dose of 25 rem or more, an eye dose of 75 rem or more, or a skin, extremity, or total organ dose of 250 rem.

24-Hour Notification. Required for any event that might have caused or threatens to cause an individual to receive in 24 hours a dose greater than 5 rem, or an extremity dose greater than 50 rem.

2.12.4 Reportable Event Notifications

A written report must be submitted to the FDOH BRC within 30 days after learning of any incidents requiring immediate or 24-hour notification, or of a radiation dose in excess of the levels/limits listed below.

- Occupational dose limits for adults (5 rem) or minors (500 mrem).
- Embryo/fetus limits for a declared pregnant woman (500 mrem).
- Public dose limits (2 mrem in any 1 hour or 100 mrem in 1 year).
- Radiation levels greater than 20 mrem in unrestricted areas.

Reports must describe the extent of exposure of individuals, including (as appropriate) the information listed below.

- Estimates of each individual’s dose.
- The levels of radiation involved.
- The causes of the elevated exposures, or dose rates.
- The corrective steps taken or planned to prevent recurrence, including a schedule for achieving compliance with license conditions.

2.12.5 Reports of Leaking/Contaminated Sources

FDOH BRC must be immediately notified upon learning of any leaking or contaminated sealed source. A follow-up written report must be submitted within 5 days. Refer to the leak testing procedure in sec. 4.14 for additional information.

2.13 ALARA Policy

2.13.1 ALARA Philosophy

Part III of Chapter 64E-5, FAC, establishes standards for protection against radiation hazards. The standards require the Department to employ, to the extent practical, procedures and engineering controls to achieve occupational and public doses that are as low as reasonably achievable (ALARA).

The concept of the ALARA philosophy is that unnecessary exposure to radiation should be avoided, even though occupational dose limits pose a very low risk of injury. The objective is to reduce radiation doses as far below regulatory limits as is reasonably achievable through good radiation safety planning and practice, and through a management commitment to policies that deter departures from good practices.

2.13.2 Management Commitment

FDOT management is committed to the philosophy of maintaining occupational and public radiation doses as low as reasonably achievable. Management will ensure that all personnel working with sources of ionizing radiation are made aware of this commitment to the ALARA philosophy and are instructed in ways to minimize doses. The State RSO and District RSO's have been delegated authority to ensure adherence to ALARA principles. FDOT management is committed to making all reasonable modifications to procedures, equipment, and facilities to reduce exposures, unless the costs are unjustified. Management is prepared to describe the reasons for not implementing modifications that have been recommended.

2.13.3 ALARA Policy Implementation

The ALARA philosophy is integrated into the FDOT RSP. Section 2.14 describes ALARA responsibilities delegated to Department personnel, and Chapter 3 (Operating Procedures) includes instructions for applying ALARA principles.

Program audits. At least annually, the SRSO conducts a formal review of the RSP content and implementation. The reviews include an evaluation of equipment, procedures, inspection findings and incidents. A summary of the results of each annual review, including a description of actions proposed and taken (if any) is provided to management.

2.14 Personnel Duties and Responsibilities

Personnel duties and responsibilities for implementation of the Department's RSP are summarized below. The listed duties may be delegated to qualified designees to ensure compliance, e.g., an Alternate DRSO.

2.14.1 State RSO

The State RSO is delegated authority to fulfill the duties and responsibilities of the position as specified in the Florida radiation control regulations and listed below. The RSO must have sufficient training and experience to be a user of the equipment authorized by FDOT's license, with practical experience and knowledge of related procedures, facilities, and equipment.

The SRSO is authorized to make legally binding statements on behalf of FDOT in all matters related to the Department's radioactive materials license (i.e., the SRSO is designated as a certifying official). The duties and responsibilities of the SRSO are listed below.

- Ensure compliance with the terms and conditions of the FDOT radioactive materials license and with applicable regulations.
- Ensuring timely payment of license and registration fees, timely revisions to the license, RSM and public dose compliance studies to address rule, policy, and operational changes.
- Ensure that radiation sources are used only by personnel authorized by the Department's license.
- Ensure that all personnel working with radiation sources read and understand the FDOT radiation safety manual and are trained in accordance with the FDOT training program.
- Maintain all RSP related records required by the Department and applicable regulations, provide records to the DRSOs as necessary, and maintain a current copy of the RSM on the Department website.
- Ensure that all radiation sources are properly secured against unauthorized access or removal and that local fire departments are informed of locations where gauges are routinely stored.
- Ensure that radioactive sources possessed by the Department are leak tested and inventoried as required by the FDOT license and procedures.
- Serve as a contact with FDOH BRC for FDOT radiological incidents, and coordinate FDOT assistance to FDOH BRC in responding to in-state radiological incidents.
- Serve as the District 8/SMO DRSO.
- Assist the DRSOs in implementing the FDOT RSP within each district.
- Ensure that the ALARA philosophy is emphasized to workers, and that workers are instructed on ways to minimize exposure.

- Review monitoring reports for pregnant workers to determine if unnecessary exposures are being received, investigate any doses that appear to be excessive, and document investigations and any corrective actions taken.
- At least annually, conduct a comprehensive review of the Department's RSP.

2.14.2 Radiation Safety Consultant

The radiation safety consultant (RSC) is an optional contract position. The RSC is an individual with extensive radiation safety training and experience applicable to the Department's radiological operations, serving an administrative support role to the State and District RSOs. Specific duties and responsibilities for the RSC are listed below:

- Assist with license and registration management.
- Assist with RSP records maintenance.
- Assist with RSP-related training and audits.
- Provide regulatory and technical support.

2.14.3 District RSO (DRSO)

The DRSO serves as an extension of the State RSO within the districts, fulfilling the applicable duties and responsibilities of the RSO at the district level. Specific duties and responsibilities are listed below:

- Cooperate with the SRSO and district personnel in implementation of program requirements, provide timely response to reports of problems or program-related inquiries.
- Emphasize the ALARA philosophy to workers, provide guidance on ways to reduce their radiation doses.
- Provide or arrange radiation safety training for Department personnel as needed and ensure proper supervision of gauge operator trainees.
- Ensure compliance with requirements related to security, storage, and public dose limits for gauges in their district, including notification to local fire department regarding locations where gauges are routinely stored.
- Ensure that leak tests and inventories are performed at required intervals in accordance with state regulations and FDOT procedures.
- Inspect gauges, related equipment, and documents in accordance with FDOT procedures.
- Maintain an adequate number of calibrated and operable radiation survey instruments in their district.
- Address declared pregnancy requirements.

- Monitor non-departmental personnel for compliance with FDOT procedures applicable to their operations, including review of radioactive materials licenses and supporting documentation.
- Respond to radiological incidents in coordination with the State RSO and assist FDOH in responding to in-state radiological incidents.

2.14.4 Resident Engineer/Project Administrator

The Resident Engineer and/or Project Administrator has direct responsibility for safe use of Department gauges at FDOT construction projects and has the duties listed below.

- Ensure that only qualified operators or trainees working under the direct supervision of an operator handle, use and/or transport Department gauges.
- Arrange for employees to obtain radiation safety training in accordance with the Department's training program.
- Ensure that personnel under their supervision comply with the operating and emergency procedures described in the FDOT RSM.
- Ensure that all pregnant employees who may be operating nuclear equipment or entering restricted areas are furnished dosimeters and that required information for monitored pregnant workers is given to the DRSO.
- Ensure the security and proper storage of gauges subject to their jurisdiction and maintain keys for all gauge locks for their projects.
- Advise the DRSO of any unsafe gauge conditions or practices.
- Respond to gauge incidents in coordination with the DRSO/SRSO and submit a written report to the DRSO following a gauge incident.
- Review contractor licenses and verify that the license authorizes the gauges to be used before their use on an FDOT project.

2.14.5 Gauge Operators

Department personnel working with sources of ionizing radiation are responsible for the duties listed below.

- Be familiar with the FDOT RSM and ensure that a copy of the RSM accompanies each gauge at all times.
- Comply with all applicable provisions of the RSM and all other pertinent instructions and requirements to ensure safe handling, transport, and use of portable nuclear gauges.
- Know and practice the ALARA philosophy to minimize radiation exposures.
- Provide direct supervision and mentoring of operator trainees.

- Maintain their gauge diary according to RSM requirements.

2.15 Personnel Monitoring Program

2.15.1 FDOT Personnel Monitoring Program

Personnel likely to receive 500 mrem/year or more from their work with sources of ionizing radiation are required to have their occupational radiation exposures monitored. Decades of monitoring data demonstrate that FDOT personnel are unlikely to receive such exposures. Therefore, the Department has discontinued badging of personnel who routinely work with portable nuclear gauges.

2.15.2 Monitoring Requirement for Declared Pregnant Workers

Due to the elevated risk associated with radiation exposure to an embryo/fetus, Florida regulations limit the occupational dose of a declared pregnant woman to 500 mrem during the pregnancy. In addition, FDOH recommends that no more than 50 mrem be received in any one month of pregnancy. These limits apply only if a worker elects to follow them by formally declaring her pregnancy in accordance with this procedure. A declared pregnant woman is defined as a female worker who has voluntarily informed her supervisor in writing of her pregnancy and the estimated date of conception. If by the time the woman declares pregnancy, the dose to the embryo/fetus has exceeded 500 mrem or is within 50 mrem of 500 mrem, the Department will be considered in compliance with the limit, provided the additional dose to the embryo/fetus does not exceed 50 mrem during the remainder of the pregnancy. Doses above these limits shall be investigated by the DRSO to establish their cause and to determine if any corrective actions are warranted to prevent recurrence. The investigation should include an interview with the worker and a review of the worker's gauge use for the period in question. The DRSO will submit an email memo to the SRSO describing the findings of the investigation and any corrective actions taken or recommended.

To initiate the process, a declared pregnant woman must submit a completed form shown in Appendix B.2, "Declaration of Pregnancy", to her supervisor and comply with the form's instructions. The worker's supervisor must submit the form to the DRSO, who will forward a copy to the SRSO. Declared pregnant women will not be removed from working with gauges unless requested in writing by the individual. The supervisor must ensure that the employee wears her badge at waist level for the duration of the pregnancy.

Upon receipt of "Declaration of Pregnancy" form (Appendix B.2), the DRSO must verify that the employee has not requested removal from gauge work, ensure that the badge is worn properly, maintain records, and monitor compliance with the dose limit. Upon completion of the embryo/fetus monitoring, the DRSO must submit a memo to the SRSO describing how these instructions were implemented

and noting the doses reported for the worker's pregnancy. A copy of all relevant documentation will be maintained with the Department's dosimetry files.

2.15.3 Issuance and Processing of Dosimeters for Pregnant Workers

Each monitored pregnant worker is assigned a dosimeter or participant number. Prior to assigning a dosimeter, the SRSO must obtain name (first, middle initial, last name), gender, and date of birth from the worker.

The SRSO or designee then contacts dosimetry vendor by phone, email, or through the company's website to provide the above information and request that the worker be issued a badge imprinted with their name.

Dosimeters are exchanged on a quarterly basis. The vendor ships each district's batch of dosimeters to the respective DRSO. Each shipment includes a control dosimeter, which is used to monitor radiation doses received during transit and storage of the other dosimeters. The control badge must be stored in a protected area during the wear-period and returned to the dosimetry vendor with the other badges at the end of the quarter. The reading on the control dosimeter is subtracted from the dosimeter reading of each participant. Failure to include the control dosimeter will cause transit and storage doses to be reflected in the participants' doses.

The DRSO is responsible for exchanging dosimeters assigned to personnel within their district and ensuring timely processing by returning them to the vendor within 14 days of the end of the monitoring period.

2.15.4 Dosimetry Reports for Monitored Pregnant Workers

Quarterly Reports. The dosimetry vendor mails a copy of each district's dosimetry report to the SRSO. The SRSO maintains the reports for all districts. Electronic copies of dosimetry reports are available at the SMO and may be requested by DRSO. The pregnant worker may request their personal dose data at any time.

The SRSO is responsible for timely reviews of the dosimetry reports and for addressing any identified issues. Upon review, the SRSO will request the DRSO to respond to issues. If possible, absent badges must be located and processed. The DRSO is responsible for investigating elevated doses (refer to the ALARA policy for additional instructions).

Annual Dose Reports. The Department issues annual dose reports for all monitored pregnant workers, which are available upon request. The reports are signed, dated and issued by the SRSO using the form shown in Appendix B.2 or a vendor form.

Termination Dose Reports. The Department issues termination dose reports for monitored pregnant workers when monitoring has been discontinued, which are issued within 30 days after the individual's final dose total has been reported. The

reports are issued by the SRSO using the form shown in Appendix B.2 or a vendor form and are available upon request.

2.15.5 Instructions for Lost/Damaged Dosimeters for Pregnant Workers

In the event of a lost or damaged dosimeter, the DRSO must estimate the pregnant worker's dose for the period the badge was worn and notify the dosimetry processor if the individual's dose total needs to be revised. A pregnant worker's dose is estimated by reviewing the individual's doses received during prior monitoring periods and their gauge use for the time covered by the lost or damaged dosimeter. The DRSO must document the results of the review and describe how the dose for the monitoring period covered by the lost/damaged badge was estimated, then submit a memo to the individual and to the SRSO for review and concurrence. If no objections to the estimated dose are received, and the pregnant worker's dose total needs to be revised, the DRSO must contact the SRSO. The SRSO will then contact the dosimetry vendor and instruct the vendor to make the change. The entire process must be documented and retained on file with the district's dosimetry records.

If a lost/damaged badge requires that a replacement dosimeter be issued for the rest of the monitoring period, the DRSO must document the number of the assigned replacement badge and notify the SRSO. The SRSO will inform the dosimetry vendor to add the dose from the replacement badge to the worker's dose total. A record of the process must be documented and retained on file with the district's dosimetry records.

2.15.6 Occupational Dose Limits for Minors

Florida regulations limit the occupational dose to a minor to 500 mrem/year. To ensure compliance, minors are prohibited from working with the Department's licensed and/or registered radiation sources.

2.15.7 Reports of Elevated Exposures

If an elevated exposure is investigated and reported to FDOH BRC, a copy of the report will be provided to the exposed individual no later than when the report is sent out. A copy of the report, including a notation of the date a copy was provided to the exposed individual, will be maintained with the Department's dosimetry files for at least 3 years.

2.16 Gauge Receipt, Transfer and Disposal Procedures

State regulations impose stringent restrictions on the receipt, transfer, and disposal of licensed sources of radioactive material. Prior approval from the SRSO is required to purchase any radioactive material. The SRSO will take the necessary steps to obtain regulatory approval for the acquisition and notify the personnel seeking the equipment once the authorization process has been completed. Any acquisition of additional radiation sources must include an evaluation of their

impact on the Department's ability to comply with public dose limits and may necessitate a revision to the Department's public dose limit compliance studies.

2.16.1 Ordering, Transfer and Disposal of Radioactive Material

The SRSO must approve all orders for gauges and other devices containing radioactive material and is responsible for ensuring that the radioactive material is authorized by the Department's license.

FDOT License. Receipt of a licensed source of radioactive material requires an amendment to the Department's license, if acquiring the additional source(s) will exceed the possession limits specified in the license, if the source and/or device is not currently authorized by the license, or if the proposed use is not authorized. A license amendment may also be required if a radioactive source/device acquisition results in changes to FDOT procedures or locations of use and/or storage.

Verification. If a nuclear gauge or other device containing radioactive material is to be purchased, sold, or transferred for disposal, verification of the transferor's/transferee's authorization to possess the radioactive material must be documented. Either a copy of each party's license will be exchanged, and the transferor's license retained on file as evidence of an authorized transfer, or one of the other verification methods listed in 64E-5.215(4), FAC will be used.

Documentation. Receipt, transfer, and disposal records are retained on file until termination of the Department's license. Documentation will include the information listed below.

- Description of the material being acquired or transferred (device manufacturer, model and serial number, type and activity of radioactive material, and source manufacturer).
- Name, address, and license number of the transferor and transferee.
- Date of the transfer and signatures of the individuals shipping or receiving the device(s).

2.16.2 Receipt and Opening of Radioactive Material Packages (Gauges)

Receipt. The SRSO or DRSO will provide instructions to the shipper on where to deliver the gauge(s) and make arrangements to take prompt possession.

Opening. Only a qualified gauge operator or the radiation safety consultant is authorized to open an incoming gauge package. The first step is to inspect the exterior of the transport case and verify that the case's tamper-evident security seal is intact. If the seal is missing or there is damage to the case exterior, notify the SRSO/DRSO and perform a radiation survey to verify that the radiation levels are acceptable. If the case exterior passes inspection, the next step is to open the

case and inspect its contents for signs of damage, missing equipment, or missing labels/documentation. The gauge model and serial numbers must be verified as matching the accompanying documentation. If any problems are noted, the SRSO/DRSO must be notified for further instructions.

If the contents inspection is satisfactory, store and lock the gauge in the approved gauge storage area. Receipt of a new or transferred gauge requires the creation of a new gauge records file that includes a copy of the gauge certificate, mfr. warranty, and shipping papers/packing slip. Copies of all documentation must be forwarded to the SRSO for retention.

2.17 Radiation Detection Instruments

Each DRSO maintains at least one radiation detection instrument (survey meter) for routine radiation surveys and for response to radiological emergencies. The meters are calibrated and maintained by the FDOH BRC Health Physics Lab in Orlando. Each meter bears a calibration label. Survey meter models may vary; all are low-range Geiger counters, such as the models listed below.

- Victoreen Model CD V-700 (0.1 – 50 mR/hr) with
- Victoreen Model 493 (0.1 – 50 mR/hr)
- W.B. Johnson Model GSM-10S (0.1 – 20 mR/hr)

The meters may be equipped with an internal Geiger-Mueller (GM) detector (Model 493) or external “pancake” or side-widow GM probes (Model CD V-700 and GSM-10S). The external probes and cables are delicate and cannot withstand abuse. The mylar window of the pancake probe is particularly fragile and cannot withstand being dropped or “banged” against a hard surface. When used, the cover on the pancake probe should be kept on and the window of the side-window probe should be kept closed.

Each DRSO is responsible for secure storage and routine checks on the status of their meters, keeping replacement batteries on hand, and ensuring that at least one calibrated and operable meter is available for their use.

2.18 Consultant and Contractor Procedures

2.18.1 Department Oversight

Consultants, contractors, and their subcontractors using gauges at FDOT facilities and/or FDOT Right of Way sites must make their current radioactive materials license available to DRSOs upon request. In the case of out-of-state companies operating under reciprocal recognition of their out-of-state license, documentation from FDOH stating that the company has been granted reciprocity will be accepted in lieu of a copy of their license.

Consultants, contractors, and their subcontractors must comply with all applicable regulatory requirements related to their use, transport, and storage of nuclear gauges at FDOT sites, and are subject to Department oversight.

Any apparent violations observed by Department personnel must be reported to the DRSO. The DRSO will orally inform the operator observed committing the violation (if available) and will submit a written report to the consultant/contractor RSO, and forward copies to the SRSO, the site Resident Engineer, and the District Construction Engineer. The report should include the information listed below.

- Date of the report.
- Name of gauge/device operator and consultant/contractor RSO.
- DRSO name.
- Time, date, project, and project location of observed violation.
- Equipment model and serial number (if relevant).
- Description of violation (including regulatory reference).
- Note that report has been copied to the State RSO, Resident Engineer, and District Construction Engineer.

2.18.2 Storage of Non-FDOT Gauges at FDOT Facilities

FDOT consultants may be authorized to store their gauges at Department facilities if the following conditions are met:

- The DRSO seeks approval in writing from SRSO;
- The DRSO approves the storage in writing;
- The storage area is not used to store FDOT gauges;
- The storage area satisfies all applicable regulatory and Department requirements for posting, security and public dose limits; and
- The consultant's procedures (which must be provided to the DRSO) include instructions for storage of gauges at temporary job sites or, if the storage area will be used for more than 2 years, the consultant's license lists the FDOT location as the permanent storage location for gauges under License Condition 10 (a copy of the license must be provided to the DRSO).

2.18.3 Procedure for Loaning FDOT Gauges to Consultants

FDOT gauges may not be loaned to the Department's contractors or their subcontractors or suppliers. FDOT gauges may be loaned to Department consultants to perform tests on Department projects, in accordance with the conditions described below.

- The contract must have a provision for using Department equipment.

- The DRSO must authorize loaning the equipment.
- The DRSO must verify that the consultant receiving the gauge is authorized by their license to receive the gauge make and model.
- The consultant RSO must submit a notarized statement that includes the following commitments:
    1) Possession of the FDOT gauge(s) is authorized by the consultant's license;
    2) Operators of the gauge are qualified by the consultant's license;
    3) All applicable FDOT and regulatory requirements will be followed;
    4) The gauge(s) will be returned in the same condition as received;
    5) Any repairs needed while the gauge is on loan will be performed by the manufacturer at no cost to the Department; and
    6) The DRSO will be immediately notified if the gauge is involved in an incident.

Note: The Department will maintain the gauge's calibration during the loan period.

Chapter 3 - Training Program

3.1 Purpose

This chapter describes training requirements for personnel permitted to handle, transport, and operate radiation-emitting devices possessed by the Department. It describes the Department's radiation safety training program and certification process for gauge operators.

3.2 Authority

This manual conforms to requirements for a written radiation safety training program specified in Parts III and XIII of Chapter 64E-5, Florida Administrative Code (FAC), and to requirements for hazmat employee training specified in Part 172 of Title 49, Code of Federal Regulations.

3.3 Scope

The principal users of this chapter are:

- Department personnel operating portable nuclear gauges possessed under Florida Radioactive Materials License Number 109-1; and
- Department personnel responsible for administration of the FDOT radiation safety program (RSP) addressing portable nuclear gauges. These personnel are the State Radiation Safety Officer (SRSO), District RSOs (DRSOs), and Alternate DRSOs.

3.4 Training Requirements for Nuclear Gauge Operators

Handling, transport, and use of portable nuclear gauges is restricted to certified gauge operators -- individuals certified as having completed the Department's gauge training program, and gauge operator trainees – individuals that have completed the Department's gauge radiation safety training course but are not yet certified because they lack sufficient hands-on experience working with gauges. Gauge operator trainees may only work with gauges under the direct supervision of a certified gauge operator. Exceptions to the above restrictions are made for the Department's radiation safety consultants and vendors (who are qualified through independent training and experience); they are authorized to handle and transport FDOT gauges in the course of their duties in support of the Department's RSP.

There are three training components for certification as an FDOT gauge operator: radiation awareness training, operator training, and hazmat employee training. Regulatory references for each training component are listed in Table 1.

3.5 Radiation Awareness Training

Prior to handling, transporting, or operating a gauge, personnel receive instruction on the topics listed in 64E-5.902(1), FAC, and listed below. The topics are covered in the Department's nuclear gauge radiation safety training course.

- Information on the Department's storage, transfer, and use of gauges.
- Health risks associated with exposure to radiation and radioactive material.
- Precautions and procedures for minimizing radiation exposures.
- Provisions of applicable regulations and the Department's license.
- Worker responsibility to report unsafe conditions in the workplace.
- Response to radiological incidents.
- Occupational radiation exposure reporting requirements.

3.6 Gauge Operator Training

Certification as a gauge operator requires completion of at least 8 hours of radiation safety training on the subjects listed in 64E-5.1313(1), FAC, which are summarized below. With the exception of practical experience with gauges, the gauge operator training course addresses all required subjects.

- Radiation safety fundamentals and practices.
- Radioactivity measurements and radiation detection.
- Biological effects of radiation.
- FDOT gauge operating and emergency procedures.
- Practical experience working with gauges.

Note: Any third-party training portable nuclear gauge radiation safety training course accepted by the FDOH BRC, including computer-based courses, may be used in place of the FDOT training course.

3.6.1 Practical Training

Operator training concludes with completion of 16 hours of hands-on work with gauges under the supervision of an experienced gauge operator, provided as part of the Earthwork Construction Inspection (ECI) Level 1 qualification.

3.7 Hazmat Employee Training

FDOT gauge operators are classified by the U.S. Department of Transportation (USDOT) as hazmat employees and are subject to training requirements specified in 49 CFR Part 172, Subpart H. There are four training components: general awareness/familiarization, function-specific, safety, and security awareness. All are covered in the Department's gauge operator radiation safety training course.

3.8 Training and Certification Process for Gauge Operators

- Gauge operators must complete the Department's computer-based radiation safety course ST-06-0001, Safety and Control of Equipment with Radioactive Materials. In class training may be provided by the RSO, DRSO or their designees (e.g., consultants, experienced FDOT gauge operators) if needed.
- Prior to attending the gauge operator course, personnel are required to read the FDOT radiation safety manual (RSM). The manual can be accessed on the Internet and SharePoint site at the website shown in section 2.6.4.
- Successful completion of the Department's gauge operator radiation safety training course qualifies personnel for certification as a gauge operator and is a prerequisite for working with gauges. Such personnel are designated as apprentice gauge operators until they complete at least 16 hours of hands-on work with gauges under the supervision of a certified gauge operator. On-the-job training as an apprentice operator is part of ECI Level 1 qualification.
- Successful completion of the gauge operator course requires a passing score (at least 70 out of 100 possible points) consisting of 50 multiple-choice questions, with each correct answer counting two points. Individuals failing the exam must review the course materials and retake the exam.
- Gauge operators must provide a copy of their certificate to their DRSO.

3.9 Refresher Training

Gauge operators must complete refresher training every 3 years to address the recurrent training requirement for hazmat employees specified in 49 CFR 172.704(c)(2). Refresher training may be obtained by either attending a gauge operator course or by completing a computer-based, self-paced course.

3.10 Training Records

At a minimum, documentation of training will be maintained for the duration of each worker's employment, plus 90 days, or for 5 years, whichever is greater. In accordance with 49 CFR 172.704(d), records of training will include the following information:

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

Chapter 4 - Gauge Operating Procedures

4.1 Purpose

This chapter provides instructions for FDOT personnel handling, transporting and/or operating the Department's portable nuclear gauges. The purpose of the instructions is to ensure that operators comply with applicable regulations, Department policies and procedures, and keep radiation exposures as low as reasonably achievable (ALARA).

4.2 Authority

This manual conforms to requirements for written operating procedures specified in Part XIII of Chapter 64E-5, Florida Administrative Code (FAC).

4.3 Scope

The principal users of this chapter are FDOT personnel handling, transporting and/or operating the Department's portable nuclear gauges. Additional users are FDOT personnel responsible for oversight of nuclear gauge operators: State Radiation Safety Officer (SRSO), District RSOs (DRSOs), and Alternate DRSOs.

4.4 Training

The training requirements shown in Table 1 are mandatory for the Department's portable gauge operators and RSOs. Chapter 3 of this manual describes the Department's training program.

4.5 Posters and Forms

The required posters and forms referenced in this chapter are available in Appendices A and B.

4.6 Procedures

- A complete and current copy of the FDOT Radiation Safety Manual (RSM) must always accompany the gauge.
- Copies of the manufacturer operation/maintenance manual for each gauge model possessed at the district are maintained by the District RSO for ready reference by operators.

4.7 Personnel

Handling, transporting, and/or operating the Department's portable nuclear gauges is restricted to qualified gauge operators and personnel under the direct supervision of a qualified operator. Examples of personnel who may work with a gauge without being a qualified gauge operator are operator trainees gaining on-the-job experience and the Department's radiation safety consultant.

4.8 General Rules of Use

Gauge operators and trainees (as applicable) must follow the below instructions.

- Operate gauges in accordance with the manufacturer's instructions unless otherwise stated in a test method approved by the Department.
- Apply ALARA principles to keep radiation exposures as low as reasonably achievable: minimize time spent near the gauge (the less time, the less exposure); maximize the distance from the gauge (doubling the distance quarters the radiation intensity); and make use of available shielding to block out radiation (e.g., delay extending the source rod until the gauge is centered over the test hole; the ground shields the radiation emitted by the source).
- Keep members of the public away from gauges to minimize their exposures.
- Do not handle, transport, or store a gauge unless the sliding block is completely closed. Maintenance of the scraper ring or sliding block may be required if any of the problems listed below are encountered.
  - Indexing problems (difficulty raising or lowering the source rod); the scraper ring may need replacement.
  - No "click" is heard from the sliding block striking the back of the shield cavity when the source rod is raised to the safe position.
  - Erratic or incorrect density standard counts, counts approaching allowable limits, or an "Error" message displayed after a self-test.
- Opening or removing a gauge source is prohibited as is direct contact with an unshielded source rod.
- Direct viewing of the bottom of a gauge when the source is in the open or unshielded position is prohibited. If the source rod must be inspected, use an inspection mirror to eliminate the need for direct eye contact.
- Report to the DRSO any situation which appears to be unsafe or a violation of FDOT procedures, or may lead to, or cause an unsafe situation, unnecessary exposure, or violation of regulations or Department procedures.

4.9 Gauge Security and Storage Requirements

- Except when securely stored in an approved storage area or transport vehicle, operators must keep their gauge under constant surveillance and immediate control. Operators must always maintain visual contact with the gauge and be in sufficiently close proximity to protect it from tampering, damage, or theft.

- Before removal from storage, check the gauge to verify that the source rod is in its shielded position and locked (for models equipped with locking mechanisms), then lock it in the transport case.
- After completing each measurement in which the source is unshielded, immediately return the source to the shielded position. Keep the source holder locked in the "off" or closed position whenever the gauge is not in use.
- Whenever the gauge is not under direct surveillance, a minimum of two independent physical controls must be used to prevent unauthorized access to the gauge. Districts may employ different methods of addressing the “two independent controls” requirement. A generic approach is described below.
    - Lock the gauge source rod in its shielded/safe position as identified in the operator’s manual and store the locked gauge in its case.
    - Lock the transport case containing the gauge.
    - Secure the transport case (e.g., with a chain) and lock it.
    - Use an additional lock, so that there are always at least two independent locks preventing tampering or theft of the gauge.

  Note: A locked transport case does not count as an independent control because a locked case can be stolen.

4.9.1 Security While Charging Gauges

When a gauge must be outside of its case for charging, it must be stored in a secured location where the “two independent controls” requirement can be met.

4.9.2 Additional Storage and Security Requirements and Precautions

Gauges cannot be left in vehicles that are taken to a maintenance or repair shop and gauges cannot be taken to a private residence. Operators should take all reasonable measures to deter theft, including concealing gauges from view during transport and storage and maintaining an elevated level of awareness in unsafe areas. When possible, vehicles containing gauges should be parked in fenced lots. Storage areas must be able to protect gauges from water damage. Operators must move gauges stored in vehicles to approved storage areas during inclement weather. Personnel entering a gauge storage area must be supervised by a gauge operator to prevent unauthorized access and to comply with public dose limits.

4.9.3 Replacement Locks

The DRSO will provide new and replacement gauge locks for fastening the source rod to the index rod and for storage rooms and vehicles.

4.9.4 Posting Requirements for Gauge Storage Areas

Areas where gauges are stored must be conspicuously posted with a “Caution (or Danger) Radioactive Materials” sign. In addition, each gauge storage area must have the documents listed below conspicuously posted where they can be viewed by workers. The documents may be posted in a clear plastic sleeve that allows them to be easily read.

- FDOH “Notice to Employees" poster (Appendix A.1).
- RSM Chapter 5 – FDOT Emergency Procedures
- Latest FDOH enforcement correspondence and FDOT responses.

The "Notice to Employees" poster is used to state where a copy of the FDOT license, regulations, this manual, dosimetry reports, and other RSP related documents are maintained for review by workers.

Any FDOH Notices of Violations are posted within 5 working days after receipt; FDOT responses, if any, are posted within 5 working days after dispatch; the documents remain posted for at least 5 working days or until actions correcting the violation(s) have been completed.

4.9.5 Storage of Consultant/Contractor Gauges

Non-FDOT gauges and other licensed or registered sources of ionizing radiation cannot be stored in areas used to store FDOT radiation sources.

4.10 Gauge Transportation Procedures

The below instructions are consistent with U.S. Department of Transportation hazardous materials regulations (49 CFR) applicable to the radioactive material (nuclear density gauge) shipments conducted by the Department.

Note: Requirements for transporting gauges in Department vehicles – known as private (sole) use shipments – differ from common carrier shipments.

4.10.1 Preparing Packages for Shipment

Gauge operators are responsible for ensuring that their gauges are properly packaged, marked, labeled, secured, blocked and braced, and that proper documentation accompanies the devices during shipment.

The Department uses gauge manufacturer transport cases which are approved Type A (USA DOT 7A) containers.

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 markings include the information listed below. Examples of ID labels used by the Department are shown below:

- Shipping name (Radioactive material, Type A package, special form' (may also include the phrase "Non-Fissile or Fissile Excepted")
- RQ (before or after the shipping name)
- Identification number (UN 3332)
- Package type (Type A)

USA DOT 7A TYPE A RADIOACTIVE MATERIAL TYPE A PACKAGE SPECIAL FORM, NON FISSILE OR FISSILE EXCEPTED, UN 3332, RQ

USA DOT 7A TYPE A
RADIOACTIVE MATERIAL
TYPE A PACKAGE, SPECIAL FORM
7, UN3332, RQ

Figure 2: Sample Radiation Warning Label (Troxler Model 3440 Gauge)

Figure 3: Sample Gauge Identification Labels

Two USDOT Radioactive Yellow II warning labels must be applied to opposite sides of the transport case (the long sides), which must list the package contents (radioactive isotopes) and activities (in international and traditional units), and the package's Transport Index (TI). The TI is a dimensionless number indicating the package's radiation level at 1 meter. The TI for Troxler Model 3440 Series gauges is 0.6; for Instrotek gauges, the TI is 0.5. Figure 2 shows a sample label for a Troxler Model 3440 Series gauge.

Transporting a gauge requires two documents: A Bill of Lading and an Emergency Response Information (ERI) sheet.

Shipping papers. Operators must carry a Bill of Lading that must include the information listed below. The two forms are shown in Appendices B.4 for Troxler gauges and B.5 for InstroTek gauges.

- Name and address of shipper (FDOT, SMO address).
- Description of shipment [shipping name, ID number, hazard class, type of package, RQ, name and activity of each nuclide, category of labeling and Transport Index).
- Emergency response telephone number.
- Date of shipment (the Shipment Date column enables the form to be used repeatedly).
- Gauge serial number.

The operator must verify that the Bill of Lading lists the serial number of the gauge being shipped and must write in the shipment date. When all the Shipment Date spaces have been filled in, the document must be turned in to the DRSO and a new form replaces it. Replacement forms are available from the DRSO.

Emergency response information. The ERI sheet (Appendix B.6) provides instructions for first responders in the event of a transport accident involving a gauge. The form must be kept with the Bill of Lading during shipments. If the information remains legible, the same ERI sheet can be used repeatedly.

Accessibility of shipping papers. The Bill of Lading and ERI sheet must be immediately accessible to the driver during transport of gauges, within immediate reach while restrained by the lap belt 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. Papers should be kept in a transparent document protector.

Package inspection. Prior to shipment, the gauge transport case must be inspected to verify proper packaging of the gauge and the unimpaired physical condition of the container and its closure devices. Inspections must include checks for moisture leakage and verification that gauge cushioning materials and seals are intact. Any defects noted during the inspection must be promptly reported to

the DRSO. The DRSO will label and remove from use any gauge or package found to be defective and ensure their repair or replacement.

Blocking and bracing. In addition to the "two independent controls" requirement for securing gauges, the gauge transport case must be blocked and braced to prevent shifting during normal transportation conditions. The districts may use different methods of securing their transport cases to address the blocking/bracing requirement. Shipment of gauges in the passenger compartment or outside of the transport case is prohibited.

Note: If an operator is unable to comply with the above requirements, the issue(s) preventing compliance must be resolved before transporting the gauge. Problems that cannot be resolved by the operator must be promptly brought to the attention of their supervisor and/or the DRSO.

4.11 Gauge Cleaning and Maintenance

Only qualified gauge operators may perform routine gauge cleaning and maintenance, in accordance with manufacturer instructions. Monitored pregnant workers must wear their assigned dosimeter during such activities. A copy of the appropriate manufacturer's gauge manual should be referenced, and the manual's instructions followed. The source rod cannot be extended during cleaning or maintenance, and removal of the source rod or source is prohibited.

Gauge repairs and non-routine maintenance may only be performed by a vendor approved by the State RSO. An inoperable or malfunctioning gauge must be removed from service and should be tagged to indicate its out-of-service status.

4.12 Manuals and Diaries

4.12.1 FDOT Radiation Safety Manual

A current copy of the Department's radiation safety manual (RSM) must always accompany the gauge. The manual is typically stored in the gauge case. Manual updates and replacement copies are available from the DRSO. The DRSO is responsible for providing manual updates to operators, and operators must maintain a complete copy, and obtain replacements as necessary.

4.12.2 Gauge Diaries

Each gauge has its own data diary which accompanies the gauge at all times and must be kept up to date by the operator assigned to the gauge. As a minimum, the diary contains the items listed below.

- Diary data entry sheets.
- Gauge Calibration Parameter Data – shows calibration date and calibration coefficient numbers furnished by the manufacturer or the SMO.

- Latest issue of FM 1-T 310 (“In-Place Density of Soils and Soil Aggregates by Nuclear Methods”).
- Latest issue of FM 5-507 (“Determination of Moisture Content by Means of a Calcium Carbide Gas Pressure Moisture Tester).
- Gauge certificate – lists the model and serial numbers for the gauge and its sources, and other manufacturer data.

4.12.3 Gauge Manuals

Operators are expected to read and be familiar with the manufacturer’s operation/maintenance manual for the gauges they use. Copies of gauge manuals for each type of gauge possessed by their district are maintained by each DRSO and are available for reference by operators, who may also request their own copy.

4.13 Leak Testing Procedure

4.13.1 Leak Testing Requirements

The Department currently possesses two different gauge models, which must be tested for radioactive contamination (leakage) at regular intervals. Gauges must be tested at intervals not to exceed 12 months. In addition, gauges are leak tested if they have been, or are suspected to be damaged, before being returned to service. Routine leak tests are typically performed concurrently with semiannual gauge inventories.

- Leak tests are performed by a qualified gauge operator (typically a DRSO) or by the Department’s radiation safety consultant using a kit provided by an approved vendor. Leak test samples are analyzed by a vendor licensed by FDOH BRC, another state radiation control program, or the U.S. Nuclear Regulatory Commission to provide the service. The Department uses a service vendor for the leak test analysis.

4.13.2 Leak Testing Instructions

The SRSO arranges for a sufficient number of leak test kits to be sent to each DRSO and provides advance notice to each DRSO that the tests are due. The DRSOs ensure that the tests are conducted and returned to the SRSO, who sends them to the vendor for analysis. Reports of analysis results are sent to the SRSO.

Tests are performed in accordance with the written instructions provided by the test kit supplier and the gauge manufacturer. The procedure is described below.

- Verify that the source rod is locked in the storage/safe position.
- Test the Am-241:Be source: remove the gauge control panel and wipe the surface of the radiation label and adjacent area. Reattach the control panel.

- Test the Cs-137 source: turn the gauge on its side and wipe around and in the opening the rod extends from when indexed. The source rod must remain in the shielded/safe position at all times.
- If a radiation detection instrument is available, step away from the gauge and survey the wipe sample. If radiation is detected, place the envelope in a plastic bag, mark the bag “Radioactive”, tag the gauge as out of service, and immediately notify the RSO for additional instructions. If no radiation is detected, place the sample in the vendor’s envelope.
- Fill in the information on the leak test form, date and initial it, insert the form into the envelope, and forward it to the State RSO.

Leak test records include the following information:

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

If a source is found to be leaking, the gauge will be removed from service and the FDOH Bureau of Radiation Control will be notified immediately (407-297-2095). A written report on the leaking source will be submitted to FDOH within 5 days (mailing address: FDOH BRC, Radioactive Materials Program, 4052 Bald Cypress Way, Bin C21, Tallahassee, FL 32399-1741; for overnight deliveries: Rm. 230.09, 4042 Bald Cypress Way, Tallahassee, FL 32399). 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).

4.14 Gauge Inventory Procedure

Inventories of the Department’s gauges are conducted each May and November. Coordinated by the DRSOs, the inventories include physical inspections of each gauge, transport case, and related equipment to evaluate their general condition and to verify that all the identification and warning labels are attached, legible, and have the proper information. The inspection must include a check to verify that all required documents are present.

If an inspection reveals damage, missing or illegible labels, or incorrect or missing information on the labels, the gauge or case must be removed from service until the problem is corrected. Any apparent damage must be reported to the DRSO/State RSO.

In conjunction with semiannual inventories, gauges must undergo routine cleaning and maintenance. Refer to section 4.12 for gauge cleaning and maintenance instructions.

The State RSO maintains an inventory of all gauges possessed by the Department, and each DSRO maintains an inventory of the gauges in their district. Inventory information includes:

- District number.
- Date of inventory.
- Assigned location (the district office where the gauge is assigned).
- Present location (actual location at the time of inventory).
- Gauge manufacturer, model, and serial number.
- Source manufacturer, model, and serial number.
- Source isotope and activity.
- Signature of the State RSO or designee (not required for District inventory records).

4.15 Department Oversight of Consultants and Contractors

Consultants, contractors, and their subcontractors must comply with all applicable state and federal regulatory requirements related to their use, transport, and storage of nuclear gauges at FDOT sites, and are subject to Department oversight to ensure full compliance. FDOT personnel observing radiation safety-related violations by non-FDOT personnel on Department sites should report such violations to the DRSO, who will coordinate appropriate action.

Chapter 5 - FDOT Emergency Procedures

5.1 Purpose

This chapter provides instructions for FDOT personnel responding to radiological incidents involving portable nuclear gauges possessed by the Department.

A radiological incident is defined as any situation involving a Department owned nuclear gauge where a radiation exposure has occurred, is suspected to have occurred, or has the potential to occur, including gauge damage, loss, or theft.

Examples of situations that are not radiological incidents include water damage to a gauge and accidents involving a vehicle transporting a gauge where no damage to the gauge occurred or is suspected.

5.2 Authority

This manual conforms to requirements for emergency procedures specified in Part XIII (of Chapter 64E-5, Florida Administrative Code (FAC).

5.3 Scope

The principal users of this chapter are:

- Department and contract personnel operating portable nuclear gauges possessed under Florida Radioactive Materials License Number 109-1; and
- Department personnel responsible for administration of the FDOT radiation safety program (RSP) addressing portable nuclear gauges. These personnel are the State Radiation Safety Officer (SRSO), District RSOs (DRSOs), and Alternate DRSOs, whose responsibilities include responding to gauge-related incidents.

5.4 Training

The training requirements described in Table 1 are mandatory for the Department's portable gauge operators and RSOs. Chapter 3 of this manual describes the Department's training program.

5.5 Posters and Forms

Posters referenced in this chapter are available in this manual's Appendix A.

5.6 Lost, Stolen, or Missing Gauge

In the event of a lost, stolen, or missing nuclear gauge, the following individuals must be immediately notified, in this order, based on their availability: the site supervisor, the District Radiation Safety Officer (DRSO), and the State RSO. The

DRSO or State RSO will notify the Florida Dept. of Health (FDOH) Bureau of Radiation Control and, as appropriate, local law enforcement agencies. The State RSO will submit any required reports.

5.7 Damage (or Suspected Damage) to a Gauge

- Evaluate the situation to determine if anyone may have been exposed to radiation. If there are any injuries, address them first; if appropriate, notify emergency personnel and hospital staff regarding possible radioactive material contamination.
- Secure the area around the gauge using a radius of at least 15 feet from its location. Maintain direct surveillance to prevent unauthorized entries.
- Visually inspect the gauge to determine whether damage to the source housing or shielding has occurred. If appropriate, wait for technical assistance or instruction from the DRSO, Asst. DRSO, State RSO, or the FDOH Bureau of Radiation Control prior to moving the gauge. The full extent of damage/contamination will be determined, and if necessary, appropriate actions will be taken to decontaminate the area.
- If contamination is suspected, the gauge (and vehicle, if appropriate) must be evaluated with a survey meter (meters are available at each district office) for the presence of contamination prior to being released from the accident scene. A leak test may also be performed.
- As soon as possible, notify the site supervisor, the District Radiation Safety Officer (DRSO) or Assistant DRSO, and the State RSO. The DRSO, Asst. DRSO or State RSO will notify the FDOH Bureau of Radiation Control in accordance with state reporting requirements. If no supervisor or RSO is available, notify FDOH directly.

5.8 Radiation Surveys

If damage to a gauge is suspected, a radiation detector (survey meter) should be used to measure the gauge's radiation levels. Elevated levels indicate that a radiation hazard exists.

5.8.1 Radiation Detection Instruments

Each DRSO maintains at least one radiation detection instrument (survey meter) in their district. Survey meter models may vary, and all are low range Geiger counters, such as:

- Victoreen Model CD V-700 (0.1 – 50 mR/hr)
- Victoreen Model 493 (0.1 – 50 mR/hr)
- W.B. Johnson Model GSM-10S (0.1 – 20 mR/hr)

The meters may be equipped with an internal Geiger-Mueller (GM) detector (Model 493) or external “pancake” or side-widow GM probes (Model CD V-700 and GSM-10S). The external probes are delicate and should be used with the cover on the pancake probe and with the window of the side-window probe closed.

5.8.2 Survey Meter Checks

Before use, perform the checks listed below.

Calibration check. Read the meter’s calibration label to verify its calibration within the last 12 months. If the calibration has passed the due date, the meter should not be used, unless no other meter is available.

Visual check. Inspect the meter for damage to knobs, meter face, and the water-tight seal. If any damage is noted that might compromise the meter’s ability to function properly, obtain a different meter (if available).

Battery check. Turn the knob to the Battery setting; if the indicator reads within the “Batt” area of the scale, the batteries have an adequate charge. If the indicator is below the “Batt” level, replace the batteries and repeat the test. If the indicator is still below the “Batt” level, tag the meter with a note describing the problem and obtain a different meter.

Radiation response check. Using a radiation check source (e.g., button source, thorium lantern mantle or a gauge) with a known radiation level (doesn’t have to be exact), verify that the meter will detect radiation. A slight under- or over-response is acceptable. If the meter does not respond or is way off, obtain another meter. If a Troxler gauge is the only radiation source available, check the instrument’s reading at one meter from the transport case containing the gauge is about 0.5 mR/hr.

5.8.3 Survey Meter Operation

Prior to use, the meter should be turned on and “warmed up” for a few minutes, and a background reading should be taken away from any radiation sources, using the lowest range. Always start reading with the meter range at its lowest setting then increase the range as necessary.

The needle of the meter should be kept between 1/4 and 1/3 of the meter extremes (readings near either end of the scale are less accurate). If the needle is at the upper end of the scale, switch to a higher setting (e.g., from x1 to x10, or from x10 to x100).

All survey instruments have an electronic response time, and some have a switch which allows you to choose the response time (F for fast, S for slow). The response time is the time it takes the instrument to reach 90% of the final value for a specific reading. With either setting, the reading will fluctuate to some degree;

with a slow response, the reading will fluctuate less but take longer to reach the maximum value. In any case, be aware that measurements are not instantaneous; the meter may take up to 30 seconds to reach a maximum value, and some fluctuation is normal.

Note: the radiation readings expected for a Troxler Model 3440 Series gauge are ~20-30 mR/hr at the surface and less than 1 mR/hr at one meter. Inside its case, the highest readings should be ~10-15 mR/hr at the surface and less than 1 mR/hr at one meter. Readings for InstroTek gauges should be similar or slightly lower.

5.9 Instructions for Handling Damaged Gauges

In the event that a gauge is damaged, only the DRSO, SRSO, radiation safety consultant, or a qualified gauge operator working under the guidance of a DRSO, etc. may attempt to recover the gauge and its radioactive sources. Any recovery should be conducted with concurrence and guidance from the FDOH Bureau of Radiation Control.

The objective is to return the device to its transport case for return to the nearest secure storage location. If components have broken off, they should be collected (while wearing disposable gloves, if available), placed in disposable plastic bags, and stored in the transport case. If the source rod has been separated, shielding should be used to lower the rod's radiation levels prior to handling the rod. If available, lead provides the best shielding. The Department maintains several small lead-filled paint cans with a slot that accommodates the tip of the source rod; the container may be used to temporarily shield a broken source rod. FDOH may also be able to provide lead shielding or suitable containers. Alternative shielding materials include wet sand and metal.

5.10 Emergency Contact and Phone Numbers

Radiation emergency names and contact numbers are provided on Radiation Emergency posters (Appendix A.2) at each gauge storage location and on the dashboard labels (Appendix A.3) in each Department vehicle used to transport gauges.

Appendix A: Poster Notification

A.1 FDOH Notice to Employees

FLORIDA DEPARTMENT OF HEALTH

NOTICE TO EMPLOYEES

STANDARDS FOR PROTECTION AGAINST RADIATION;
NOTICES, INSTRUCTIONS AND REPORTS TO WORKERS; INSPECTIONS

POSTING REQUIREMENT

THIS NOTICE MUST BE POSTED IN PLACES THAT PERMIT EMPLOYEES IN A RESTRICTED AREA TO SEE A COPY ON THE WAY TO OR FROM THEIR PLACE OF EMPLOYMENT.

The Department of Health has established standards for protection against radiation hazards in Chapter 64E-5, Florida Administrative Code.

YOUR EMPLOYER IS REQUIRED TO:

- Post or provide you a copy of the Department of Health rules and operating procedures that apply to your work and explain them to you.
- Apply the rules to work involving radiation sources.
- Post or provide you any Notice of Violation involving radiological working conditions, proposed civil penalties, and orders.

YOU ARE REQUIRED TO:

- Become familiar with the rules and the operating procedures that apply to your work.
- Observe the requirements to protect yourself and your co-workers.

WHAT IS IN THESE RULES:

- Limits on exposure to radiation and radioactive material in restricted and unrestricted areas
- Actions to take after accidental exposure
- Personnel monitoring, surveys, and equipment
- Caution signs, labels, and safety interlocks
- Exposure records and reports
- Options for workers about Department of Health inspections
- Related matters

REPORTS ON RADIATION EXPOSURE

Your employer must give you a written report if you receive an exposure above the limits in the rules or in the license. The maximum limits for exposure to employees are in Part III of the rules. However, your employer should keep your radiation exposure as low as reasonably achievable.

If you work where personnel monitoring is required:

- Your employer must give you a written annual report of your radiation exposures.
- Your employer must give you a written report of your radiation exposures when you terminate employment.

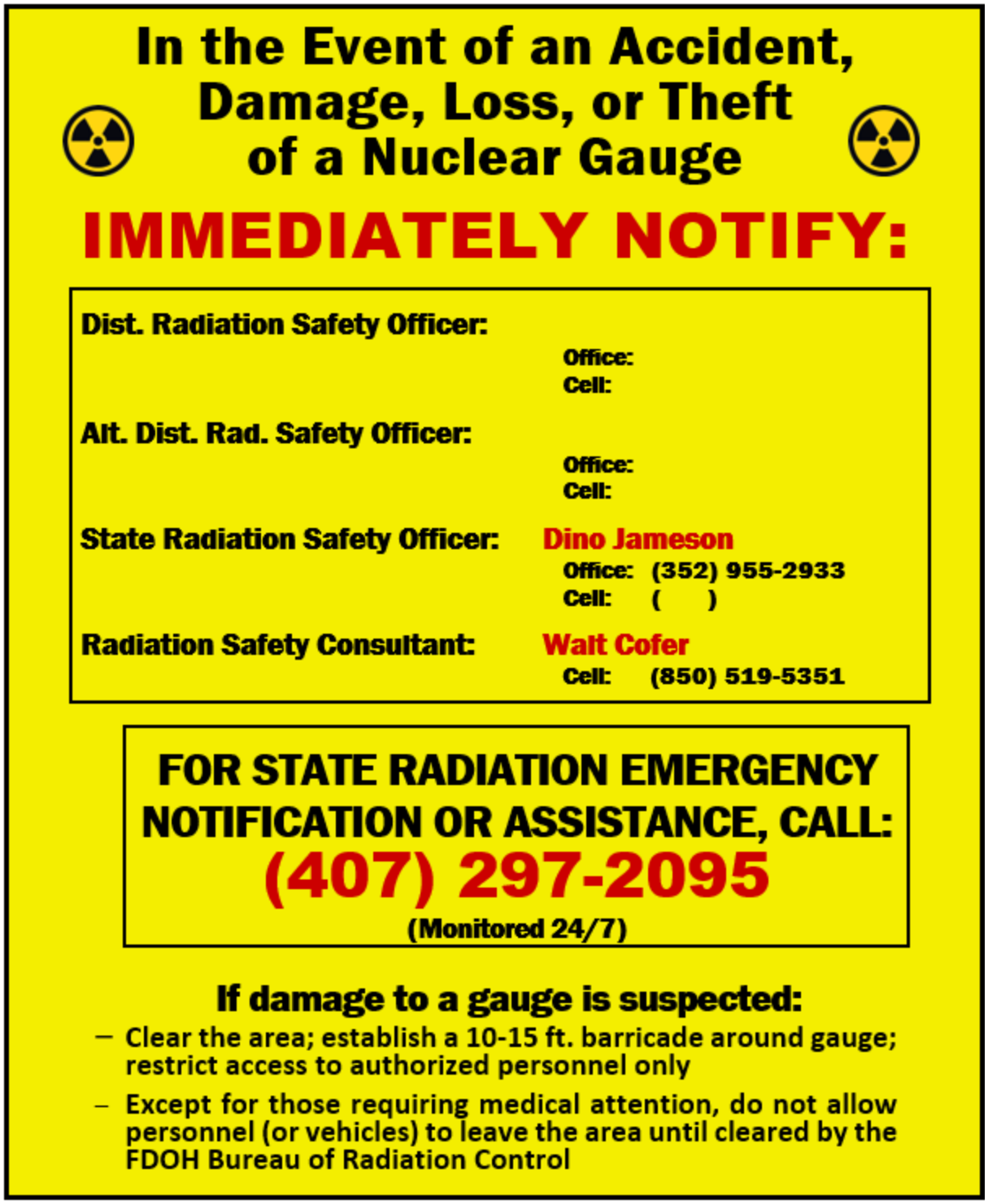
INSPECTIONS

Representatives of the Department of Health inspect all licensed and registered activities. Any worker or worker representative who believes that there is a violation of Chapter 404, Florida Statutes; Chapter 64E-5, Florida Administrative Code; or the terms of the employer's license or registration can request an inspection by contacting the Bureau of Radiation Control, Bin C21, 4052 Bald Cypress Way, Tallahassee, FL 32399-1741 (850) 245-4266. The request must state specific reasons for the inspection. During inspections, Department of Health inspectors can confer privately with workers and any worker can bring to the attention of the inspectors any past or present condition that they believe contributed to or caused any violation.

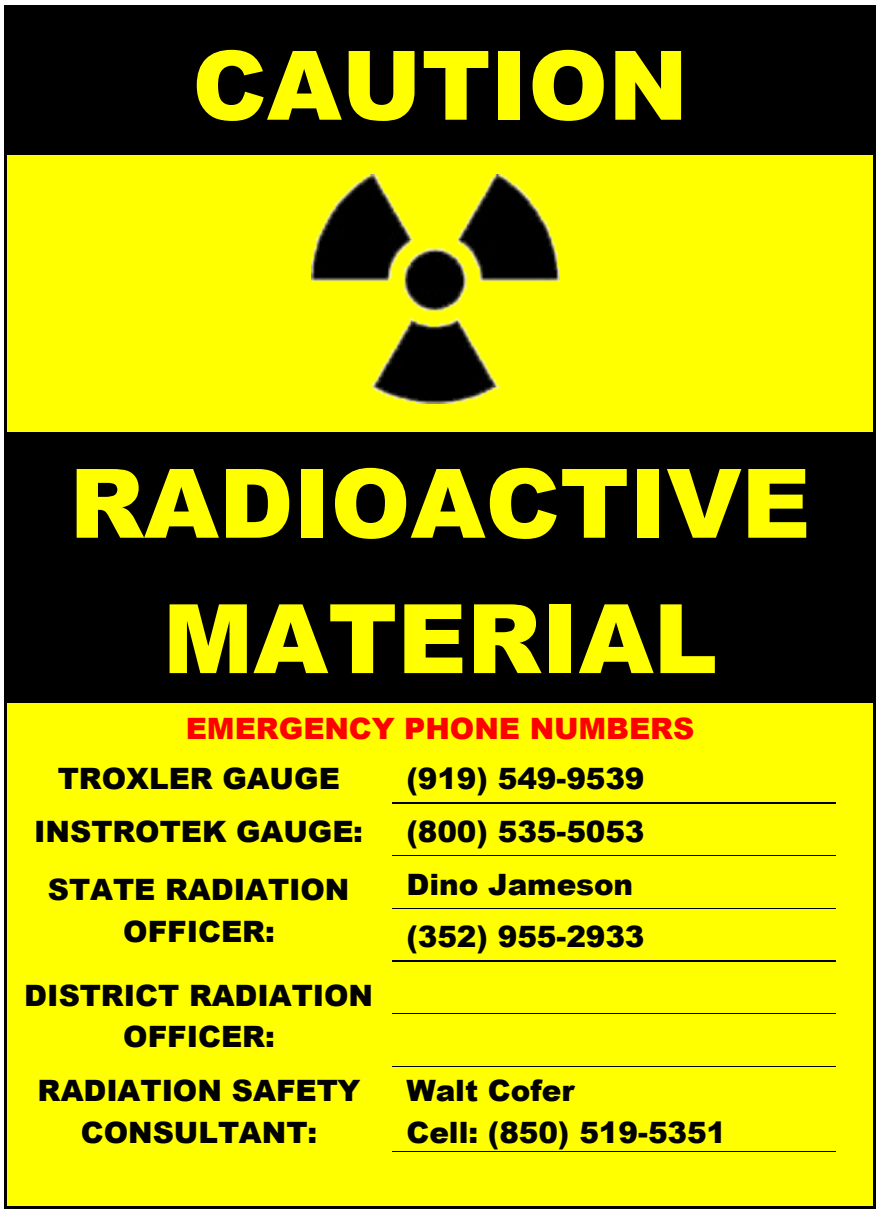
Copies of Chapter 64E-5, FAC, the Dept.'s radioactive materials license, radiation safety manual, dosimetry reports, enforcement correspondence, and other documents related to the FDOT radiation safety program can be examined at:

Notice to Employees – 3/01

A.2 FDOT Emergency Notification Poster



A.3 Vehicle Dashboard Label



Appendix B: Forms

B.1 Notification of FDOT Nuclear Gauge Storage Area

FLORIDA DEPARTMENT OF TRANSPORTATION

FDOT

- **Notification**

This form documents required notifications and provides information on the gauges relevant to emergency personnel.

Date: _____

Notification Provided To: _____

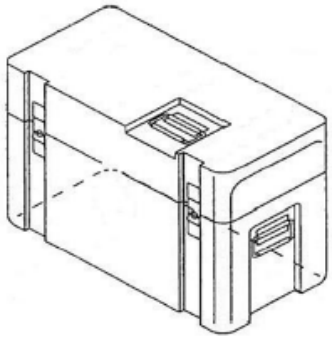
Notification Provided By: _____

_____

- **Description**

Portable nuclear gauges are used to test moisture and density content of soils and construction materials. Each device contains two low-activity radioactive sealed sources (metal capsules containing small amounts of radioactive material). The Americium-241 source is located beneath the gauge keypad near the base. The Cesium-137 source is located at the tip of the source rod, which is shielded by the gauge body when not in use.

Nuclear Gauge



Transport/Storage Guage (Typically Yellow Color)

The radiation levels associated with the gauges are low. In the event of a fire, the radioactive sources do not present an airborne contamination hazard, and their double-encapsulated sources are unlikely to be breached, so the potential for local contamination is minimal.

- **Physical Location**

- **Emergency Contacts**

Dist. Radiation Safety Officer (RSO):	
FDOT State RSO:	Dino Jameson @ (352) 955-2933
FDOT Radiation Safety Consultant	Walter Cofer @ (850) 519-5351
FDOH Bureau of Radiation Control:	(407) 297-2095 (24-hr number)

B.2 Declaration of Pregnancy

DECLARATION OF PREGNANCY

To: _____

Employee Supervisor

In accordance with section 64E-5.311, Florida Administrative Code (FAC),

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 understand that meeting the lower dose limit may require a change in job or job responsibilities during my pregnancy. I have been instructed to always wear my assigned PM badge at waist level to estimate the embryo/fetus dose. I will make every effort to maintain the fetal dose as low as reasonably achievable (ALARA), and I am aware that the Florida Department of Health (FDOH) and the U.S. Nuclear Regulatory Commission (NRC) recommend that an embryo/fetus not receive more than 50 mrem in any one month. I understand that records of fetal dose will be maintained with my dose records.

I have received verbal instructions on exposure monitoring requirements for declared pregnant women conducting activities involving sources of radiation, in accordance with the requirements of the Department's radiation safety program, the terms and conditions of the Department's radioactive materials license, and Chapter 64E-5, FAC.

I have received instructions concerning the potential risks involved for pregnant women exposed to radiation, including copies of NRC Regulatory Guide 8.13 "Instruction Concerning Prenatal Radiation Exposure", and NRC Regulatory Guide 8.13 "Radiation Dose to the Embryo/Fetus", which I have been encouraged to review. I understand that a declaration of pregnancy is voluntary, must be in writing, and must include the estimated date of conception.

I have been encouraged to request additional information if needed. I am aware that the State Radiation Safety Officer and District RSO are available to answer any questions I may have regarding declared pregnancies, and that radiation safety specialists from the FDOH Bureau of Radiation Control, and the U.S. NRC are also available to answer my questions.

_____

Signature

_____

Printed Name

_____

Date

B.3 Radiation Survey

Radiation Survey Report

Survey Date: _____ Performed By: _____

Survey Instrument Data

Mfr. & Model No.: _____ Serial No.: _____ Cal. Date: _____

Radiation Measurements

No.	Location	Reading	Units
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
Background reading: Location:			

Notes: _____

B.4 Bill of Lading for Troxler

FLORIDA DEPARTMENT OF TRANSPORTATION

BILL OF LADING

SHIPPER: Florida Department of Transportation

ADDRESS: _____

_____

CONTACT: _____

PHONE NO.: _____ ( ) - _____

SHIPMENT DATE

_____

DESCRIPTION

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

PACKAGE CONTENTS

Radioactive Material	Activity (maximum)
Cesium-137	0.33 GBq (8 mCi)
Americium-241:Be	1.48 GBq (40 mCi)

LABEL CATEGORY: Radioactive Yellow II

TRANSPORT INDEX: 0.6

24-HR. EMERGENCY RESPONSE INFORMATION NUMBER:

(919) 549-9539

(Troxler Electronic Labs)

Gauge Serial No.: _____

B.5 Bill of Lading for InstroTek

FLORIDA DEPARTMENT OF TRANSPORTATION

BILL OF LADING

SHIPPER: Florida Department of Transportation
ADDRESS: _____

_____

CONTACT: _____
PHONE NO.: _____ ( ) - _____

SHIPMENT DATE

_____

DESCRIPTION

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

PACKAGE CONTENTS

Radioactive Material	Activity (maximum)
Cesium-137	0.37 GBq (11 mCi)
Americium-241:Be	1.63 GBq (44 mCi)

LABEL CATEGORY: Radioactive Yellow II

TRANSPORT INDEX: 0.5

24-HR. EMERGENCY RESPONSE INFORMATION NUMBER:

(800) 535-5053

(InstroTek, Inc.)

Gauge Serial No.: _____

B.6 Emergency Response Information

EMERGENCY RESPONSE INFORMATION

DESCRIPTION

Radioactive Material, Type A Package, Special Form, Hazard Class 7, UN 3332, RQ

POTENTIAL HAZARDS

IMMEDIATE HAZARDS TO HEALTH

- Radioactive material; type and quantity are non-life-endangering amounts and present minimal risk during transportation accidents.
- Undamaged packages are safe; damaged packages or material released from packages present potential external radiation hazard from unshielded radioactive material.
- Radioactive materials are in special form (sealed sources); contamination is not expected.
- If special form capsule(s) breached (possible if package damage is severe), potential internal radiation hazard from inhalation, ingestion, or breaks in skin.

FIRE OR EXPLOSION

- No risk of fire or explosion; radioactivity does not change flammability or other properties of the materials.
- Packagings can be consumed without content loss from sealed sources

EMERGENCY ACTION

IMMEDIATE PRECAUTIONS

- Priority response actions may be performed before taking radiation measurements.
- Priorities are life saving, control of fire and hazards, and first aid.
- Isolate hazard area to at least a 15 foot radius and deny entry.
- Notify local authorities and FDOH Bureau of Radiation Control (407/297-2095) of accident conditions
- Detain uninjured persons, isolate equipment with suspected contamination, and delay cleanup until instructions received from FDOH Bureau of Radiation Control.

FIRE

- Do not move damaged containers; move undamaged containers out of fire zone.
- Fight fire from maximum distance.
- Small fire: Dry chemical, CO_2, water spray, or standard foam.
- Large fire: 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.
- If source(s) out of package, stay away and await advice from FDOH Bureau of Radiation Control.

FIRST AID

- Use first aid treatment according to the nature of the injury.
- Persons exposed to special form sources are not likely to be contaminated, but if suspected, advise medical personnel that victim(s) may be contaminated with radioactive material.
- If contamination is suspected, remove and isolate potentially contaminated clothing and shoes if not affecting injuries and wrap victim in blanket before transporting.
- Except for the injured, detain persons exposed to radiation until instructed by FDOH Bureau of Radiation Control.