



Radioactive Material License Guide

Fixed Industrial Gauges Application

Louisiana Department of Environmental Quality

Radiation Section

P. O. Box 4312

Baton Rouge, Louisiana 70821-4312

602 N. Fifth Street

Baton Rouge, LA 70802

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PURPOSE OF LICENSING GUIDE

This guide provides instructions to an applicant preparing an application for a fixed gauge license. This type of specific license is used for authorizing the possession and use of radioactive material in the form of sealed sources contained in fixed gauges. The fixed gauges are permanently mounted in place and typically used to analyze an industrial process (e.g. to measure the density in a liquid in a pipe, to detect the level of material in a tank, volumetric flow rate, and to measure thickness in a sheet of metal, paper, etc.).

This guide addresses a variety of radiation safety issues associated with use of fixed gauges. The application and materials submitted must be sufficient to demonstrate that the proposed equipment, facilities, personnel, and procedures are adequate to protect public health and safety.

APPLICABLE REGULATIONS

It is the licensee's/applicant's responsibility to have available up-to-date copies of Louisiana Regulations, LAC Title 33, Part XV, Radiation Protection. Sections 102, 1013, Chapter 4

FILING AN APPLICATION

A license application for radioactive material should be submitted on Form DRC-11, "Application for Radioactive Material License", Form DRC-13, "Schedule of Radioactive Material", and Addendum To Permit which can all be found at <https://deq.louisiana.gov/resources/category/radiation-forms-guides-and-information>. The applicant should complete all items on the application form delineated in this licensing guide:

- A. Any section in the application which is not applicable should be designated with N/A.
- B. Material submitted on a separate attachment should be clearly identified; for example, Attachment A, Page 5, Item C.
- C. The application should be completed and mailed to:

Mailing address: Louisiana Department of Environmental Quality
Emergency & Radiological Services Division
Radiation Section
P. O. Box 4312
Baton Rouge, LA 70821-4313

Physical address: Louisiana Department of Environmental Quality
Emergency & Radiological Services Division
Radiation Section
602 N. 5th Street
Baton Rouge, LA 70802

- D. Submit one copy of the application and all attachments to the Department. The applicant should retain one copy, since the license will require as a condition that the institution follow the statements and representations set forth in the application and any supplements following.
- E. Since the space on Form DRC-11 may not be sufficient to contain all of the required information, additional sheets should be attached. Each separate sheet or document submitted with the application should be identified by heading indicating the appropriate item number. When completed, Form DRC-11 should be signed and dated by a representative of the institution's management.

LICENSE FEES:

A fee is required for all initial applications and for licenses that are required to be reissued. The applicant should refer to the Department's fee schedule in LAC 33:XV.Chapter 25 to determine the amount of the fee that must accompany the application. Review of the application will not begin until the proper fee has been received by the Department. There is also an annual fee associated with a Radioactive Material License. If you have any questions concerning the fee or the amount to submit, do not hesitate to contact the Department, (225-219-3041)

CONTENTS OF APPLICATION:

DRC – 11, Application for Radioactive Material License:

1. Name of Applicant and Mailing address

List the legal name of the applicant/corporation or company, including the designation "doing business as", or other legal entity with direct control and responsibility for the radioactive material.

Provide the mailing address and telephone number.

2. Check "New License" or "Renewal".

3. Department, Location or Address(es) At Which Used and/or Stored

If the mailing address in Item 1 is a P. O. Box, or if different from the location where the gauge is located, then enter the street address where the gauge will be located or other descriptive address (such as 5 miles east on Highway 10, Anytown, Louisiana) to allow us to easily locate your facility.

Provide an email address for the person who can answer questions about the application. This will most likely be the Radiation Safety Officer.

4. Radiation Program Personnel

Provide the name of the Radiation Safety Officer (RSO) - a qualified individual should be designated the responsibility for radiation protection. Individuals who will use or supervise the use of radioactive materials should be listed and the qualifications and training of these individuals given on the Form DRC-13, "Radiological Qualifications and Training."

The RSO, at a minimum, should have completed either of the following two methods:

- a. The fixed gauge manufacturer's or distributor's training program for users or for RSOs

OR

- b. An equivalent training course – See Appendix L of this guide.

Each gauge user should have completed either of the following two methods:

- a. The fixed gauge manufacturer's or distributor's training program for users or for RSOs

OR

- b. An equivalent training course – See Appendix L of this guide

If the responsible individual has completed the device manufacturer's program, you should state in your application the title of the course, where and when the course was completed, and the name of the course instructor (a certificate).

If the responsible individual has received training other than that provided by the device manufacturer, you should state where and when the training was received, the topics covered in the training, and the name and qualifications of the training instructor.

For programs in which you wish to perform **non-routine** operations such as installation, initial radiation survey, gauge relocation, repair and maintenance of components related to the radiological safety of the gauge, replacement and disposal of sealed sources, gauge alignment, and removal from service must provide additional training. See Appendix D of this guide.

RSO Duties and Responsibilities

Submit a description of the duties and responsibilities of the RSO. An example of typical duties and responsibilities that may be found in Appendix A.

5. Personnel Monitoring:

Applicants must do either of the following:

- a. Perform an evaluation demonstrating that unmonitored individuals are not likely to receive, in one year from sources external to the body, a dose in excess of 10 percent of the limits specified in LAC 33:XV.410.A and maintain a record of this evaluation for inspection by the department.

OR

- b. provide and require the use of personnel monitoring devices- dosimetry. All personnel dosimetry shall be processed and evaluated by a dosimetry processor that has accreditation from the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology; and approved in this accreditation process for the type of radiation.

6a. Contamination Surveys:

Contamination surveys are not necessary for sealed sources, except in the case of a leaking source and non-routine operations.

6b. Radiation Area Surveys:

Radiation area surveys which measure radiation levels in the vicinity of the gauge should be performed after a gauge is installed or relocated and prior to use. Records of surveys must be maintained for inspection by the Department. Most fixed gauge licensees that only engage in routine operations do not possess their own radiation survey meters, because these licensees contract with a service provider that perform the surveys required by LAC 33:XV.430. However, non-routine operations will need to perform surveys in accordance with LAC 33:XV.430 that are related to these activities and such licensees should possess radiation survey meters that are used for this purpose. Because these operations increase the opportunity for radiation exposure, the areas where individuals perform these operations should be monitored with a survey meter. These survey meters shall be properly calibrated.

6c. Environmental Surveys:

Environmental surveys do not apply to sealed sources.

7. Leak Tests:

The Department requires leak testing in accordance with LAC 33:XV.426. Leak tests will be required at six (6) month or up to three (3) year intervals, depending on the manufacturer and model of the sealed source. Check with manufacturer and SSD for the correct leak test interval. Leak test records must be maintained in accordance LAC 33:XV.473 for inspections.

Please state how this service will be performed. For example, it may be performed by the manufacturer, a consultant or by the applicant using an approved leak test kit.

If the applicant proposes to conduct the entire of leak test sequence themselves, a complete description of method (including instrumentation, material, procedures, sample calculations, and

the training and experience of the individual evaluating the wipes) must be included. An example of leak test program can be found in Appendix E.

Leak tests for transfers and disposal must be performed no longer than 6 months prior to the transfer.

8. Waste Disposal:

Licensees must dispose of radioactive material in accordance with LAC 33:XV.460. Please indicate the firm or individual that will handle disposal of sources. Normally, sources can be returned to the manufacturer for disposal. Radioactive material may only be returned to a person holding a specific license for receipt and/or disposal of such sources. Before transferring radioactive material, it is the licensee's responsibility to verify that the recipient is properly licensed and authorized to receive the licensed material. Records of all disposals and transfers shall be maintained for inspections in accordance to LAC 33:XV.478.

9a. Health Physics Program:

Operating Procedures:

ALARA

In order to minimize radiation dose to gauge users and to members of the public, the applicant must adopt operating procedures that comply with the As Low As is Reasonably Achievable (ALARA) principles. See Appendixes B and C for an example.

RSO Duties and Responsibilities

The RSO is responsible for assuring that the gauges are used in a manner that is ALARA. The RSO is responsible for completing and/or performing certain radiation protection procedures that are required in accordance with applicable regulations in LAC 33:XV. See Appendix A for an example of RSO duties and responsibilities.

Material Receipt and Accountability

Licensed materials must be tracked "from cradle to grave" in order to ensure sealed source/gauge accountability; identify when sealed sources/gauges could be lost, stolen or misplaced; and ensure that possession limits listed on the license are not exceeded.

Licensees must:

- Maintain records of receipt, transfer and disposal of fixed gauges
- Conduct physical inventories every 12 months (or some other intervals justified by the applicant and approved by the department) to account for all sealed sources
- Update transactions in the National Source Tracking System (NSTS) annual inventory reconciliation, if applicable.

Use of Gauge

See Appendix I for example of "use of gauge procedures".

- **Gauge Lockout Procedures.** See Appendix J for example.
- **Leak Test Procedures.** See Appendix E for example.
- **Routine Maintenance Procedures-** Licensees need to perform routine maintenance to ensure proper operation of the gauge. Licensees should follow the manufacturer's or distributor's written recommendations and instructions provided with the gauge(s). Information on the maintenance of gauges, including frequency, checks for proper shutter operation, checks that labels are legible and visible, and checks that gauges are protected against corrosive materials or materials at high temperature should be submitted.
- **Non-Routine Maintenance Procedures (if applicable).** See Appendix D for example.
- **Emergency Procedures.** See Appendix K for example.
- **Postings:**
Provisions should be made for posting of the following:
 - 1) DRC-3, NOTICE TO EMPLOYEES (Form may be found at <https://deq.louisiana.gov/resources/category/radiation-forms-guides-and-information>).
 - 2) A copy of the Louisiana Radiation Regulations. (May be found at <https://deq.louisiana.gov/page/radiation>)
 - 3) A copy of the license, with all current amendments.
 - 4) A copy of operating and emergency procedures.
 - 5) Notices of violations regarding radiological working conditions issued by the Department, and responses to these violations.

NOTE: Items 2, 3, and 4 may be satisfied by posting a notice of where these documents can be found.

- **Security:**
Develop, implement, and maintain security procedures to prevent theft, loss, or sabotage. These procedures will contain instructions to prevent unauthorized access, removal, or use of the fixed gauges; including at temporary jobsites if authorized on the license¹. Whenever a gauge is not under the control and constant surveillance of the licensee, it shall be secured by two independent physical controls that form tangible barriers to secure it from unauthorized removal².

¹NUREG 1556, Vol. 4

²LAC 33:XV.326.B (This requirement is explicitly prescribed for Portable Gauges)

9b. Physical Facilities:

Briefly describe or sketch where the gauge will be installed or located, including adjacent ladders, scaffolding and work areas. If appropriate, specify the department or location in the

plant area where the gauge will be located and used.

Each gauge must contain a tag or label clearly identifying the source, including the isotope, activity, and date when the source contained this activity. The source housing must also contain a label bearing the radiation caution symbol and the words: "CAUTION (or DANGER) RADIOACTIVE MATERIALS." If radiation levels greater than those specified in LAC 33:XV.102 (5 millirems in any one hour, 100 millirems in any 5 consecutive days) exist, the area must be posted with "CAUTION (or DANGER) RADIATION AREA" signs. All labels, tags and signs mentioned must be durable and remain readable. If necessary, periodic replacement and/or cleaning of such signs should be provided for to assure that these signs remain clearly visible.

10. Health Physics Instrumentation:

If the applicant proposes to perform area surveys, it shall be necessary to indicate the manufacturer, model number and other information pertinent to the survey meter, as specified in this item. Provisions should be made for at least annual calibration of the survey meter(s); this will normally be performed by a consultant or service company who holds a license to perform such calibrations. The license number which authorizes this service should be referenced.

11. General Instrumentation:

List any other radiation detection instruments that are available which are not routinely used for health physics surveys or monitoring.

12. Medical Supplements:

Not applicable.

13. Industrial Radiography Supplements:

Not applicable.

14. If a representative of another company assisted the applicant in completing the application, the name and company affiliation should be listed.

DATE AND SIGNATURE: THE APPLICATION MUST BE SIGNED AND DATED.

FORM DRC-13

SCHEDULE OF RADIOACTIVE MATERIALS

Complete the required information under Sealed Source(s) and Device(s) for all radiation devices to be possessed at your facility.

Example:

Element	Mass No.	No. of Sources	Max. Activity	Source Mfg./Model	Device Mfg./Model	Use
Cs	137	5	250 mCi	Isotopes, Inc. Model P-10	XYZ Corp. Model 7492-B	Level/Density Measurement

RADIOLOGICAL QUALIFICATIONS AND TRAINING

Complete the requested information for all individuals under Item 4, "Radiation Program Personnel," Form DRC-11. This information may be submitted on a separate attachment if desired, but the attachment should be referenced.

Radiation Safety Program (Operating and Emergency Procedures)

Supplements:

ADDENDUM TO PERMIT APPLICATIONS:

The "ADDENDUM TO PERMIT APPLICATIONS PER LAC 33:I.1701. This form must be completed before a license can be issued. This form can be found at <http://www.deq.louisiana.gov/portal/tabid/240/Default.aspx>

License Amendment or Termination:

A. Amendment

1. Submit an amendment request by letter, rather than on an application form. Always reference your license number when corresponding with LDEQ/Radiation Section. Amendments submitted on an application form may cause a processing delay.
2. Specify exactly what you want changed on the license. Always furnish a justification for the request.
3. Plan ahead whenever possible. For instance, if you have placed a bid on a job and know that an amendment to the license will be required (i.e., new storage/use location, additional radioactive material, etc.), forward your request for amendment to LDEQ/Radiation Section immediately. **PLEASE DO NOT WAIT** until after you are awarded the contract to request an amendment.
4. Send your amendment request to the LDEQ/Radiation Section at the following address:

Mailing address: Louisiana Department of Environmental Quality
Emergency & Radiological Services Division
Radiation Section
P. O. Box 4312
Baton Rouge, LA 70821-4313

Physical address: Louisiana Department of Environmental Quality
Emergency & Radiological Services Division
Radiation Section
602 N. 5th Street
Baton Rouge, LA 70802

5. You will receive your license amendment by mail.
6. When requesting the relocation of a permanent storage/use facility, note that the new facility must be authorized on the license before relocation can occur. After the amendment is issued and you have relocated to your new facility it is important that you submit a request to remove the former facility.

B. TERMINATION

1. To terminate your license, the department requires the following.
 - a. Request should specify that you want to **terminate** the license. You can use RAD 14 Radioactive Material License Termination & Location Closure form.
<https://deq.louisiana.gov/resources/category/radiation-forms-guides-and-information>
 - b. Copies of current leak tests required by LAC 33:XV.426, if applicable.

- c. All fees shall be paid/current. Not paying your annual fee does **NOT** automatically terminate your license.
 - d. Documentation of radioactive material disposition and current leak testsp required by LAC 33:XV.426.A.1.
 - e. All Notices of Deficiencies shall be resolved through the LDEQ/Radiation Section and Enforcement Division.
2. LDEQ/Radiation Section reserves the right to conduct a confirming radiation survey and facility evaluation prior to the release of controlled areas for unrestricted use. It is the licensee's responsibility to decontaminate facilities to levels allowing release for unrestricted use. If residual radiation levels or contamination levels exceed the applicable release limits contained in LAC 33:XV.Chapter 4, your license will not be terminated until release limits have been met.

APPENDIX A

RSO Duties and Responsibilities

The RSO's main objective is to ensure radiological safety and compliance with Louisiana Department of Environmental Quality regulations and with the conditions of the license.

Typically, these duties and responsibilities include ensuring the following:

- Gauges are used in a manner such that the radiation dose to workers and the public is **As Low As Reasonably Achievable (ALARA)**
- RSO stops licensed activities which the RSO considers unsafe
- Possession, use, storage, and maintenance of gauges are consistent with the limitations in the license and the manufacturer's recommendations and instructions
- Individuals using gauges are properly trained
- Personnel monitoring devices are used and exchanged at the proper intervals; records of the results of such monitoring are maintained
- Gauges are properly stored and secured against unauthorized removal
- Gauges are leak tested as required by the license
- Proper authorities are notified in case of accident, damage to gauges, fire, or theft
- Unusual occurrences involving the gauge (e.g., accident, damage) are investigated, cause(s) and appropriate corrective action are identified, and corrective action is taken
- Audits are performed at least annually, documented, and corrective actions taken
- Radioactive material is transported in accordance with all applicable DOT requirements
- Radioactive material is disposed of properly
- Appropriate records are maintained
- Up-to-date license is maintained, and amendment and renewal requests are submitted in a timely manner

APPENDIX B

ALARA PROGRAM

Each licensee shall develop and implement a written program to maintain radiation doses and releases of radioactive material in effluents to unrestricted areas as low as reasonably achievable in accordance with LAC 33:XV.406.

To satisfy this requirement:

1. the management, radiation safety officer, and all authorized users shall participate in the establishment, implementation, and operation of the program as required by these regulations; or
2. for licensees that are not medical institutions, management and all authorized users shall participate in the program as required by the radiation safety officer.

The ALARA program shall include an annual review by the radiation safety committee for licensees that are medical institutions, or by management and the radiation safety officer for licensees that are not medical institutions, of summaries of the types and amounts of radioactive material used, occupational dose reports and continuing education and training for all personnel who work with or in the vicinity of radioactive material. The purpose of the review is to ensure that individuals make every reasonable effort to maintain occupational doses, doses to the general public, and releases of radioactive material as low as reasonably achievable, taking into account the state of technology and the cost of improvements in relation to benefits.

The licensee shall retain a current written description of the ALARA program for the duration of the license. The written description shall include:

1. A commitment by management to keep occupational doses as low as reasonably achievable;
2. a requirement that the radiation safety officer brief management once each year on the radiation safety program;
3. personnel exposure investigational levels that, when exceeded, will initiate an investigation by the radiation safety officer of the cause of the exposure and a consideration of actions that might be taken to reduce or eliminate the probability of recurrence.

Please submit a copy of your ALARA program for the Department's review.

APPENDIX C

SAMPLE ALARA PROGRAM

The following conditions describe the program followed by _____ to ensure that occupational radiation exposures to employees engaged in the use of radioactive equipment are kept as low as reasonably achievable.

1. MANAGEMENT COMMITMENT

_____ IS COMMITTED TO MAKE EVERY REASONABLE EFFORT TO MINIMIZE RADIATION EXPOSURES TO EMPLOYEES, THROUGH THE FOLLOWING CONTROL MEASURES:

- a. Personnel will be made aware of management's commitment to maintain low exposure levels.
- b. Management will periodically review operating procedures with radiation safety officer to determine steps taken to reduce exposures.
- c. Management will ensure that the person, or persons, selected for Radiation Safety Officer responsibilities are fully qualified to administer all aspects of a radiation protection program.
- d. Management will ensure that all employees engaged in the use of radioactive equipment are fully trained in the area of radiation safety. This will be reviewed at least once per year, and additional training will be scheduled as necessary.
- e. The RSO has full authority to enforce safe operation, and to communicate as required with appropriate levels of management to halt an operation he deems unsafe.

2. VIGILANCE BY THE RSO AND RADIATION PROTECTION STAFF

The RSO has the responsibility to monitor the Radiation Safety Program to ensure that exposures are as low as reasonably achievable, and to search for new and better ways to perform jobs with less exposure. The following aspects apply to this responsibility:

- a. The RSO shall know the origins of radiation exposure and be aware of trends in exposures.
- b. Should unusual exposures occur, the RSO shall initiate an investigation of the circumstances to determine causes and prevent the likelihood of

recurrence. Operating procedures should periodically be reviewed to identify situations in which exposures can be reduced.

- c. The RSO shall be responsible for ensuring that the equipment used is maintained in good working order and used properly. Written procedures for use of the equipment are to be available and followed.

SIGNED: _____
(Management)

APPENDIX D

Information Needed To Perform Non-Routine Operations

Non-Routine operations, which require specific authorization by the NRC or an Agreement State, include gauge installation, initial radiation survey, repair and maintenance of radiological safety components, gauge relocation, replacement and disposal of sealed sources, gauge alignment, or removal of a gauge from service.

Any replacement components, parts, or other materials other than those supplied, specified, or recommended by the manufacturer or distributor need to be evaluated to ensure that they do not degrade the engineering safety analysis performed and accepted as part of the device's Sealed Source and Device (SSD) registration certificate. Licensees also need to ensure that, after maintenance or repair is completed, the gauge is tested and functions as designed before the unit is returned to routine use.

If non-routine operations are not performed properly with attention to good radiation safety principles, the gauge may not operate as designed, and personnel performing these tasks could receive radiation doses that exceed the NRC's regulatory limits. Radionuclides and activities in fixed gauges vary widely. For illustrative purposes, in less than 1 minute, an unshielded cesium-137 source with an activity of 3.7 gigabecquerels [100 millicuries] can deliver 0.05 Sv [5 rem] to a worker's hands or fingers (i.e., extremities), assuming the extremities are 1 centimeter from the source. This dose corresponds to the threshold for extremity monitoring. Some gauges may contain sources of even higher activities with correspondingly higher dose rates.

Thus, applicants wishing to perform non-routine operations must use personnel with specialized training for the activities intended to be performed and follow appropriate procedures consistent with the manufacturer's or distributor's instructions and recommendations that address radiation safety concerns [e.g., use of radiation survey meter, shielded container for the source, and personnel dosimetry (if required)].

Accordingly, applicants wishing to perform non-routine operations must provide the following information with their license application:

- Describe the types of work, maintenance, cleaning, and/or repair that involve any of the following:
 - installation, relocation, or alignment of the gauge
 - components, including electronics, related to the radiological safety of the gauge (e.g., the source, source holder, source drive mechanism, shutter, shutter control, or shielding)
 - replacement and disposal of sealed sources
 - removal of a gauge from service
 - a potential for any portion of the body to come into contact with the primary radiation beam
 - any other activity during which personnel could receive radiation doses exceeding NRC limits

- Identify who will perform nonroutine operations, and describe their training and experience. Acceptable training includes manufacturers' or distributors' courses for nonroutine operations or an equivalent.
- Submit procedures for nonroutine operations. These procedures should ensure the following:
 - doses to personnel and members of the public are within regulatory limits and are kept as low as is reasonably achievable (ALARA) (e.g., use of shielded containers or shielding)
 - the source is secured against unauthorized removal or access or is under constant surveillance
 - appropriate labels and signs are used (Lock-out procedures are adequate to ensure that no individual or portion of an individual's body can enter the radiation beam.)
 - manufacturer's or distributor's instructions and recommendations are followed
 - replacement components, parts, or other materials (e.g., lubricants) other than those supplied, specified, or recommended by the manufacturer or distributor are evaluated to ensure that they do not degrade the engineering safety analysis performed and accepted as part of the SSD registration certificate
 - the gauge, before being returned to routine use, is tested to verify that it functions as designed and source integrity is not compromised
- Confirm that individuals performing non-routine operations on gauges will wear both whole body and extremity monitoring devices or perform a prospective evaluation demonstrating that unmonitored individuals performing non-routine operations are not likely to receive a radiation dose in excess of the limits in LAC 33:XV.410.
- Confirm possession of at least one survey instrument that is appropriate for measuring the types of radiation and expected dose rates from the fixed gauge(s).
- Describe steps to be taken to ensure that radiation levels in areas where non-routine operations will take place do not exceed limits set in LAC 33:XV.421 (e.g., surveys, calculations).

APPENDIX E

LEAK TEST PROGRAM

Training:

Before allowing an individual to perform leak testing, the licensee must ensure that he or she has sufficient classroom and on-the-job training to show competency in performing leak testing and sample analysis independently.

Classroom training may be in the form of lecture, online, video, hands-on, or self-study and should cover the following subject areas:

- principles and practices of radiation protection
- radioactivity measurements, monitoring techniques, and instrument use
- mathematics and calculations used for measuring radioactivity
- biological effects of radiation

Appropriate on-the-job training consists of the following:

- observing authorized personnel collecting and analyzing leak test samples
- collecting and analyzing leak test samples under the supervision and in the physical presence of an individual authorized to perform leak testing and sample analysis

Facilities and Equipment:

- To ensure achieving the required sensitivity of measurements, analyze leak tests in a low-background area.
- Use a calibrated and operable survey instrument to check leak test samples for gross contamination before they are analyzed.
- Analyze the leak test sample using an instrument that is appropriate for the type of radiation to be measured (e.g., NaI(Tl) well-counter system for gamma emitters, liquid scintillation for beta emitters, and gas-flow proportional counter for alpha emitters).
- If the sensitivity of the counting system is unknown, determine the minimum detectable activity (MDA).

The MDA may be determined using the following formula:

$$MDA = \frac{2.71 + 4.65 \sqrt{(bkg \times t)}}{t \times E}$$

where: *MDA* = minimum detectable activity in disintegrations per minute (dpm)

bkg = background count rate in counts per minute (cpm)

t = background counting time in minutes

E = detector efficiency in counts per disintegration

Frequency for Conducting Leak Tests of Sealed Sources:

Leak tests will be conducted at the frequency specified in the respective Sealed Source and Device registration certificate. If a sealed source is not registered, leak tests should be conducted at 6 month intervals, unless a different interval is established during the licensing process. Leak testing of sealed sources may be required by license condition.

Procedure for Performing Leak Testing and Analysis:

- For each source to be tested, list identifying information such as the sealed source serial number, manufacturer, model number, radionuclide, and activity.
- Use a radiation survey meter to monitor exposure.
- Prepare a separate wipe sample (e.g., cotton swab or filter paper) for each source.
- Number each wipe to correlate with identifying information for each source.
- Wipe the most accessible area where contamination would accumulate if the sealed source were leaking, but do not wipe the surface of a plated or foil source (see manufacturer's instructions).
- Select instrumentation that is sensitive enough to detect 185 becquerels (Bq) (0.005 microcurie) of the radionuclide contained in the gauge.
- Using the selected instrument, count and record background count rate.
- Check the instrument's counting efficiency using a standard source of the same radionuclide as the source being tested or one with similar energy characteristics. The calibration source should be in the same configuration as the sample. Accuracy of standards should be within plus or minus 5 percent of the stated value and traceable to primary radiation standards such as those maintained by the National Institute of Standards and Technology.
- Calculate the counting efficiency of the detector.

$$\text{Efficiency in cpm/Bq} = \frac{[(\text{cpm from std}) - (\text{cpm from bkg})]}{\text{activity of std in Bq}}$$

where cpm = counts per minute
 std = standard
 bkg = background
 Bq = Becquerel

- Count each wipe sample; determine net count rate.
- For each sample, calculate and record estimated activity in becquerels (or microcuries). The activity of the sample in becquerels may be calculated using the following formula:

$$\text{Activity of sample [Bq]} = \frac{[(\text{cpm from wipe sample}) - (\text{cpm from bkg})]}{\text{efficiency in cpm/Bq}}$$

- Sign and date the list of sources, data, and calculations. Retain records for 3 years in accordance with LAC 33:XV.473.
- If the wipe test activity is 185 becquerels (0.005 microcuries) or greater, notify the radiation safety officer so that the source can be withdrawn from use and disposed of properly. Also, notify the department.

APPENDIX F

PERSONNEL MONITORING

I. PERSONNEL MONITORING

Personnel monitoring devices, more commonly referred to as personnel monitoring badges, shall be provided to measure the radiation dose for all individuals who are likely to receive more than 10% of the annual dose limit permitted by LAC 33:XV.410. An Applicant may provide calculations which demonstrate that an individual who is performing **routine operations** with the gauge is not likely to exceed the dose limit and is not required to be provided personnel monitoring.

However, the radiation dose to individuals performing **non-routine maintenance** such as installation, initial radiation surveys, relocation, removal from service, dismantling, alignment, replacement, disposal of the sealed source, and non-routine maintenance and repair of components related to the radiological safety of the gauge shall be measured by the individual(s) wearing a personnel monitoring device.

Submit the Personnel Monitoring Program, describing the proposed radiation dose monitoring program

II. DESCRIPTION OF PERSONNEL MONITORING DEVICES

A. General

Personnel monitoring badges must detect beta and gamma radiation, so verify the capabilities of available badges before making a selection. Dosimetry processors must hold accreditation from the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology. A list of NVLAP accredited dosimetry vendors is available on the Internet at www.nist.gov.

Each order of badges includes a control badge for measuring the amount of background radiation the badges receive each monitoring period. This enables the background to be subtracted from the total reading to provide an accurate record of each worker's occupational radiation dose. When not in use the badges should be stored with the control badge to ensure accurate dosimetry records. The control badge must be stored in a low background radiation location and must be returned with the other badges each monitoring period.

B. Film Badges

Film badges are small pieces of x-ray film contained in a plastic holder. The film darkens in proportion to the amount of radiation it has been exposed to, so measurements of the film density provide a measurement of the wearer's radiation exposure. Film badges should be protected from extreme environmental conditions which may affect their ability to accurately record radiation. Film badges must be exchanged on a MONTHLY basis.

C. Thermoluminescent Dosimeters (TLD)

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

D. Optically Stimulated Luminescent Dosimeters (OSLDs)

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

III. INSTRUCTIONS FOR USING PERSONNEL MONITORING DEVICES

A. General Instructions

If personnel monitoring is required, a whole body personnel monitoring badge (film, TLD or OSLD) shall be worn at all times when working with or around a fixed nuclear gauge. Each Authorized User or other worker will be assigned a badge, which can only be worn by the individual to whom it has been assigned. Badges are to be worn on the front of the torso, at or above the waist and below the shoulder. Badges must be promptly returned to the Radiation Safety Officer (RSO) at the end of each monitoring period to ensure rapid processing.

Recommended Work Practices for Personnel Monitoring

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

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

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

IV. PERSONNEL MONITORING RECORDS REQUIREMENTS

A. Records of Prior Occupational Dose

Prior to assigning a badge to a worker the worker's occupational radiation dose received during the current year will be determined. In addition, every reasonable effort must be made to obtain the individual's records indicating the individual's lifetime cumulative occupational radiation dose. If a worker is unable to provide the information, records from their previous employer will be obtained. Prior occupational dose records shall include all of the information required by LAC 33:XV.414.

B. Records of Individual Monitoring Results

Records of doses received by each monitored worker will be maintained as long as the company's license remains in effect. Dosimetry records will be kept in accordance with LAC 33:XV.476.

C. Annual Reports to Monitored Individuals

Each worker assigned a personnel monitoring badge will receive a written annual dose report describing the past year's monitoring results, as required by LAC 33:XV.1013. Records documenting that the reports have been furnished to monitored workers will be maintained.

D. Termination Reports to Monitored Individuals

Within 30 days of termination of employment, or within 30 days after the individual's exposure has been determined, whichever is later, each monitored worker will receive a written report summarizing the individual's occupational radiation dose, as required by LAC 33:XV.1013.C. Records documenting that the reports have been furnished to monitored workers will be maintained.

E. Records for Declared Pregnancies

The fetal dose will be closely monitored so as not to exceed 500 millirem. Female gauge operators that have declared themselves pregnant will be instructed to always wear their assigned badge at waist level to estimate the embryo/fetus dose. Recordkeeping requirements specified in LAC 33:XV.417, "Dose to an Embryo/Fetus" and 476.D.

F. Occupational Dose Limits for Minors

Minors will not exceed an annual occupational dose of 500 millirem. Recordkeeping requirements specified in LAC 33:XV.476 and 1013 "Notifications and Reports to Individuals", will be met.

G. Worker Overexposure Reports

When a report of an individual's exposure is sent to the department as required in LAC 33:XV.487 the exposed individual will also be notified as required in LAC 33:XV.491.

APPENDIX G

DISPOSAL OR TRANSFER OF RADIOACTIVE MATERIAL

Gauges containing radioactive material will only be transferred to companies or individuals who are specifically licensed to possess them, in accordance with the below procedure or equivalent procedure.

I. Description of Waste Disposal Program

Describe the procedures for handling, storing, and disposing of radioactive waste by checking the appropriate boxes. Identify the commercial waste disposal service employed and provide the Radioactive Material License number. If sealed sources and/or devices will be returned to the manufacturer, identify the manufacturer and provide the Radioactive Material License number.

- Commercial Waste Disposal Company will be used using these procedures
Name of Waste Disposal Company: _____
Vendor Radioactive Material License Number: _____
- Gauge containing the sealed source will be returned to manufacturer using these procedures
Name of Manufacturer: _____
Vendor Radioactive Material License Number: _____
- Gauge containing the sealed source will be disposed of using equivalent procedures, which are attached.

II. Verification

If a gauge containing radioactive material is bought, sold or transferred for disposal, verification of the transferor's and transferee's authorization to possess the radioactive material will be documented. A copy of each other's Radioactive Materials License will be exchanged and the transferor's license will be retained on file as evidence of an authorized transfer.

III. Documentation

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

- ◆ The material being transferred (gauge manufacturer name, model and serial number, type and activity of radioactive material, and source manufacturer name and model number)
- ◆ The date of the transfer
- ◆ The name, address, and license number of the transferor and transferee
- ◆ The signatures of the individuals shipping and/or receiving the gauge
- ◆ 6 month leak test in accordance with LAC 33:XV.426.A.1

All transfer and disposal records shall be maintained on file for inspection purposes until license termination.

APPENDIX H

TRANSPORTATION OF GAUGES

The U.S. Department Of Transportation establishes requirements for the transportation of radioactive material. Licensees are responsible for ensuring that their gauges are properly packaged, marked, labeled, and secured, and that proper documentation accompanies the gauges.

A. General

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:

- ◆ Shipping name (ex.: radioactive material, special form, n.o.s., Class 7)
- ◆ Identification number (ex.: UN 2974)
- ◆ Package type (ex.: TYPE A)
- ◆ RQ (if applicable)

B. Markings and labels

Required **labels** include:

- ◆ “Cargo Aircraft Only” label (required for shipments by air)
- ◆ Two DOT warning labels (gauges typically require RADIOACTIVE YELLOW II labels; see table) applied to opposite sides of the package, listing the package contents and activity in SI and customary units, and the package’s Transport Index (TI), the dimensionless number indicating the package’s radiation level at 1 meter (manufacturers provide the TI for their gauges)

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

C. Shipping papers

The information required on shipping papers depends on the type of shipment being made. Transporting gauges in company vehicles (without any transfers) can be exclusive use shipments, which require minimal information on the shipping paper (commonly known as a “bill of lading”). Gauges shipped by common carrier to the manufacturer or another recipient require additional information. Gauges shipped by air or internationally require still more information.

1. Exclusive use shipments (shipments to and from job sites) require a bill of lading with the information listed below. The shipping paper must be immediately accessible to the driver during transport.

- ◆ Description of shipment [proper shipping name, RQ (if applicable), identification number, hazard class, type of package, name and activity of each nuclide, category of labeling and Transport Index)
- ◆ Emergency response telephone number (24-hour monitored number of a person knowledgeable about the hazards associated with portable gauges)

2. Common carrier shipments MOST COMMON PROCEDURE FOR FIXED GAUGE LICENSEES (shipments offered to third parties for transport) require a bill of lading with the information listed below, if the shipment is made by highway. If shipped by air, the carrier will provide a “Dangerous Goods Airbill” that will describe the required information.

- ◆ Name and address of shipper [can be the *consignee* (company offering the package for shipment) or the *consignor* (company shipping the package)]
- ◆ Description of shipment (same as for exclusive use shipments)
- ◆ Emergency response telephone number (24-hour monitored number of a person knowledgeable about the hazards associated with portable gauges)
- ◆ Shipper’s certification (statement certifying that the package has been properly classified, described, packaged, marked and labeled, and is in proper condition for transportation)
- ◆ Signature of shipper (commits the signor to certification of the shipment)

3. Emergency response information (ERI) will be provided with the bill of lading and will be immediately accessible to the driver during shipment.

4. Accessibility. Shipping papers and ERI will be immediately accessible to the driver during transport of gauges.

D. Inspection

Prior to shipment, inspect transport containers to ensure proper packaging and unimpaired physical condition of the container and its closure devices. Promptly report any defects to the RSO prior to shipment or use. The RSO will label and remove from use any gauge or package found to be defective and ensure their repair or replacement.

APPENDIX I

OPERATING PROCEDURES

The following Operating Procedures will be used by all Gauge Users who use or supervise the use of the fixed gauge(s). Any deviations from these Operating Procedures must be approved by the Radiation Safety Officer.

Preparation for Work

- If a personnel monitoring badge is provided:
 - Always wear your assigned thermoluminescent dosimeter (TLD) or film badge when using the gauge.
 - Never wear another person's TLD or film badge.
 - Never store your TLD or film badge near the gauge.

Using the Gauge

- Use the gauge according to the manufacturer's or distributors instructions and recommendations. Perform routine cleaning and maintenance according to the manufacturer's or distributors instructions and recommendations.
- Test each gauge for the proper operation of the on-off mechanism (shutter) and indicator, if any, at intervals not to exceed 6 months or as specified in the SSD certificate.
- Do not touch the unshielded source with your fingers, hands, or any part of your body.
- Do not place hands, fingers, feet, or other body parts in the radiation field from an unshielded source.
- Post a radiation warning sign at each entryway to an area where it is possible to be exposed to the beam.
- Prevent employees from entering the radiation beam during maintenance, repairs, or work in, on, or around the bin, tank, or hopper on which the device is mounted by using the attached **Gauge Lockout Procedures**. These procedures specify who will be responsible for ensuring that the lock-out procedures are followed.
- Prevent unauthorized access, removal, or use of the gauge.
- After making changes affecting the gauge (e.g., changing the location of gauges, removing shielding, adding gauges, changing the occupancy of adjacent areas,), reevaluate compliance with public dose limits and ensure proper security of gauges.

Maintaining the Gauge(s)

1. Personnel monitoring badges, if applicable, will always be worn when cleaning or maintaining the gauge.
2. Routine cleaning and maintenance of the gauge will be performed in accordance with the manufacturer's instructions and recommendations.
3. No maintenance will be performed on the gauge that includes removing the radioactive source from the gauge. Any maintenance that is not included in the manufacturer's instructions and recommendations will be performed by the manufacturer or by another person who is specifically licensed to perform the maintenance.
4. Non-routine maintenance such as installation, initial radiation surveys, relocation, removal from service, dismantling, alignment, replacement, disposal of the sealed source, and non-routine maintenance and repair of components related to the radiological safety of the gauge, is performed using the attached **Non-Routine Maintenance Procedures**.

5. A Quarterly Inventory of all gauges will be performed by the Radiation Safety Officer or their designee. Records of the inventory will be maintained by the Radiation Safety Officer.

6. Leak testing of the radioactive sources will be performed and documented as specified in the Radioactive Material License using the **Leak Test Procedures**, which are attached. Gauges that do not have a current leak test will

APPENDIX J

LOCKOUT PROCEDURES

I. Scope and Purpose

This procedure establishes the minimum requirements for the lockout of fixed nuclear gauges when maintenance or servicing is performed on or near gauges such that workers could be exposed to the gauge's primary radiation beam or scattered radiation.

This procedure shall be used to ensure that gauges are properly locked out and/or tagged out before personnel perform any work where operating gauges could cause unnecessary radiation exposures.

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

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

II. Conditions Requiring Lockout

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

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

III. Lockout/Tag-out Specifications

Tag-out devices will consist of a durable tag and a means of attachment that can be securely fastened to the gauge to indicate that the gauge may not be operated until the tag-out device is removed.

Tag-out devices will be substantial enough to prevent inadvertent or accidental removal, and able to withstand the ambient environment for the maximum period of time that exposure is expected.

Tag-out devices will warn against hazardous conditions if the gauge is operated and must include a legend such as **Do Not Open** or **Do Not Operate**. Tags shall be legible and understandable to all personnel who may be in the area.

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

IV. Lockout/Tag-out Sequence

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

1. When work is required on or near a gauge, notify all affected personnel that the gauge shutter must be closed, locked-out, and tagged prior to initiating the work.
2. The RSO or another authorized fixed gauge user will lockout/tag-out the gauge in accordance with manufacturer recommendations, using lockout/tag-out devices meeting the specifications described in this procedure.
3. When locking out a gauge, the on/off or shutter mechanism will be tagged to indicate that the gauge is locked out. If a gauge is incapable of being locked out, a tag-out device must still be used.
4. The RSO or fixed gauge users designated by the RSO will verify that the gauge has been effectively locked out. Radiation surveys are required to verify gauge lockout. The surveys may be performed by using a radiation survey meter or, as appropriate, by using the gauge's radiation detector.
5. A warning sign will be posted at each entryway to areas where it is possible to be exposed to the primary radiation beam from the gauge. Such warning signs will include safety instructions (e.g., "Contact the Radiation Safety Officer Before Entering Vessel").

APPENDIX K

EMERGENCY PROCEDURES

Damage to a gauge from an accident or emergency event (fire, explosion, mechanical damage, tornado) could lead to a gauge shutter mechanism that cannot be closed or an exposed radiation source. These events could result in elevated radiation dose rates in the vicinity of the damaged gauge. Specific emergency procedures must be implemented to properly manage the event and minimize personnel radiation exposure.

EMERGENCY PROCEDURE FOR ALL EMPLOYEES

If the gauge becomes damaged or if any other emergency or unusual situation arises:

- **STOP USE** of the gauge.
- **SECURE THE AREA** and keep people away from the gauge until the situation is assessed and radiation levels are known. However, perform first aid for any injured individuals and remove them from the area only when medically safe to do so.
- **ISOLATE EQUIPMENT** until it is determined there is no contamination present.
- **REMAIN AT THE SCENE** in a safe location. Gauge users and other potentially contaminated individuals should not leave the scene until emergency assistance arrives.
- **NOTIFY** the persons in the order listed below of the situation:

NAME	WORK PHONE NUMBER	HOME PHONE NUMBER
_____RS	_____	_____
O	_____	_____
_____	_____	_____
-	_____	_____
_____	_____	_____
-	_____	_____

- **FOLLOW DIRECTIONS** Follow the directions provided by the person contacted from the above list.

THE RSO AND LICENSE MANAGEMENT MUST DO THE FOLLOWING

- Arrange for a radiation survey to be conducted as soon as possible by a knowledgeable person using appropriate radiation detection instrumentation. This person could be a licensee employee using a survey meter or a consultant. To accurately assess the radiation danger, it is essential that the person performing the survey be competent in the use of the survey meter.
- Make necessary notifications to local authorities as well as the **Louisiana Department of Environmental Quality, Radiation Section, 225-765-0160**-24 hours a day. Immediate notification is required when gauges containing radioactive material are damaged, fire, theft, loss, or other unusual occurrence affecting the gauge or sealed source integrity.
- Reports to the **Department** must be made within the reporting timeframes specified by the regulations.
- Reporting requirements are found in **LAC 33:XV.Chapter 4.Subchapter J.**
- Recovery operations and decontamination must only be attempted by properly trained and

licensed individuals.

Note: In the event of a transportation accident involving radioactive material, both the Louisiana Department of Environmental Quality, Radiation Section and the Louisiana State Police must be notified. Department of Transportation should be notified in accordance with 49 CFR § 171.15.

EMERGENCY RESPONSE INFORMATION

POTENTIAL HAZARDS

1. IMMEDIATE HAZARDS TO HEALTH

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

2. FIRE OR EXPLOSION

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

EMERGENCY PROCEDURES 3. IMMEDIATE PRECAUTIONS

- Isolate hazard area to within a 10-15 foot radius of the gauge and restrict access.
- Emergency response actions may be performed prior to any measurement of radiation; limit entry to shortest time possible.
- Notify local authorities and Radiation Safety Officer of accident conditions.
- Detain uninjured persons, isolate equipment with suspected contamination, and delay cleanup until receiving instruction from Radiation Safety Officer.
- Maintain surveillance
- Remain at scene in safe location

4. FIRE

- Do not move damaged containers; move undamaged containers out of fire zone.
- Small Fires: Dry Chemical, CO₂, water spray, or regular foam.
- Large Fires: Water spray, fog (flooding amounts).

5. 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.

6. FIRST AID

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

CALL THE FOLLOWING FOR EMERGENCY ASSISTANCE:

RADIATION SAFETY OFFICER: _____

RSO TELEPHONE NUMBER(S):

LOCAL AUTHORITIES:911 or local police, sheriff, or
fire department ARKANSAS LDEQ, Radiation
Section.....(225) 765-10160

U.S. DEPT. OF TRANSPORTATION.....(800) 424-
8802

GAUGE
MANUFACTURER.....

-
GAUGE
MANUFACTURER.....

-
GAUGE
MANUFACTURER.....

-

APPENDIX L

Criteria for Acceptable Training for Authorized Users

Classroom training may be in the form of lecture, videotape, or self-study emphasizing practical subjects important to the safe use of the gauge:

Radiation Safety:

- Radiation vs. contamination
- Internal vs. external exposure
- Biological effects of radiation
- Types and relative hazards of radioactive material possessed by the Licensee
- ALARA concept
- Use of time, distance, and shielding to minimize exposure
- Radiation survey meters
- Personnel monitoring devices
- Location of sealed source within the gauge

Regulatory Requirements:

- Applicable regulations
- License conditions, amendments, renewals
- Locations of use and storage of radioactive materials
- Material control and accountability
- Annual audit of radiation safety program
- Transfer and disposal
- Recordkeeping
- Prior events involving fixed gauges
- Handling incidents
- Recognizing and ensuring that radiation warning signs are visible and legible
- Licensing and inspection by regulatory agency
- Need for complete and accurate information
- Employee protection
- Deliberate misconduct

Practical Explanation of the Theory and Operation for Each Gauge Possessed by the Licensee:

- Operating and emergency procedures
- Routine vs. non-Routine maintenance
- Lock-out procedures, including radiation surveys

On-the-job training must be done under the supervision of an AU or RSO:

- Supervised Hands-on Experience Performing:
 - o Operating procedures
 - Test runs of emergency procedures
 - Performing radiation surveys
 - Routine maintenance
 - Lock-out procedures

Training Assessment

Management will ensure that proposed Authorized Users are qualified to work independently with each type of gauge with which they may work. This may be demonstrated by written or oral examination or by observation.

Course Instructor Qualifications

Instructor should have:

- Successful completion of a fixed gauge manufacturer's or distributor's course for users (or equivalent)
- Successful completion of an 8 hour radiation safety course; and
- Documentation of 8 hours hands-on experience with fixed gauges

Note: Additional training is required for those applicants intending to perform non-routine operations such as installation, initial radiation survey, repair, and maintenance of components related to the radiological safety of the gauge, gauge relocation, replacement, and disposal of sealed sources, alignment, or removal of a gauge from service.

Example Inventory Form

Company: _____ Radioactive Materials License No. _____

Date of Inventory: _____ Radiation Safety Officer Signature: _____

Number	GAUGE MANUFACTURER & MODEL	GAUGE SERIAL NO.	SOURCE MANUFACTURER & MODEL	SOURCE SERIAL NO.	SOURCE TYPE & EST. ACTIVITY	LOCATION	CONDITION