



**ILLINOIS EMERGENCY MANAGEMENT AGENCY
DIVISION OF NUCLEAR SAFETY**

INSTRUCTIONAL SET NO. 65.0

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Instructions for Preparing Applications
for Radioactive Material Licenses Authorizing the

**USE OF SEALED SOURCES
IN PORTABLE DEVICES**

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I. INTRODUCTION

A. General

The Illinois Emergency Management Agency, Division of Nuclear Safety (herein referred to as IEMA or the Agency) regulates the possession and use of radioactive material. Certain uses of radioactive material require a specific license to be issued by the Agency pursuant to 32 Illinois Administrative Code 330 (the IEMA administrative code herein referred to as 32 Ill. Adm. Code or the regulations).

The Agency usually issues a single radioactive material license to cover an entire radioactive material program. Separate licenses are not normally issued to different departments of a facility, nor are they issued to individuals associated with the facility. Facilities with more than one license may wish to combine those licenses where feasible, when the storage and use of radioactive material are under the same administrative control.

B. Purpose of Instructions

These instructions describe the information needed by the Agency's Radioactive Materials Section staff to evaluate an application for a specific license for the possession and use of radioactive material in the form of sealed sources in portable gauging devices and portable x-ray fluorescence analyzers (XRF), herein referred to as portable devices. Note there are certain requirements listed in this guidance document that pertain only to portable gauge licensees and not to XRF licensees. These requirements will be referred to as portable gauges in the guidance. It is not intended to address the research and development of gauging devices or the commercial aspects of manufacturing, distribution and service of such devices.

Prior to submitting an application for portable device use, the applicant should carefully study these instructions and the regulations listed in Section I.E. and submit all applicable information requested. The Radioactive Materials Section staff will request additional information when necessary to ensure that the applicant has established an adequate radiation safety program (See 32 Ill. Adm. Code 330.240, 330.250 and 340.110). Such requests for additional information will delay final action regarding the application and may be avoided by a thorough study of the regulations and these instructions prior to filing the application.

These instructions are intended only for general guidance in the preparation of the license application and should not be considered as a substitute for the applicant's careful evaluation of the proposed use of radioactive material. Applicants must assure that the application correctly and adequately describes radiation procedures to be followed in their radioactive material use program.

C. Purpose of Appendices to these Instructions

The regulations require licensees to develop and implement written policies and procedures, which ensure compliance with the regulations. This instructional set's appendices provide sample radiation safety procedures, which the licensee may choose to use in their radiation safety program. Applicants should carefully read the applicable regulations and sample procedures and then decide if the sample procedures are appropriate for their specific radiation safety needs. In the application, applicants may certify that they will follow the sample procedures or develop and submit an equivalent procedure for Agency review. If a sample procedure is followed, applicants must ensure that references to that procedure are clear and specific (e.g., references should include instructional set number, revision number, revision date and appendix identification).

D. Regulatory Jurisdiction

An Illinois license is required for applicants who request to possess or use licensed radioactive material within the State of Illinois in areas not under exclusive federal jurisdiction.

Any applicant who requests to possess or use licensed radioactive material in Illinois at a location under exclusive federal jurisdiction, in an Agreement State or in states where the Nuclear Regulatory Commission (NRC) has jurisdiction, whether at a temporary jobsite or a permanent jobsite, the applicant needs to contact the responsible officials in that Agreement State or NRC for guidance on preparing and filing an application or to obtain approval for reciprocal recognition of its license with that state or the NRC.

An Agreement State (such as Illinois) is a state that has entered into an agreement with the NRC that gives them the authority to license and inspect byproduct, source or special nuclear materials used or possessed within their borders. A listing of Agreement States can be found on the NRC website (www.nrc.gov) under the Federal & State Materials & Environmental Management.

In the special situation of work at Federally-controlled sites in Agreement States, it is necessary to know the jurisdictional status of the land in order to determine whether NRC or the Agreement State has regulatory authority. NRC has regulatory authority over land determined to be "exclusive Federal Jurisdiction," while the Agreement States have jurisdiction over non-exclusive Federal jurisdiction land. Licensees are responsible for finding out, in advance, the jurisdictional status of the specific areas where they plan to conduct licensed operations. IEMA recommends that licensees ask their local contact for the Federal Agency controlling the site to help determine the jurisdictional status of

the land and to provide the information in writing, so that licensees can comply with IEMA, Agreement State or NRC regulatory requirements.

Examples of Jurisdictional Status:

<u>Application and Proposed Location of Work</u>	<u>Regulatory Agency</u>
1. Federal Agency regardless of location (except Department of Energy and under most circumstances, its prime contractors are exempt from licensing (10 CFR 70.11))	NRC
2. Non-Federal entity in non-Agreement State, US territory, or possession	NRC
3. Non-Federal entity in Agreement state at non-Federally controlled site	Agreement State
4. Non-Federal entity in Agreement State at Federally controlled site NOT subject to exclusive Federal Jurisdiction	Agreement State
5. Non-Federal entity in Agreement State at Federally controlled site subject to exclusive Federal jurisdiction	NRC

E. Applicable Regulations

It is the applicant's or licensee's responsibility to have and abide by up-to-date regulations. Copies of the regulations may be obtained from the Agency and they are also available electronically on IEMA's website at www.state.il.us/iema or the Illinois State Register www.cyberdrive.com. The following portions of the regulations are applicable to the use of radioactive material in the form of sealed sources in portable devices and should be used in conjunction with these instructions:

- 32 Ill Adm. Code 310 "General Provisions"
- 32 Ill Adm. Code 326 "Financial Assurance Requirements"
- 32 Ill Adm. Code 330 "Licensing of Radioactive Material"
- 32 Ill Adm. Code 331 "Fees for Radioactive Material Licenses"
- 32 Ill Adm. Code 340 "Standards for Protection Against Radiation"
- 32 Ill Adm. Code 341 "Transportation of Radioactive Material"

Licensees who transport licensed radioactive material or who may offer such material to a carrier for transport must comply with the applicable requirements of the United States Department of Transportation (DOT) that are found in 49 CFR Parts 171-180. Copies of DOT regulations can be found on the DOT website or can be ordered from the Government Printing Office (GPO) Bookstore in Washington, DC or GPO Bookstore on the internet. A copy is available for review at IEMA offices at 1035 Outer Park Drive, Springfield, IL 62704.

- 32 Ill Adm. Code 400 "Notices, Instruction and Reports to Workers: Inspections"
- 32 Ill Adm. Code 410 "Radiation Inspectors and Inspections"

The Agency may amend these regulations periodically to remain compatible with current standards. The licensee will be notified of these changes as they occur and should incorporate them into their programs, if applicable.

F. Retention of Records

The license must maintain certain records for specified periods of time for compliance purposes. These intervals have been established in order for the

inspection staff and other authorized entities to have access to these documents as required by the regulations. Appendix A of this instructional set contains the retention requirements for these documents.

G. Radiation Protection Program

As specified in 32 Ill. Adm. Code 340.110, the licensee must develop, document and implement a radiation protection program. Specifically, this program should include provisions for ensuring compliance with the requirements of Part 340 of the regulations, the license, the license conditions with all active amendments and for establishing an ALARA program and for performing reviews of the program at 12-month intervals. In developing a radiation protection program, the licensee should design the program based on the size of the facility, potential hazards associated with radiation exposure and the physical characteristics of the radionuclides. The commitments made to the Agency, which lead to the issuance of the license, the regulations and the complete license document are considered the applicant's radiation protection program.

Active control over the radiation protection program should be exercised by management personnel in positions of authority. In addition, management should be aware that the assignment of duties to individuals (e.g., the Radiation Safety Officer (RSO)) does not relieve management of the responsibilities to review and control the licensed activities. It is recommended that assignment and acceptance of RSO duties be done in writing and signed by management and the RSO.

H. Audit Program

Part of the annual review of the radiation protection program required by 32 Ill. Adm. Code 340.110(c) can be accomplished by implementing an annual audit program. Appendix B contains a suggested audit program that is specific to the use of portable devices and is acceptable to IEMA. All areas indicated in Appendix B may not be applicable to every licensee and may not need to be addressed during each audit.

Currently IEMA's emphasis in inspections is to perform actual observations of work in progress. As part of their audit program, applicants should consider performing unannounced audits of device users in the field to determine if, for example, devices, such as gauges, are secured when not in use and are under the direct supervision of trained licensee personnel.

It is essential that, once identified, problems be corrected comprehensively and in a timely manner. IEMA will review the licensee's audit results and determine if corrective actions are thorough, timely and sufficient to prevent recurrence. If the licensee identifies violations they should be self-reported to the Agency. IEMA's

goal is to encourage prompt identification and prompt, comprehensive correction of violations and deficiencies.

Audit records should include the following: date of audit, name of person(s) being audited, name and signature of individual conducting the audit, areas audited, audit findings, corrective actions and follow-up.

Note: The licensee is not required to submit its audit program to IEMA for review during the licensing phase.

I. Management Responsibility

IEMA recognizes that effective radiation safety program management is vital to achieving safe and compliant operations. IEMA also believes that consistent compliance with its regulations provides reasonable assurance that licensed activities will be conducted safely.

To ensure adequate management involvement, a senior-level management representative must sign the submitted application acknowledging management's commitments and responsibility for the following:

- Radiation safety, security and control of radioactive materials and compliance with regulations;
- Completeness and accuracy of the radiation safety records and all information provided to IEMA;
- Knowledge about the contents of the license and application;
- Compliance with current IEMA and DOT regulations and the licensee's operating and emergency procedures;
- Commitment to provide adequate resources (including space, equipment, personnel, time and if needed contractors) to the radiation protection program to ensure that the public and workers are protected from radiation hazards and compliance with regulations is maintained;
- Selection and assignment of a qualified individual to serve as the Radiation Safety Officer for licensed activities;
- Obtaining IEMA's prior written consent before making any changes to the licensee's commitments under the license, including locations of storage; and

- Notifying IEMA in writing, immediately following filing of a petition for voluntary or involuntary bankruptcy.

J. As Low as Reasonably Achievable (ALARA)

Persons engaged in activities authorized by radioactive material licenses issued by the Agency must to the extent practicable, make every reasonable effort to maintain the release of radioactive material and the total effective dose equivalent (TEDE), ALARA for both workers and members of the public. License applicants must give consideration to the ALARA philosophy when designing facilities, procuring equipment and for developing procedures for work with radioactive material. The ALARA concept is a key element in establishing any radiation protection program as described above. The definition of ALARA may be found in 32 Ill. Adm. Code 310.20.

K. Système International (SI) Units

In accordance with State and Federal policy, the Agency is making an effort to implement the SI system of units. If applicants wish to utilize SI units in the application, please feel free to do so. This conversion is by no means mandatory at this time. However, DOT transportation regulations require the SI unit to be listed, followed by the English units in parenthesis if shown on the shipping paper or label. The Agency will continue to recognize SI and English units. Appendix C of this instructional set has been included to assist applicants in the use of SI units.

L. Security

The events of September 11, 2001 have put new emphasis on security to prevent the malicious use of radioactive material. IEMA has been working with its licensees, Federal and State partners, as well as the international community, to provide appropriate safety and security requirements for radioactive materials without discouraging their beneficial use. Advancements in communications among government agencies and the public, security and controls of radioactive sources, recovery and disposition of radioactive sources and credentialing of authorized users have vastly improved security and accountability of devices. As part of this process, you will occasionally be asked for additional information about security measures and backgrounds for authorized users of devices. IEMA appreciates your cooperation in this matter. Your efforts to ensure devices are used and secured in accordance with your license and the regulations are extremely important for protecting public health and safety in Illinois.

II. FILING AN APPLICATION

An application for a specific license for the use of radioactive material in the form of sealed sources in portable devices should be submitted on the "Application Form for a Radioactive Material License Authorizing the Use of Sealed Sources in Portable Devices", in accordance with 32 Ill. Adm. Code 330.240(a) (see Exhibits A and A.1). All items on the application form must be completed in sufficient detail for the Agency staff to determine that the applicant's equipment, facilities and radiation protection program are adequate to protect health and minimize danger to life and property. Avoid submitting proprietary information unless it is absolutely necessary.

All license applications may be available for review by the general public as requested under the Freedom of Information Act. Public inspection of applications and other documents submitted to the agency pursuant to 32 Ill. Adm. Code 330.240 shall be in accordance with 2 Ill. Adm. Code 1076 and the requirements of the Freedom of Information Act (5 ILCS 140). Employee personal information, i.e., home address, home telephone number, social security number, date of birth and radiation dose information should not be submitted unless specifically requested by the Agency.

Since the space provided on the application form is limited, separate 8.5 by 11 inch sheets of paper may be appended for any items listed on the form where additional space is needed. Each appended sheet should contain the item number, page number, applicant's name and the application date in the lower right corner.

The application must be completed in triplicate. The original and one copy of the application form, along with duplicate copies of supporting documents must be mailed to:

Illinois Emergency Management Agency
Division of Nuclear Safety
Radioactive Materials Licensing
1035 Outer Park Drive
Springfield, Illinois 62704

At least one copy of the submitted application form, with all attachments, must be retained by the applicant. When issued, the license will require, as a condition, that the licensee possess and use radioactive material described in all schedules of the license in accordance with statements, representations and procedures contained in, or enclosed with, the application form and supporting documentation. The regulations contained in 32 Ill. Adm. Code: Chapter II, Subchapters b and d shall govern unless the statements, representations and procedures set forth in the licensee's application and correspondence are more restrictive than the regulations.

III. CONTENTS OF AN APPLICATION

The following paragraphs explain the information requested on the "Application Form for a Radioactive Material License Authorizing the Use of Sealed Sources in Portable Devices" (Exhibit A.) and the "Expedited Renewal Application Form for a Radioactive Material License Authorizing the Use of Sealed Sources in Portable Devices" (Exhibit A.1.):

Item 1. Type of Application

Indicate by checking the appropriate box, if the application is for a new license, an amendment to an existing license, a renewal in its entirety or an expedited renewal of an existing license. If the application is for an amendment to, renewal or expedited renewal of an existing license, specify the license number in the space provided.

Additionally, indicate in the appropriate box if the application is for use of sealed sources in a portable gauging device or a portable x-ray fluorescence analyzer (XRF) or both.

Item 2. Applicant's Name and Mailing Address

List the legal name of the applicant's corporation or other legal entity with direct control over use of the radioactive material. A division or department within a legal entity may not be a licensee. An individual may be designated as the applicant only if the individual is acting in the private capacity and the use of the radioactive material is not connected with employment in a corporation or other legal entity. Provide the mailing address where correspondence should be sent. The applicant's mailing address may or may not be the same as the address where radioactive material will be used. Enter the name, mailing address, telephone number, telefacsimile and email address of the applicant in the space provided. Documentation of registration of the applicant/licensee with the Illinois Secretary of State to conduct business within Illinois is also required to be submitted.

Note: IEMA must be notified in the event of bankruptcy proceedings in accordance with 32 Ill. Adm. Code 330.310(j). If a change of ownership occurs, IEMA must be notified of and licensees must have prior written consent of the change of ownership or control prior to transferring ownership or control of licensed material. If personnel and procedures are changing with the new ownership, the new owners must obtain a new license. If the personnel and procedures remain the same, the license may be transferable. If so, the information listed in Appendix D. must be addressed.

Even though a licensee may have filed for bankruptcy, the licensee remains responsible for all regulatory requirements. IEMA needs to know when licenses are in bankruptcy proceedings in order to determine whether all licensed material is accounted for and adequately controlled, and whether there are any public health and safety concerns (e.g.,

contaminated facility, etc.). Any health and safety issues must be resolved before bankruptcy actions are completed.

Item 3. Person to Contact Regarding this Application

The applicant should name a qualified individual who is authorized by the applicant's management to answer questions and make commitments regarding this application and the radiation safety program. This individual, usually the Radiation Safety Officer (RSO) or a principal radioactive material user, will serve as the point of contact during the application review. In the space provided, enter the name, address, telephone number, telefacsimile and email address of the individual to be contacted regarding this application. Email addresses are important as the Agency distributes numerous items of interest to affected licensees via email, including notices of proposed rules that could affect the licensees operations or fees.

Item 4. Address(es) Where Radioactive Material will be Used and/or Stored

Specify all the addresses and physical locations where licensed radioactive material will be used and/or stored. Each location description should include the street address, city and other descriptive information (e.g., building name/number, suite, room or floor number) to allow specific facility identification. If multiple facilities will be used, specify the extent of use, storage or both at each location. Do not specify a post office box number as a use location. Additionally, IEMA does not consider long-term storage in a vehicle or personal residences not listed on the license as an acceptable practice. If more than one permanent facility is used, specify where records will be maintained for each facility. Permanent facilities are address locations where radioactive material can be used or stored for more than 180 days in a 12 month interval.

IEMA is required by Illinois law [420 ILCS 40/10(11)] to notify a local government of each listed location of storage or use of radioactive material. This allows local officials, fire and police the opportunity to review local ordinances and prepare for emergencies.

Note: Personal residences are generally not considered ideal locations for storage of radioactive material because of local ordinances and access restrictions for public dose and security.

If the applicant does not own the use/storage locations(s), submit confirmation that the owner of the property/facility has been notified in writing of the use/storage of radioactive material on this property.

Use of radioactive material at temporary job sites should be requested by checking off the box provided under Item 4. on the application. Use of licensed material at temporary job sites will become part of the license conditions and each separate address does not need to be specified so long as the licensee does not use, receive or store radioactive material at any one site for more than 180 days during any 12-month period.

Note: Being granted an IEMA license does not relieve a licensee from complying with other applicable Federal, State, or local regulations (e.g., local zoning requirements for storage locations).

Item 5. Individual(s) Who Will Use Radioactive Material and Personnel Training Program

List the full name of at least one individual who will use or directly supervise the use of radioactive material in portable devices and submit evidence of their training and experience. All personnel who will independently use portable devices containing radioactive material do not have to be designated by name. However, if the applicant does not specifically identify all individuals who should be authorized to use radioactive material independently and include training and experience for each individual identified, then the applicant must provide a commitment that all authorized users will complete either:

- A. An approved device manufacturer's training program for use of the device and completion of the United States Department of Transportation (DOT) hazardous materials training (49 CFR 172, Subpart H), or
- B. An approved training program equivalent to the device manufacturer's training program, including the DOT hazardous materials training. If this option is chosen, the information specified below for an in-house training program should be submitted.

In-house Training Program

Submit a description of the training, which includes the following:

- a. The form of training (e.g., formal course work, lecture, on-the-job training, including use of the device, etc.),
- b. A list of topics covered in the training (See Appendix E.),
- c. The means used to evaluate the training (e.g., submit a copy of the exam and answer key and specify the minimum passing criteria),
- d. The duration of training. Initial training for device users should be a minimum of 8 hours in duration including classroom and hands-on training.
- e. Submit a sample of the training record to be maintained, which includes, the date of training, the outline of training, the individual completing the training, a statement that they passed, name and signature of RSO and instructor.

- f. Confirm that the instructor will be an individual who has completed an approved device training program plus has 30 hours of actual use of the same type of device they are training new users on.
- g. In addition, for individuals who may not use the portable devices, but who have access to any portion of a restricted area must receive instruction as specified in 32 Ill. Adm. Code 400.120.

Note: Individuals who transport licensed radioactive material or who may offer such material to a carrier for transport must comply with the applicable requirements of the United States Department of Transportation (DOT) as described in 49 CFR 172, Subpart H, which is 172.700 – 172.704. Currently, the DOT training is required within 90 days after employment or change in job duties and at least once every three years.

Agency Note: Additional information on an individual's background and training may be requested to ensure that radioactive materials will be used as intended. See Exhibit B for a Release and Authorization Full Due Diligence Investigation form.

Item 6. Radiation Safety Officer (RSO)

State the name and qualifications of the RSO. This person is designated by, and responsible to, the applicant's management for the coordination of the applicant's radiation safety program and for ensuring compliance with the applicable regulations and license provisions.

The individual responsible for the radiation safety program should, at a minimum, have completed the training requirements listed in Item 5. of this Instructional Set. The RSO should be an on-site individual designated to assume the responsibilities of the office, to advise on the establishment of safe working conditions and to assure that the licensee is in compliance with all pertinent federal, state and local regulations. The RSO needs independent authority to stop operations that he/she considers unsafe. The RSO must have sufficient time and commitment from management to fulfill certain duties and responsibilities to ensure that radioactive materials are used and stored in a safe manner. The RSO should be familiar with the basic principles of radiation protection in order to properly fulfill the responsibilities, although for details the RSO may consult with appropriate qualified experts.

If the RSO is not an on-site individual the licensee should submit information as to the availability of the RSO and the means of contacting the RSO when they are not on-site.

The RSO duties and responsibilities must be defined. Appendix F. contains a sample listing of these duties and responsibilities. Either indicate the RSO will commit to these duties and responsibilities or submit an alternate program for Agency review.

The RSO may delegate certain duties to qualified individuals provided the terms of said designation are specifically outlined in the applicant's written procedures. The applicant must request the option of delegating duties and must receive permission from the Agency prior to initiation of this procedure. The condition listed in Appendix F.1. can be listed on the license if the applicant requests to delegate RSO duties.

Item 7. Radioactive Material

Licensees will only be authorized for sealed sources and devices registered by NRC or an Agreement State and documented in a Sealed Source and Device (SSD) Registration Certificate. Manufacturers and Distributors of the devices can confirm this registration.

Submit a description of the radioactive material and portable device for which a license is requested. The description should include the following:

1. Radionuclide(s)
2. Device Manufacturer Name and Model
3. Number of Devices Requested (note that the applicant can request more devices than they actually possess so that they can order additional devices in the future without first obtaining an amendment to do so. (e.g., they currently will use one device, but request possession of 3 devices.)
4. Sealed Source Manufacturer's Name and Model
5. Activity of each radionuclide

For licensees who request to perform instrument calibrations within their facility as described in Item 9. of this instructional set, specify the radionuclides, activity, make and models of the calibration sources and the make and model of the calibration instrument requested for use for performing radiation monitoring instrument calibration.

For licensees who request to perform their own leak test analysis within their facility as described in Item 16. of this instructional set specify the radionuclides, activity, make and models of the sources requested for use as calibration or reference standards.

Item 8. Instrumentation and Monitoring Procedures

Radiation monitoring instruments are not normally required for most licensees if the portable devices are used for their intended purpose, transported in U.S. Department of Transportation (DOT) approved containers and no maintenance procedures involving access to the sources or source holders are performed. There are situations (e.g., receipt of damaged packages, incidents involving portable devices being run over at construction sites, auto accidents, etc.) where a monitoring instrument is needed to determine whether the radioactive source has been breached. In most cases the portable device is damaged, but the source remains intact. Accordingly, the licensee should implement their

emergency procedures and obtain technical assistance from the Agency and arrange for a timely evaluation of the source integrity following receipt of a damaged package or an incident.

If maintenance involving access to the sources and source holders is performed by the licensee, these procedures must be submitted for Agency approval and the licensee must have at least one low range beta-gamma (0-50 mR/hr or 0-200 mR/hr) monitoring instrument available at each maintenance area for monitoring during and upon completion of the maintenance procedures.

If the licensee requests to analyze samples for leakage and/or contamination (leak/wipe tests), a radiation measurement instrument that is sufficiently sensitive to detect 185 Bq (0.005 μ Ci) is also required. The applicant must submit the minimum detectable activity (MDA) calculations, which are also referred to as Lower Limit of Detection (LLD), for each instrument used for leak/wipe test analysis. Appendix G contains sample LLD calculations. An LLD calculation is used to determine if a measurement instrument is sufficiently sensitive to measure 185 Bq if you want to use the instrument to perform analysis of leak test wipes.

Exhibit B is a form that may be used to describe the applicant's instrumentation. If this form is not used, then submit equivalent information for Agency review.

For applicants who wish to perform their own maintenance, repair or analysis of test samples for leakage and/or contamination (leak/wipe tests), submit a procedure for performing periodic radiation monitoring and contamination monitoring. The procedure must describe the routine monitoring program, including the areas to be monitored, frequency of the monitoring, action levels initiating decontamination procedures and provisions for maintaining records of monitoring. Otherwise indicate that instrumentation and monitoring is not applicable.

Item 9. Instrument Calibration and Operability Checks

Agency Note: If Item 8. is marked as not applicable, then Item 9. should also be not applicable.

If radiation monitoring instruments are required (see Item 8), the licensee must ensure that the monitoring instruments used to demonstrate compliance with 32 Ill. Adm. Code 340 are calibrated prior to first use, at intervals not to exceed 12 months thereafter and also following repair. Specify if monitoring instruments will be calibrated by a service company specifically licensed to perform monitoring instrument calibrations as a customer service or by the applicant using specified procedures.

If monitoring instruments are to be calibrated by the applicant, then the applicant must submit the information requested in Appendix H. Additionally, specify in Item 7. above,

the manufacturer, model, radionuclide and activity of the sources and the manufacturer and model of the devices used for performing instrument calibrations. If a consultant or other licensed firm will perform the calibration of the monitoring instruments, then the applicant must maintain a copy of the radioactive material license, which authorizes that entity to perform monitoring instrument calibrations as a customer service.

In addition, the Agency requires the licensee to check instrument operability by using a source of radiation and maintain records of these checks. These instrument operability checks are required to be performed on each day that the instrument is used; however, a record of these checks is required only after repair, battery change or instrument calibration. If any check source reading varies greater than 20% from the reading measured immediately after calibration, the licensee shall require that the instrument be repaired or recalibrated before use for monitoring required to maintain compliance.

Item 10. Facilities and Equipment

Portable devices must be stored and secured in such a manner as to prevent unauthorized removal, access or use as required by 32 Ill. Adm. Code 340.810. Storage/use areas should not include areas used as residential quarters, motel rooms, etc. Submit diagrams of all areas in which radioactive material will be permanently stored or used (e.g., closets, rooms, cabinets, etc.). The submitted diagrams and additional information should include the following:

- a. Specify the diagram scale.
- b. Indicate the direction of north.
- c. Clearly mark or identify all areas adjacent (e.g., beside, above and below) to radioactive material storage/use rooms or areas (e.g., offices, hallways, outside walls, etc.). Specify the distance of the closest occupied workstation to the radioactive material storage/use area.
- d. Specify the building, floor, room number and principal use (e.g., for storage only or for storage and use of the device) of each room or area.
- e. Indicate all lockable doors, cabinets, lockers and storage containers for all storage/use locations for radioactive material.
- f. Provide a description of the security measures implemented to limit access to the storage/use areas to authorized personnel only (e.g., areas locked when not in use and only accessible by authorized users). There must be two independent means of security provided for radioactive sources while at the storage facility and while in the field, including during transportation (two-lock rule).

- g. Submit a description of the storage containers (e.g., manufacturer's shipping container, etc.) used for the portable devices.
- h. For each permanent storage or use location, if the applicant does not own the use/storage facility/property, submit a letter from the owner of the facility/property verifying the owner is aware of the use/storage of radioactive material on this property or verify the owner has been informed in writing of the use/storage of radioactive material within their facility. If the facility/property is owned by the applicant, so indicate.
- i. See information in Item 11. and submit a copy of the information in Attachment I. for determining public dose rates if more than a total of 2 portable gauges or 10 portable XRFs are requested for the same storage location and to ensure public doses do not exceed the limits.

Appendix J. contains a sample facility diagram.

Item 11. Public Dose

Licensees must do the following:

- a. Ensure that portable devices will be used, transported, and stored in such a way that members of the public will not receive more than 1 millisievert (1 mSv) [100 millirem (100 mrem)] in one year, and the dose in any unrestricted area will not exceed 0.02 mSv (2 mrem) in any one hour, from licensed operations, and
- b. Control and maintain constant surveillance over portable devices that are not in storage and secure stored gauges from unauthorized removal or use.

Members of the public include persons who live, work, or may be near locations where portable devices are used or stored and employees whose assigned duties do not include the use of licensed materials and who work in the vicinity where devices are used or stored.

Operating and emergency procedures regarding security and surveillance should be sufficient to limit the exposure to the public ALARA during use or storage and after accidents. Public dose is controlled, in part, by ensuring that devices not in use are stored securely (e.g., stored in a locked area) to prevent unauthorized access or use (see Figure 11.1). If devices are not in storage, then authorized users must maintain constant surveillance to ensure that members of the public, who could be co-workers or workers in an adjoining work location, cannot get near the portable devices or use them, and thus receive unneeded radiation exposure.

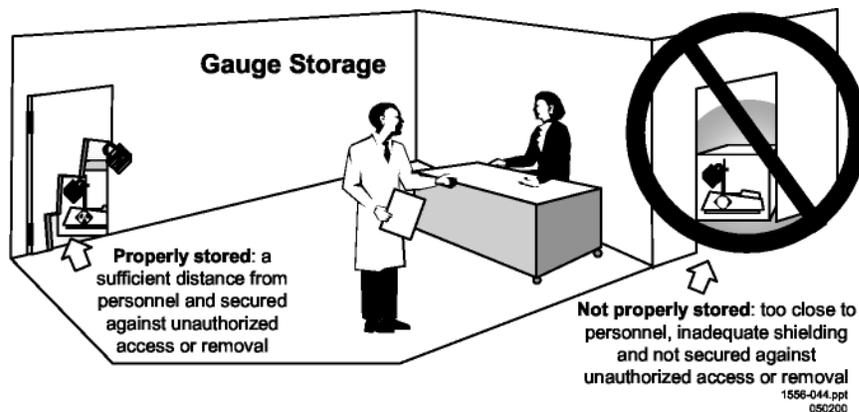


Figure 11.1 Storing Gauges or XRFs. *Devices should be stored away from occupied areas and secured against unauthorized removal.*

Public dose is also affected by the choice of storage location and conditions. Because a portable device has a radiation field, it must be stored so that the radiation level in an unrestricted area (e.g., an office, the exterior surface of an outside wall, a neighboring facility not controlled by the licensee, etc.) does not exceed 1 mSv (100 mrem) in a year or 0.02 mSv (2 mrem) in any one hour. Licensees should take time, distance, and shielding into consideration when choosing a permanent or temporary storage location. Decreasing the time spent near a portable device, increasing the distance from the device, and using shielding (i.e., brick, concrete, lead or other solid walls) will reduce radiation exposure. As a rule of thumb, portable devices should be stored as far away as possible from areas that are occupied by other employees and members of the public. Storing the device in its transportation case and in the gauges upright position will also reduce exposure rates.

Licensees can determine the radiation levels adjacent to the storage location either by calculations or a combination of direct measurements and calculations using some or all of the following: typical known radiation levels provided by the manufacturer, the “inverse square” law to evaluate the effect of distance on radiation levels, and occupancy factors to account for the actual presence of the member of the public and of the device(s). See Appendix I for examples.

If, after making an initial evaluation, a licensee makes changes affecting the storage area (e.g., changing the location of portable devices within the storage area, removing shielding external to the gauge or storing the portable devices outside of the manufacturer's transportation case, adding devices, changing the occupancy of adjacent areas, moving the storage area to a new location), then the licensee must ensure that portable devices are properly secured, perform a new evaluation to ensure that the public dose limits are not exceeded and take corrective action, as needed. Note the license must be amended prior to permanently moving the storage area.

Item 12. Procedures for Ordering and Receiving Radioactive Material and Opening Radioactive Material Packages

Submit a description of procedures for ordering, receiving radioactive material and safely opening radioactive material packages, including receipt during off-duty hours and for notification of responsible persons upon receipt of radioactive material. This procedure should be adequate to meet the requirements of 32 Ill. Adm. Code 340.960, to ensure that possession limits are not exceeded, radioactive material is secured at all times against unauthorized removal, radiation levels in unrestricted areas do not exceed the limits specified in 32 Ill. Adm. Code 340.310 that all receipts are properly documented, and damaged packages are promptly evaluated.

If packages are only received during normal working hours, so indicate. Security personnel or any other individuals who receive packages of radioactive material during off-duty hours should be issued written procedures, which detail receipt, examination and security of packages and receive training in these procedures. Procedures should include:

- a. Notification procedures to be followed for packages that are missing, found or suspected to be damaged, contaminated or leaking and indicate the immediate steps to be taken to prevent the spread of contamination.
- b. Procedures or methods for verifying the contents of packages of radioactive material, not only against the packing slip, but also against the amount, type and form of material ordered and against the license to ensure that possession limits are not exceeded.
- c. Procedures or methods to ensure that radioactive material is secured at all times against unauthorized removal.
- d. Procedures or methods to ensure that receipt of radioactive material is properly documented.

Appendix K contains a sample procedure and instructions for ordering, receiving and opening radioactive material packages.

Item 13. General Rules for the Safe Use of Radioactive Material and Security Requirements

Each applicant must develop, implement, and maintain procedures for the safe use of radioactive material and security of that material. Submit procedures that include the following:

- a. Provisions that only qualified individuals will use the portable device(s).

- b. Instructions for securing the portable device(s) prior to relocation or transport of the device, including who maintains control of keys.
- c. Provisions for maintaining doses ALARA.
- d. Instructions for using the portable device and performing routine maintenance and cleaning, according to the manufacturer's recommendations and instructions.
- e. Procedures to be followed for records regarding receipt, use and transfer of radioactive material and for accountability of radioactive material. Note that a physical inventory of the sealed sources is required to be performed at frequencies not to exceed six months. This inventory is not the same as conducting tests for leakage and/or contamination (leak/wipe tests), but it may coincide with leak/wipe tests as long as the sources are not placed into permanent storage. A sample utilization log is contained in Appendix M. This log can be used on a daily basis for accountability and can be used for the physical inventory required to be performed at frequencies not to exceed six months.
- f. Safety measures to be used when transporting the portable device(s) in a vehicle. Transportation activities must be carried out in accordance with 32 Ill. Adm. Code 341 and the requirements of the U.S. Department of Transportation regulations.
- g. Procedures or methods for preventing unauthorized access, use or removal of the portable device(s) at permanent and temporary job sites or storage locations and during transportation. See the two-lock provisions in Item 1.
- h. Procedures for use and care of personnel monitoring devices, if assigned.
- i. Specific instructions to the users informing them that:
 - 1. The source holder shall be locked in the "off" or closed position when the device is not in use.
 - 2. Sealed sources shall not be opened or removed from their source holders by the licensee.
 - 3. Current copies of the following documents shall be maintained at temporary job sites for Agency inspection:
 - a) The license, including all active amendments;
 - b) Manufacturer's instruction manual for the sealed sources and devices at the temporary job site;
 - c) The licensee's emergency procedures; and
 - d) The results of the latest test for leakage and/or contamination performed on the sealed source.
- j. Specific instructions to users informing them that any maintenance, beyond the manufacturers training, and repair on the portable device(s) is prohibited, unless authorized by the license. Manufacturers training and repair typically covers

cleaning of the bottom surface and shutter or shield movement area, but no other maintenance or repair involving access to the source or source holders or dismantling of the shielding or shutter devices.

NOTE: If the applicant desires authorization to perform maintenance and repair on portable devices involving access to the source or source holders and/or dismantling of the shielding or shutter devices, specific step-by-step procedures, including radiation safety precautions, survey instrumentation and provision for personnel dosimeters must be submitted to the Agency for review. In addition, the names and qualifications of personnel who will perform such maintenance and repair must be submitted.

- k. For portable gauging devices used when procedures require lowering the sealed source into the ground more than three feet, submit procedures for use of the portable gauging device in this manner and procedures to minimize the possibility of the source being stuck or lost "down hole" due to collapse of dirt or concrete around the source, including procedures requiring the use of piping, tubing or other casing material to line the hole from the lowest depth to 12 inches above the surface. Otherwise, specify that this type of use is not applicable.
- l. The objective of the security measures is to reduce the opportunity for unauthorized removal and/or theft by providing a delay and deterrent mechanism. By following this guidance, it will become more difficult and time-consuming to defeat security measures.

The following security requirements apply to portable gauge licensees regardless of the location, situation and activities involving the portable gauge. **The security requirements apply to: 1) storage on vehicles; 2) storage at temporary job sites and 3) storage at permanent facilities.** At all times, licensees are required to either maintain control and constant surveillance of the portable gauge when in use and at a minimum, use two independent physical controls to secure the portable gauge from unauthorized removal when not in use. The physical controls used must be designed and constructed of materials suitable for securing the portable gauge from unauthorized removal and both physical controls must be defeated in order for the portable gauge to be removed. The construction and design of the physical controls used must be such that they will deter theft by requiring a more determined effort to remove the portable gauge. The security procedures used must ensure that the two physical barriers chosen clearly increase the deterrence value over that of a single barrier and the two physical barriers would make unauthorized removal of the portable gauge more difficult.

IEMA requires portable gauge licensees to use a minimum of two independent physical controls that form tangible barriers to secure portable gauges from unauthorized removal whenever the portable gauge is not under the control and constant surveillance by the licensee. This is not a requirement for XRF licensees at this time.

Examples of two independent physical controls to secure a portable gauge when stored at a licensed facility are:

1. The portable gauge or transportation case containing the portable gauge is stored inside a locked storage shed within a secured outdoor area, such as a fenced parking area with a locked gate;
2. The portable gauge or transportation case containing the portable gauge is stored in a room with a locked door within a secured building for which the licensee controls access by lock and key or by a security guard;
3. The portable gauge or transportation case containing the portable gauge is stored inside a locked, non-portable cabinet inside a room with a locked door if the building is not secured;
4. The portable gauge or transportation case containing the portable gauge is stored in a separate secured area inside a secured mini-warehouse or storage facility; or
5. The portable gauge or transportation case containing the portable gauge is physically secured to the inside structure of a secured mini-warehouse or storage facility.

When securing a portable gauge in a vehicle, licensees commonly use a chain and a padlock to secure a portable gauge in its transportation case to the open bed of a pickup truck while using the vehicle for storage. Because the transportation case is portable, a theft could occur if the chain is cut and the transportation case with the portable gauge in it is taken. If the licensee simply loops the chain through the handles of the transportation case, a thief could open the transportation case and take the portable gauge without removing the chain or the case. Because the transportation case is also portable, it must be protected by two independent physical controls if the portable gauge is inside. A lock on the transportation case or a lock on the portable gauge source rod handle would not be sufficient because the case and the gauge are portable. A vehicle should be used for storage only for a short period of time when a gauge is in transit. A portable gauge should only be kept in a vehicle overnight if it is not practicable to provide temporary storage in a permanent structure. When a portable gauge is being stored in a vehicle, the licensee would be specifically required to use a minimum of two independent physical controls to secure the gauge. Examples of two such independent physical controls to secure portable gauges in these situations are:

1. The locked transportation case containing the portable gauge is physically secured to a vehicle with brackets, and a chain or steel cable (attached to the vehicle) is wrapped around the transportation case such that the case can not be opened unless the chain or cable is removed. In this example, the locked transportation case would count as one control because the brackets would prevent easy removal of the case. The chain or cable looped only through the transportation case handle is not acceptable. If chains or cables and locks are used the chain/cable/lock combination must be physically robust enough to provide both a deterrence, and a reasonable delay mechanism;

2. The portable gauge or transportation case containing the portable gauge is stored in a box physically attached to a vehicle, and the box is secured with (1) two independent locks; (2) two separate chains or steel cables attached independently to the vehicle in such a manner that the box cannot be opened without the removal of the chains or cables; or (3) one lock and one chain or steel cable is attached to the vehicle in such a manner that the box cannot be opened without the removal of the chain or cable; or
3. The portable gauge or transportation case containing the portable gauge is stored in a locked trunk, camper shell, van, or other similar enclosure and is physically secured to the vehicle by a chain or steel cable in such a manner that one would not be able to open the case or remove the portable gauge without removal of the chain or cable. In this example, the transportation case would not count as one control because it could be easily removed.

NOTE: The IEMA staff interprets "control and maintain constant surveillance" of portable gauges to mean being immediately present or remaining in close proximity to the portable gauge so as to be able to prevent unauthorized access to the portable gauge, including damage by other operating equipment or vehicles.

Physical controls used may include, but are not limited to, a metal chain with a lock, a steel cable with a lock, a secured enclosure, a locked tool box, a locked camper, a locked trailer, a locked trunk of a car, a locked shelter, a locked non-portable cabinet, a locked room or secured building.

Appendix L contains a sample set of General Rules for the Safe Use of Radioactive Material and Security Requirements for Items a.-j. and l. above. **Either indicate that the procedures covering Items a - j and l. above and contained in Appendix L will be followed or submit an alternate procedure for Agency review.** If the applicant requests authorization to perform procedures listed in Items k. above, or perform maintenance on portable devices, separate procedures, in addition to the information in Appendix L. must be submitted. Appendix L also contains security requirements applicable to portable gauge Licensees.

Item 14. Emergency Procedures

Submit a copy of the procedure to be implemented during an emergency. A copy of this procedure should be posted in all areas where radioactive material is used/stored and should be available to authorized users at each temporary job site. The procedure should:

- a. Describe immediate action to be taken after an incident in order to prevent contamination/radiation exposure of personnel or members of the public. Actions to be taken for handling injured people who may be contaminated should also be addressed.

- b. List the names and telephone numbers of the responsible persons (e.g., RSO) to be notified in case of an emergency. The Agency's 24-hour telephone number is to be included in this section (217/782-7860). Other than normal working hours contact information must be provided to the Agency. An alternate contact is also recommended.
- c. Instruct personnel on appropriate methods for re-entering effected areas.
- d. Describe what action is to be taken in the event of fire, theft, loss, or incident involving radioactive material. This response must include the notification of this Agency in accordance with 32 Ill. Adm. Code 340.1210 and 340.1220.
- e. Be posted or readily accessible to all authorized users.
- f. Address stuck source recovery for portable gauging devices used when procedures require lowering the sealed source into the ground more than three feet.

Appendix N. contains a sample emergency procedure for Items a.- e. above. Either indicate that the procedure in Appendix N. will be followed or submit an alternate procedure for Agency review. If you request authorization for Item f. above, separate procedures, in addition to the information in Appendix N., must be submitted.

Item 15. Portable Device Transfer and Waste Disposal

Licensed radioactive materials must be disposed of in accordance with Agency requirements by transfer to an authorized recipient.

- a. The portable device may be transferred to another licensee who is authorized to possess the same make and model device, for the same isotope and activity, not to exceed the maximum possession limits on the recipient's license.
- b. The portable device may also be disposed of by transfer to an authorized recipient who is licensed to receive waste from another licensee or a licensed radioactive waste disposal facility.
- c. The portable device may also be returned to the original manufacturer if they are licensed and accept the return.

Before transferring radioactive material, a licensee must verify that the recipient is properly licensed to receive it. In addition, all leak test analysis must be up to date and all packages containing radioactive material must be prepared and shipped in accordance with 32 Ill. Adm. Code 341 and DOT regulations.

Since the licensee is only authorized to transfer or dispose of radioactive material in accordance with 32 Ill. Adm. Code 340.1010, this item is already completed on the application form. Note however, that records pertaining to transfer or disposal are required to be maintained and will be required to be submitted when the licensee

requests to remove the portable device from the license, to delete an authorized site location, or to terminate the license.

Item 16. Testing Sealed Sources for Leakage and/or Contamination

IEMA requires testing to determine whether there is any radioactive leakage from the source in the device at intervals specified in the Sealed Source and Device (SS&D) registration. The measurement of the leak test sample is a quantitative analysis requiring that instrumentation used to analyze the sample be capable of detecting 185 Bq (0.005 microcurie) of radioactivity. Testing of sealed sources for leakage and/or contamination (leak/wipe tests) shall be performed only by persons who are specifically licensed by either the Agency, the NRC, another Agreement State to perform such services. In establishing a program for performing leak tests in accordance with 32 Ill. Adm. Code 340.410, two alternatives are available from which to choose:

- a. The services of a licensed consultant or commercial organization may be used to obtain test samples, analyze the samples and report the results back to the applicant. In addition, a commercially available test kit may be used to obtain a test sample for subsequent analysis by a licensed service company. When using a licensed service, please note the licensee is required to maintain a copy of that company's license, which authorizes them to perform leak tests as a customer service.
- b. The applicant may request authorization to perform leak tests, including sampling and analysis. If this option is chosen, then submit the information outlined in Appendix O. for Agency evaluation.

Item 17. Personnel Monitoring

Submit documentation demonstrating that unmonitored individuals are not likely to receive, in one year, a radiation dose¹ in excess of 10 percent of the allowable limits of 0.05 Sv (5 rems) for whole body and 0.5 Sv (50 rems) for extremities. Otherwise, provide information for dosimetry processed and evaluated by a National Voluntary Laboratory Accreditation Program (NVLAP)-approved processor that is exchanged at a frequency recommended by the processor.

Under conditions of routine use (including weekly cleaning and lubrication of the gauge according to the manufacturer's instructions), the typical portable gauge user does not require use of a personnel monitoring device. In most accidents where a gauge has been run over and has been damaged, the shielding of the source remains intact. A gauge user also does not require personnel monitoring when proper emergency procedures are used. Portable XRF users also do not normally require use of a personnel monitoring device. Part 1 of Appendix P provides guidance on preparing a written evaluation demonstrating

that portable device users are not likely to exceed 10 percent of the applicable limits and thus, are not required to have personnel monitoring devices.

When personnel monitoring is needed, most licensees use either film badges, thermoluminescent dosimeters (TLDs) or optically stimulating luminescent devices (OSL) that are supplied by a NVLAP-approved processor. The exchange frequency for film badges is usually monthly because of technical concerns about film fading. The exchange frequency for TLDs is usually quarterly and for OSLs is usually every two months. Applicants should verify that the processor is NVLAP-approved. Consult the NVLAP-approved processor for its recommendations for exchange frequency and proper use.

Exhibit D contains IEMA Forms 4 and 5 for documentation of routine occupational dose and for doses received during planned special exposures, accidents and emergency conditions. These forms can be used for reporting dose histories to employees on a monthly basis, annual basis or for those who leave employment with the licensee. If these forms are not used, the licensee must keep clear and legible records containing all of the information required by the forms.

Item 18. Fees

Refer to 32 Ill. Adm. Code 331 and the appropriate fee schedule to review the applicable fees. You will receive a billing statement from the Agency regarding payment of fees. **Do not send a fee payment with the application.** Note that for new applications however, that although a billing statement will be mailed to new applicants allowing a certain time period to remit the payment, **the license will not be issued until the fee for the new application has been paid.** Therefore, prompt payment upon billing may avoid unnecessary delay in issuing a license. Questions concerning fees should be directed to the Radioactive Materials Licensing Section staff. The regulations also include a requirement for payment of an annual recovery/remediation fee for use in cases where such costs for decontamination/disposal cannot be recovered from the responsible parties or available financial assurance documents. **Note, the annual and remote site fees listed in Appendix F. of Part 331 are nonrefundable, and are assessed on a 12-month period.**

Item 19. Financial Assurance

Most portable device licensees will not be required to post financial assurance because they do not possess the radioactive material in quantities listed in 32 Ill. Adm. Code 326, which requires it. The licensee should review Part 326 to ensure they are not required to post financial assurance and indicate such on the application. Should the licensee possess activities requiring financial assurance, the applicant should reference the, "Guidance Document on Financial Assurance" available on the Agency's website.

Item 20. Certification

The application must contain an original signature and date by the applicant, if acting as an individual or by an individual who is authorized by management to sign on behalf of the licensee. A statement signed by facility management granting authority to sign license requests and related documents is required for applications not signed by an officer or the administrator of the facility. Unsigned applications will be returned for proper signature. For applications not from individuals the Federal Employers Identification Number (FEIN) should be included in the Certification block.

Submit an original and a copy of the application. Keep a copy of license for you use. More detailed instructions are in Section II. FILING AN APPLICATION

IV. LICENSE AMENDMENTS

It is the licensee's obligation to keep the license current. If any information in the original application is to be modified or changed, the licensee must submit an application for a license amendment before the change takes place. Licensees are required to conduct their programs in accordance with the regulations and statements, representations and procedures contained in the license application and supporting documents.

Applications for license amendments should be filed on the "Application Form for a Radioactive Material License Authorizing the Use of Sealed Sources in Portable Devices" or in letter form. The application must identify the license by number and clearly describe the exact nature of the changes, additions or deletions requested. Be sure to use the most recent guidance in preparing an amendment request. References to previously submitted information and documents must be clear and specific and identify the applicable information by date, page and paragraph. This documentation must also be maintained on file for inspection. An original and two copies of the application for amendment should be prepared. The original and one copy must be submitted and the licensee must retain one copy and all attachments with the license file. Licensees must conduct their program in accordance with their current license until said amendment is issued.

For all amendments that require a fee the licensee will be billed by the Agency. See Item 18. Fees for additional information regarding issuing amendments and receipt of fees.

V. LICENSE RENEWALS

If you intend to use radioactive material after the expiration date on your license, regulations require filing an application for license renewal with this office at least 30

days before the expiration date of your license. If the renewal application is timely filed prior to the expiration date, your license will remain in effect until the Agency takes final action regarding the application. This filing will ensure that the license does not expire until final action on the application has been taken by the Agency as provided for by 32 Ill. Adm. Code 330.330.

If you have a Reclamation Plan and Cost Estimate for financial assurance filed with the Agency, you must update these documents as part of your renewal application. Upon approval of the Cost Estimate, you may need to revise your financial assurance arrangement. If you do not submit a timely application to renew your license, see Section VI for License Termination.

COMPLETE RENEWAL APPLICATION

Renewal applications must be filed on the "Application Form for a Radioactive Material License Authorizing the Use of Sealed Sources in Portable Devices" (See Exhibit A) appropriately supplemented, contain complete and up-to-date information about the applicant's program and meet all licensing and regulatory requirements in effect at the time of renewal. Be sure to use the most recent guidance in preparing a renewal application. Applications should be submitted without reference to documentation and information submitted previously, except for previously approved users. If such references cannot be avoided, they are acceptable provided:

- a. The reference is made in response to a particular item of required information (e.g., radiation instrument calibration procedures);
- b. The reference is clear and specific (e.g., title of document, date of submission, page and paragraph); and
- c. The referenced document contains all information required for a particular item at the time of renewal.
- d. Any previous exemptions granted to the licensee must be resubmitted in their entirety.

Renewal applications should be submitted in accordance with the procedures outlined in Section II (Filing an Application) of these instructions.

EXPEDITED RENEWAL APPLICATION

In an effort to streamline the license renewal process, the Agency has implemented an Expedited Renewal option for all specific radioactive material licensees. If you choose the expedited option the Agency expects you to perform a comprehensive review of your program as in the past. However, you only need to submit for Agency review those changes that are desired by you to up-date your existing license to conform with existing licensed operations and facilities, regulatory requirements, informational notices, inspection and enforcement experience, etc.

After you identify the desired changes, complete the expedited renewal form “Expedited Renewal Application Form for a Radioactive Material License Authorizing the Use of Sealed Sources in Portable Devices” (See Exhibit A.1.). Attach all pertinent information pertaining to the desired changes and submit the form with attachments to the Agency. If no changes appear to be necessary or desired, indicate this on the Expedited Renewal Form, complete the remaining items, and submit it to the Agency. Submittal 120 days prior to expiration allows the Agency to review your application and potentially issue the renewed license prior to expiration of your existing license.

The Agency does not discourage licensees from submitting a complete renewal application as in the past. If there have been significant changes to the regulations, guidance, or your program since the last renewal, you should review the impact of these changes on your program and consider which renewal option to pursue. Periodically, the Agency will require the submittal of a complete renewal application to ensure that all program elements are current.

Licensees are subject to all applicable rules, regulations, representations and orders of the Agency and to any conditions specified on the license.

VI. LICENSE TERMINATIONS

A licensee may request termination of a radioactive material license at any time. To terminate a license, the licensee must meet the requirements of 32 Ill. Adm. Code 330.325, which include:

- Notify IEMA, in writing, within 30 days prior to the expiration date, when a decision is made to permanently cease licensed activities;
- Transfer or dispose of all licensed radioactive material in the licensee's possession in accordance with 32 Ill. Adm. Code 340;
- Certify the disposition/transfer of licensed materials by submission of IEMA Form KLM.007, "Certificate – Termination and Disposition of Radioactive Material," (see Exhibit C); and
- Perform radiation monitoring or the equivalent in accordance with 32 Ill. Adm. Code 330.325(b)(1)(F). Submit copies of the latest leak test results for each source possessed under the license. For sources designed to emit beta/gamma radiation the leak test results shall be within the previous six months and for sources designed to emit alpha radiation the leak test results shall be within the previous three months.
- Submit a record documenting that a licensee noted on KLM.007 received each source transferred.
- Pay any outstanding fee owed to IEMA.

The Agency reserves the right to perform confirmatory monitoring of licensed facilities prior to termination.

APPENDIX A

RETENTION OF DOCUMENTS

<u>Document</u>	<u>Retention Interval</u>
32 Ill. Adm. Code	Until termination of license
License, all active amendments and supporting documents (including the application)	Until termination of license
Annual Radiation Protection Program, ALARA Reviews and Audits	5 years
Surveys and Calibrations	5 years
Leak Test Results	5 years
Personnel Monitoring Results	Until the Agency terminates the license
Public Dose Records	Until the Agency terminates the license
Waste Disposal/Transfer	Until the Agency terminates the license
Inventories	5 years
Utilization Logs	Until record disposal is authorized by the Agency
Training and Testing Records	Until record disposal is authorized by the Agency or 3 years after termination of employment
Radiation Monitoring Records	5 years or until record disposal is authorized by the Agency if monitoring was used to determine an individual's exposure.
Receipt, Transfer and Disposal of Material	Until disposal is authorized by the Radioactive Agency

II. Records to be Maintained at Temporary Job Sites

<u>Document</u>	<u>Retention Interval</u>
License and Active Amendments	Until termination of job
Manufacturer's Instruction Manual for the Sealed Sources and Devices at the Temporary Job Site	Until termination of job
Licensee's Emergency Procedures	Until termination of job
Latest Leak Test Result	Until termination of job

Note other records are required to be maintained and are listed in the regulations. The above listing is for the most common records required to be maintained.

APPENDIX B

Portable Device Audit Checklist

Note: All areas indicated in audit notes may not be applicable to every license and may not need to be addressed during each audit.

Licensee's name: _____ License No. _____

Auditor Name: _____ Date of Audit: _____

Auditor Signature: _____ RSO Signature: _____

1. AUDIT HISTORY

- a. Last audit of this location conducted on (date) _____ .
- b. Were previous audits conducted annually? [32 Ill. Adm. Code 340.110(c)]
- c. Were records of previous audits maintained? [32 Ill. Adm. Code 340.1120]
- d. Were any deficiencies identified during the last two audits or two years, whichever is longer?
- e. Were corrective actions taken? (Look for repeated deficiencies)

2. ORGANIZATION AND SCOPE OF PROGRAM

- a. Does the licensee have a current copy of the license?
- b. If the designated contact person, mailing address, telephone, telefacsimile, email address or places of use changed, was the license amended?
- c. If ownership changed or bankruptcy was filed, was prior IEMA consent obtained or was IEMA notified?
- c. If the RSO was changed, was the license amended? Does the new RSO meet IEMA training requirements?
- d. Does the license authorize all of the IEMA-regulated radionuclides contained in the devices possessed?
- e. Does the licensee have the manufacturers' manuals for operation and maintenance for each model device possessed?
- f. Are the actual uses of devices consistent with the authorized uses listed on the license?
- g. Is the RSO fulfilling his/her duties?

3. TRAINING AND INSTRUCTIONS TO WORKERS

- a. Were workers instructed per 32 Ill. Adm. Code 400.120? Was refresher training provided, as needed?
- b. Did each device operator attend an approved course before using the devices?
- c. Are training records maintained for each device operator?
- d. Did interviews with operators reveal that they know the emergency procedures?
- e. Did this audit include observation of operators using the devices in a field situation? Operating device? Performing routine cleaning and lubrication? Transporting device? Storing device?
- f. Did the operator demonstrate safe handling and security during transportation, use and storage?
- g. Was HAZMAT training (required at least once every three years) provided as required? [49 CFR 172 Subpart H (172.700, 49 CFR 172.701, CFR 172.702, 49 CFR 172.703, 49 CFR 172.704)]

4. RADIATION SURVEY INSTRUMENTS

- a. If the licensee possesses its own survey instrument, does the instrument meet IEMA's criteria?
- b. If the licensee does not possess a survey instrument, are specific plans made to have one available?
- c. Is the survey instrument needed for non-routine maintenance calibrated as required? [32 Ill. Adm. Code 340.510(b)]
- d. Are calibration records maintained? [32 Ill. Adm. Code 340.1130]

5. DEVICE INVENTORY AND ACCOUNTABILITY

- a. Is a record kept showing the receipt of each device? [32 Ill. Adm. Code 310.40]
- b. Are all devices received physically inventoried every 6 months?
- c. Are records of inventory results with appropriate information maintained?
- d. Are records of use maintained (use logs)?

6. PERSONNEL RADIATION PROTECTION

- a. Are ALARA considerations incorporated into the radiation protection program? [32 Ill. Adm. Code 340.110(b)]
- b. Is documentation kept showing that unmonitored users receive less than 10 percent of the limit?

- c. Did unmonitored users' activities change during the year, which could put them over 10 percent of limit? If so, was a new evaluation performed?
- d. Is external dosimetry required (user receiving greater than 10 percent of the limit)? Is dosimetry provided to users?
- e. Is the dosimetry supplier NVLAP-approved? [32 Ill. Adm. Code 340.510(d)]
- f. Are the dosimeters exchanged monthly for film badges and at the industry-recommended frequency for TLDs and OSLs?
- g. Are dosimetry reports reviewed by the RSO when they are received?
- h. Are the records in accordance with IEMA forms 4 or 5 or equivalent? [32 Ill. Adm. Code 340.1160(c)]

- or -

Was IEMA-4 "Cumulative Occupational Exposure History" or equivalent completed?

- and -

Was IEMA-5 "Occupational Exposure Record for a Monitoring Period" or equivalent completed?

- i. If a worker declared her pregnancy, did licensee comply with 32 Ill. Adm. Code 340.280? Were records kept of embryo/fetus dose per 32 Ill. Adm. Code 340.1160(d)?
- j. Are records of exposures, surveys, monitoring, and evaluations maintained? [32 Ill. Adm. Code 340.1130, 340.1140, 340.1150, 340.1160, and 340.1170]

7. PUBLIC DOSE

- a. Are devices stored in a manner to keep doses below 100 mrem in a year? [32 Ill. Adm. Code 340.310(a)(3)]
- b. Has a survey or evaluation been performed per 32 Ill. Adm. Code 340.320? Have there been any additions or changes to the storage, security, or use of surrounding areas that would necessitate a new survey or evaluation?
- c. Do unrestricted area radiation levels exceed 2 mrem in any one-hour? [32 Ill. Adm. Code 340.310(a)(1)]
- d. Are devices being stored in a manner that would prevent unauthorized use or removal? [32 Ill. Adm. Code 340.810] Is the two-lock rule being implemented and enforced? [32 Ill. Adm. Code 340.810(g)]
- e. Are records maintained for public dose? [32 Ill. Adm. Code 340.1170]

8. OPERATING AND EMERGENCY PROCEDURES

- a. Are operating and emergency procedures being maintained?

- b. Do they contain the required elements?
- c. Does each operator have a current copy of the operating and emergency procedures, including current telephone numbers?

9. LEAK TESTS

- a. Was each sealed source leak tested every 6 months or at other prescribed intervals?
- b. Was the leak test performed as described in correspondence with IEMA and according to the license?
- c. Are records of results retained with the appropriate information included?
- d. Were any sources found leaking and if yes, was IEMA notified?

10. MAINTENANCE OF GAUGES

- a. Are manufacturer's procedures followed for routine cleaning and lubrication of the device?
- b. Does the source or source rod remain attached to the device during cleaning?
- c. Is non-routine maintenance performed where the source or source rod is detached from the device? If yes, was it performed according to license requirements (e.g., extent of work, individuals performing the work, procedures, dosimetry, survey instrument, compliance with 32 Ill. Adm. Code 340 Subpart C limits)?

11. TRANSPORTATION

- a. Were DOT-7A or other authorized packages used? [49 CFR 173.415, 49 CFR 173.416(b)]
- b. Are package performance test records on file?
- c. Are special form sources documented? [49 CFR 173.476(a)]
- d. Did the package have 2 labels (ex. Yellow-II) with TI, Nuclide, Activity, and Hazard Class? [49 CFR 172.403, 49 CFR 173.441]
- e. Was the package properly marked? [49 CFR 172.301, 49 CFR 172.304, 49 CFR 172.310, 49 CFR 172.324]
- f. Was the package closed and sealed during transport? [49 CFR 173.475(f)]
- g. Were shipping papers prepared and used? [49 CFR 172.200(a)]
- h. Did the shipping papers contain proper entries (Shipping name, Hazard Class, Identification Number (UN Number), Total Quantity, Package Type, Nuclide, RQ, Radioactive Material, Physical and Chemical Form, Activity, category of label, TI, Shipper's Name, Certification and Signature, Emergency Response Phone Number, Cargo Aircraft Only [if applicable])? [49 CFR 172.200, 49

CFR 72.201, 49 CFR 172.202, 49 CFR 172.203, 49 CFR 172.204, 49 CFR 172.604]

- i. Were the shipping papers within the driver's reach and readily accessible during transport? [49 CFR 177. 817(e)]
- j. Was the package secured against movement? [49 CFR 177. 834]
- k. Was the package secured against unauthorized access and removal?
- l. Was the vehicle placarded, if needed? [49 CFR 172.504]
- m. Were overpacks, if needed, used properly? [49 CFR 173.25]
- n. Were any incidents reported to DOT? [49 CFR 171.15, 16]

12. AUDITOR'S INDEPENDENT SURVEY MEASUREMENTS (IF MADE)

- a. Describe the type, location, and results of measurements. Do any radiation levels exceed regulatory limits?

13. NOTIFICATION AND REPORTS

- a. Were there any credible threats made? Were reports made? [32 Ill. Adm. Code 340.1205]
- b. Was any radioactive material lost or stolen? Were reports made? [32 Ill. Adm. Code 340.1210]
- c. Did any reportable incidents occur? Were reports made? [32 Ill. Adm. Code 340.1220]
- d. Did any overexposures or high radiation levels occur? Were they reported? [32 Ill. Adm. Code 340.1230]
- e. Were there any required notifications to individuals? Were they reported? [32 Ill. Adm. Code 340.1250]
- f. Were there any leaking or contaminated sources? Were they reported? [32 Ill. Adm. Code 340.1260]
- g. Were there any missing waste shipments? Were they reported? [32 Ill. Adm. Code 340.1270]
- h. If any events (as described in items a through h above) did occur, what was the root cause? Were the corrective actions appropriate?
- i. Is the licensee aware of the 24-hour telephone number for IEMA's Radiological Emergencies and Assistance? [(800) 782-7860 or (217) 782-7860]

14. POSTING AND LABELING

- a. Is KLM.001 "Notice to Workers" posted?

- b. Are IEMA regulations and license documents posted or is a notice posted stating where these documents are located?
- c. Is there any other posting and labeling, such as storage areas and containers? [32 Ill. Adm. Code 340.920].

15. RECORDKEEPING FOR WASTE TRANSFER/DISPOSAL

- a. Are records for waste transfer/disposal maintained? [32 Ill. Adm. Code 340.1180]

16. BULLETINS AND INFORMATION NOTICES

- a. Were any NRC/IEMA Information Notices received?
- b. Was appropriate training and action taken in response to the notices?

17. SPECIAL LICENSE CONDITIONS OR ISSUES

- a. Did the auditor review special license conditions or other issues (e.g., non-routine maintenance, such as removal of source rod from the device)?

18. DEFICIENCIES IDENTIFIED IN AUDIT; CORRECTIVE ACTIONS

- a. Summarize problems and/or deficiencies identified during the audit.
- b. If problems and/or deficiencies were identified in this audit, describe the corrective actions planned and taken. Are corrective actions planned and taken at ALL licensed locations (not just location audited)?
- c. Provide any other recommendations for improvement.

19. EVALUATION OF OTHER FACTORS

- a. Is senior licensee management appropriately involved with the radiation protection program and/or RSO oversight?
- b. Does RSO have sufficient time to perform his/her radiation safety duties?
- c. Does licensee have sufficient staff to support the radiation protection program?

APPENDIX C

GUIDE TO SI UNITS

RADIATION DOSE EQUIVALENT

OLD (<i>rem</i>)	NEW (<i>sievert</i>)
0.1 mrem	1 μ Sv
0.25	2.5
0.5	5
0.75	7.5
1.0 mrem	10 μ Sv
2.5	25
10 mrem	100 μ Sv (0.1 mSv)
100 mrem	1 mSv
500 mrem	5 mSv
1 rem	10 mSv
1.5 rem	15 mSv
5	50
10 rem	100 mSv
15 rem	150 mSv
50 rem	500 mSv
100 rem	1 Sv

AMOUNT OF RADIOACTIVE MATERIAL

OLD Ci (<i>curie</i>)	NEW Bq (<i>becquerel</i>)
1 pCi	37 mBq
27 pCi	1 Bq
1 nCi	37 Bq
27 nCi	1 kBq
1 μ Ci	37 kBq
27 μ Ci	1 MBq
1 mCi	37 MBq
27 mCi	1 GBq
1 Ci	37 GBq
27 Ci	1 TBq

SURFACE ACTIVITY LEVELS

μ Ci/cm ²	Bq/cm ² (kBq/m ²)
10 ⁻⁶	0.037 0.37
3 x 10 ⁻⁶	0.1 0.1
10 ⁻⁵	0.37 3.7
3 x 10 ⁻⁵	1 10
10 ⁻⁴	3.7 37
3 x 10 ⁻⁴	10 100
10 ⁻³	37 370
3 x 10 ⁻³	100 1000
10 ⁻²	370 3700

(1 m² = 10⁴ cm²)

CONVERSIONS	RADIATION DOSE RATES	DERIVED AIR CONCENTRATION (DAC)	CONCENTRATION IN SOLUTION
100 rem = 1 Sv		Units: Bq m ⁻³	μ Ci/l kBq/dm ³ (kBq/l)
100 rad = 1 Gy (gray)	μ Sv/h, mSv/h		1 37
1 ton = 1 Mg	e.g.,	Conversion:	10 370
1 ton = 1000 kg	7.5 μ Sv/h	μ Ci cm ⁻³ x 3.7 x 10 ¹⁰ = Bq m ⁻³	100 3700
1 kg = 1000 g	25 μ Sv/h	$\frac{\text{dpm m}^{-3}}{60} = \text{Bq m}^{-3}$	
1 MBq/ton = 1 Bq/g			1 m ³ = 10 ³ dm ³ = 10 ³ l or 10 ³ L 1 mBq/m ³ = 1 kBq/dm ³

PREFIXES FOR UNITS:

a	atto	10 ⁻¹⁸		k	kilo	10 ³	thousand
f	femto	10 ⁻¹⁵		M	mega	10 ⁶	million
p	pico	10 ⁻¹²	trillionth	G	giga	10 ⁹	billion
n	nano	10 ⁻⁹	billionth	T	tera	10 ¹²	trillion
μ	micro	10 ⁻⁶	millionth	P	peta	10 ¹⁵	
m	milli	10 ⁻³	thousandth	E	exa	10 ¹⁸	

APPENDIX D

Information Needed for Change of Ownership or Control by the Applicant

Licensees must provide full information and obtain IEMA's prior written consent before transferring ownership or control of the license or licensed radioactive material. Licensees must provide the following information concerning changes of ownership or control by the applicant (transferor and/or transferee, as appropriate). If any items are not applicable, licensees must so state.

1. The new name of the licensed organization. If there is no change, the licensee should so state.
2. The new licensee contact, telephone and telefacsimile number(s) and email address to facilitate communications.
3. Any changes in personnel having control over licensed activities (e.g., officers of a corporation) and any changes in personnel named in the license such as RSO, authorized users, or any other persons identified in previous license applications as responsible for radiation safety or use of licensed material. The licensee should include information concerning the qualifications, training, and responsibilities of new individuals.
4. An indication of whether the transferor will remain in non-licensed business without the license.
5. A complete, clear description of the transaction, including any transfer of stocks or assets, mergers, etc., so that legal counsel is able, when necessary, to differentiate between name changes, transferring control and changing ownership.
6. A complete description of any planned changes in organization, location, facility, equipment, or procedures (i.e., changes in operating or emergency procedures).
7. A detailed description of any changes in the use, possession, location, or storage of the licensed materials.
8. Any changes in organization, location, facilities, equipment, procedures, or personnel that would require a license amendment even without transferring control or changing ownership.
9. With regard to open inspection items, etc., the transferee should confirm, in writing, that it accepts full responsibility for open inspection items and/or any resulting enforcement actions; or the transferee proposes alternative measures for meeting the requirements; or the transferor provides a commitment to close out all such actions with IEMA before license transfer.

10. An indication of whether all records (e.g., calibrations, leak tests, surveys, inventories, and accountability requirements, etc.) will be current at the time of transfer. Provide a description of the status of all records.
11. Confirmation that all records concerning the safe and effective decommissioning of the facility; public dose; and waste disposal by release to sewers, incineration, radioactive material spills, and on-site burials, have been transferred to the new licensee, if licensed activities will continue at the same location, or to IEMA for license terminations.
12. A description of the status of the facility. Specifically, the presence or absence of contamination should be documented. If contamination is present, will decontamination occur before transfer? If not, does the successor company agree to assume full liability for the decontamination of the facility or site?
13. With regard to contamination of facilities and equipment, the transferee should confirm, in writing, that it accepts full liability for the site, and it should provide evidence of adequate resources to fund decommissioning; or the transferor should provide a commitment to decontaminate the facility before change of control or ownership.
14. A description of any decontamination plans, including financial assurance arrangements of the transferee. Note that new owners must obtain their own financial assurance arrangements. Include information about how the transferee and transferor propose to divide the transferor's assets, and responsibility for any cleanup needed at the time of transfer.
15. Confirmation that the transferee agrees to abide by all commitments and representations previously made to IEMA by the transferor. These include, but are not limited to: maintaining decommissioning records, implementing decontamination activities and decommissioning of the site, and completing corrective actions for open inspection items and enforcement actions.
16. A commitment by the transferee to abide by all constraints, conditions, requirements, representations, and commitments identified in the existing license. If not, the transferee must provide a description of its program, to ensure compliance with the license and regulations.
17. Documentation that the transferor and transferee agree to the change in ownership or control of the licensed material and activity, and the conditions of transfer; and the transferee is made aware of all open inspection items and its responsibility for possible resulting enforcement actions.
18. Identify any licenses or registrations for radioactive material already held by the transferee. If applicable, identify the regulating authority and license or registration number.

19. Identify any state or federal government licenses, registrations or authorizations already held by the transferee that are related to the same operations in which the radioactive material will be used. If applicable, identify the regulating authority and license or registration number.

If the transferee does not commit to the aforementioned information, they should apply for and obtain a new license instead of maintaining the transferor's license.

APPENDIX E

BASIC SUBJECTS TO BE COVERED DURING RADIATION SAFETY TRAINING

- I. Fundamentals of Radiation Safety
 - A. Characteristics of radiation
 - B. Units of radiation dose and quantity of radioactivity
 - C. Math and calculations basic to the use and measurement of radioactivity.
 - D. Significance of radiation dose
 - 1. Radiation protection standards
 - 2. The ALARA principle
 - 3. Biological effects of radiation
 - E. Levels of radiation from sources of radiation
 - F. Methods of controlling radiation dose
 - 1. Working time
 - 2. Working distance
 - 3. Shielding

- II. Radiation Monitoring
 - A. Use of radiation monitoring instruments
 - 1. Operation
 - 2. Calibration
 - 3. Limitations
 - B. Monitoring techniques
 - C. Use of personnel monitoring equipment
 - 1. Film badges
 - 2. Thermoluminescent Dosimeters (TLD)
 - 3. Optically Stimulated Luminescent Dosimeters (OSL)

- III. Safety Equipment to be Used
 - A. Remote handling equipment
 - B. Storage containers

- IV. The Requirements of Pertinent Federal and State Regulations and record maintenance

- V. Terms and Conditions of the License, Active Amendments and Any Correspondence Submitted in Support of the License Application

VI. The Licensee's Written Operating and Emergency Procedures

A. Storage Procedures

1. Temporary Job Locations
 - a. Surveillance
 - b. Security – two-lock rule [32 Ill. Adm. Code 340.810(g)]
 - c. Records
2. Permanent Storage Locations
 - a. Surveillance
 - b. Security – two-lock rule [32 Ill. Adm. Code 340.810(g)]
 - c. Records

B. Transportation Procedures

1. Shipping Papers
2. Labels and Markings
3. Certification of Packaging
4. Blocking and Bracing
5. Security
6. Utilization Log
7. Prevention of Accidents
8. Notification Due to Accident

C. Procedures for Source/Device Use

1. Limitations Regarding Repair and Maintenance (including cleaning)
2. Manufacturer's Instruction Manual
3. Testing for Leakage and/or Contamination (leak/wipe tests)
4. Prevention of Accidents
5. Notification Due to Accident

VII. Disposal of Source/Device

VIII. On-the-job training emphasizing radiation safety and including test runs of setting up and making measurements with the device, controlling and maintaining surveillance over the portable device, performing routine cleaning and lubrication, packaging and transporting the device, storing the device, and following emergency procedures.

IX. Course Examination

At least a 70-percent score on a 25-to-50-question, closed-book written test with emphasis on radiation safety of portable device storage, use, sealed source location, maintenance, and transportation, rather than the theory and art of making portable device measurements;

Review of correct answers to missed questions with prospective device user immediately following the scoring of the test.

Course Instructor Qualifications:

Instructor should have successful completion of portable device user course and 30 hours of hands-on experience with portable devices.

Note: Licensees shall maintain records of training.

APPENDIX F

DUTIES AND RESPONSIBILITIES OF THE RADIATION SAFETY OFFICER

Among the specific duties and responsibilities of the RSO are the following:

1. Assure that radioactive material possessed by the licensee conforms to the material authorized by the license. An up-to-date license is maintained and amendment and renewal requests are submitted in a timely manner.
2. Assure that only individuals authorized by the license use the radioactive material.
3. Instruct personnel in proper radiation protection practices and maintain training records.
4. Ensure licensed activities that the RSO considers unsafe are stopped.
5. Possession, use, storage, and maintenance of sources and devices are consistent with the limitations in the license, the Sealed Source and Device Registration sheet(s), and the manufacturer's recommendations and instructions.
6. Up-to-date operating and emergency procedures are developed, maintained, distributed, and implemented.
7. For applicants who perform their own maintenance, repair or analysis of test samples for leakage and/or contamination (leak/wipe tests), conduct radiation monitoring where indicated and keep records of such monitoring, including summaries of corrective measures recommended and/or instituted.
8. Ensure non-routine operations are performed by the manufacturer, distributor, or person specifically authorized by IEMA, NRC or an Agreement State.
9. Assure that personnel monitoring devices are used where indicated, exchanged at required intervals and that records are maintained of the results of such monitoring.
10. Investigate each known or suspected case of excessive or abnormal exposure to determine the cause and take steps to prevent its recurrence.
11. Documentation is maintained to demonstrate, by measurement or calculation, that the TEDE to the individual member of the public likely to receive the highest dose from the licensed operation does not exceed the annual limit in Part 340.310.

12. Be immediately available to serve as a point of contact with the Agency and give assistance in case of emergency (e.g., portable device damage, fire, theft, etc.).
13. Assure that the Radiation Protection Program is implemented, reviews are performed in accordance with the regulations and audits are performed at least annually and documented, and corrective actions are taken.
14. Unusual occurrences involving the device (e.g., accident, damage, etc.) are investigated, cause(s) and appropriate corrective action are identified, and corrective action is taken.
15. Assure that the proper authorities (i.e., IEMA, local police, U.S. Department of Transportation, etc.) are notified promptly in case of accident, damage, theft or loss of a portable device.
16. Assure that portable devices are properly secured against unauthorized removal at all times when they are not in use, including storage at temporary job sites.
17. Assure that the terms and conditions of the license (e.g., periodic leak/wipe tests, inventories, etc.) are met and that the required records (e.g., personnel exposure, leak/wipe test, accountability, inventory, etc.) are maintained and periodically reviewed for compliance with IEMA regulations and license conditions.
18. Assure that the portable devices are transported in compliance with all applicable IEMA and U.S. Department of Transportation regulations (e.g., labeling, marking, shipping papers, container blocking and bracing, etc.).
19. Posting of documents required by 32 Ill. Adm. Code 400.110: regulations, license and associated documents, operating procedures and notice of violation or order or posting a notice indicating where these documents can be examined. Licensees are also required to post Agency form KLA.001, "Notice to Employees".

APPENDIX F.1

PROVISION FOR DELEGATING DUTIES TO AUTHORIZED INDIVIDUALS

The Radiation Safety Officer may delegate certain duties to specified individuals provided that:

- A. The licensee maintains, for a period of 5 years, records of all individuals designated by the Radiation Safety Officer to perform duties or meet regulatory requirements that would otherwise be required as a duty of the Radiation Safety Officer. These records shall include:
 - 1. The name of the individual;
 - 2. A list of all duties the Radiation Safety Officer's designee is authorized to perform;
 - 3. The date upon which the designation became effective;
 - 4. The signature of the Radiation Safety Officer's designee; and
 - 5. The signature of the Radiation Safety Officer.

- B. The Radiation Safety Officer shall review records generated by designees and the performance of designees quarterly. In addition, the licensee shall maintain for Agency inspection for a period of 5 years, records of the quarterly reviews of records generated by designees and quarterly reviews of each designee's performance. These records shall include:
 - 1. The date of the review;
 - 2. The records being reviewed and the name of the designee being reviewed;
 - 3. A list of all duties performed by the designee;
 - 4. The results of the Radiation Safety Officer's review and any corrective measures taken, if applicable, based on the review; and
 - 5. The signature of the Radiation Safety Officer.

APPENDIX G

SAMPLE MINIMUM DETECTABLE ACTIVITY CALCULATIONS

Several references contain discussions of counting statistics for radiation measurements. For purposes of this guide, the discussion contained in NCRP Report No. 58 appears to be the simplest to use. The formula the Agency recommends is the one for determining a measurement at the 95% confidence level. The formula for this level is:

$$LLD = \frac{2.71 + 4.65\sqrt{B}}{EFF}$$

where:

LLD = Lower Limit of Detection (dpm, divide by 2.2 E+6 for μ Ci)
B = Background count and
EFF = Counting efficiency.

For the above formula the sample counting time and background counting time must be one minute each. The counting efficiency must be determined by using a standard source of known activity that emits photons of approximately the same energy as the contaminant to be detected. The counting rate for the standard is divided by the standard activity to determine the counting efficiency. When dividing, the two values must be in compatible units. For example, a standard activity in μ Ci must be converted to dpm by multiplying by a factor of 2.2E+6.

For a copy of the full discussion of the theory and limitations of this test, refer to pages 307-311 in NCRP Report No. 58, A Handbook of Radioactivity Measurement Procedures, issued February 1, 1985 by the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814.

APPENDIX H

METHOD FOR CALIBRATING RADIATION MONITORING INSTRUMENTS

1. Application For a Licensee to Perform Radiation Monitoring Instrument Calibrations

When radioactive material is used to calibrate radiation monitoring instruments, the person or organization performing the calibration must be specifically authorized by the Agency, the U.S. Nuclear Regulatory Commission or an Agreement State.

An application for a licensee to perform radiation monitoring instrument calibrations should contain the following information:

- a. The manufacturer's name and model of the source(s) and the manufacturer's name and model of the calibration instrument to be used.
 - b. The radionuclide and activity of the radioactive material contained in the source(s).
 - c. The accuracy of the source(s) activity; documentation that the determination of each source activity is traceable to the National Institute of Standards and Technology - NIST (previously National Bureau of Standards - NBS).
 - d. A description of the facilities to be used.
 - e. The name and applicable experience of each individual who will perform the calibrations.
 - f. Calculations related to the calibration procedures.
 - g. The step-by-step calibration procedures, including associated radiation safety procedures.
 - h. Copies of records that will be maintained (see Item 4).
 - i. Verification that the requirements outlined in this appendix will be followed.
- #### 2. Recommended Methods For Calibration of Radiation Monitoring Instruments

The calibration of radiation monitoring instruments shall be performed in accordance with the following:

- a. The radionuclide sources used for calibration shall approximate point sources.
- b. The source activities shall be traceable* within $\pm 5\%$ accuracy to the NIST calibrations.**
- c. The frequency of calibration shall be as specified in 32 Ill. Adm. Code 340.540 (before first use, at intervals not to exceed one year and after servicing/repair that affects the calibration).
- d. Each scale of the radiation monitoring instrument shall be calibrated at least at two points such that: (a) one point is in each half of the scale; and (b) the two points are separated by 50-60% of full scale. Logarithmic and digital readout radiation monitoring instruments with only a single readout scale shall be calibrated, at a minimum, at one point near the midpoint of each decade.
- e. The exposure rate measured by the radiation monitoring instrument should not deviate more than $\pm 10\%$ from the calculated or known value for each point checked. (Read appropriate section of the radiation monitoring instrument manual to determine how to make necessary adjustments to bring the radiation monitoring instrument into calibration.) Readings within $\pm 20\%$ will be considered acceptable if a calibration chart or graph is prepared and attached to the radiation monitoring instrument. If the radiation monitoring instrument cannot be adjusted so that each reading falls within the $\pm 20\%$ range, it shall be taken out of service and sent to the manufacturer or to a qualified radiation monitoring instrument laboratory for repair.

* For purposes of this document, the amount of radioactivity in a source is said to be traceable to a national standard when its radioactivity was determined by comparison with a source of the same radionuclide (or a proper simulated source, isotopically) the activity of which is certified by the NIST.

** In lieu of using a traceable radioactive source, a transfer instrument traceable to the NIST, within $\pm 5\%$, may be used as an alternative standard. For purposes of this document, a transfer instrument shall meet the definition as contained in the American National Standard Institute publication, ANSI N323A-1997, "American National Standard Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments."

NOTE: Sources of cobalt-60, cesium-137, or radium-226 are appropriate for use in calibrations. The radioactivity of the calibration standard should be sufficient to calibrate the

radiation monitoring instruments on all ranges, or at least up to 1 Roentgen per hour on the higher range radiation measurement instruments. If there are higher ranges, they should be checked for operation and approximately correct response to radiation.

- f. If an electronic device, such as a pulse generator, is used to calibrate instruments, the instrument with detector must be checked for response to a known source of radiation.

3. Use of a Reference Check Source for Operational Checks

A reference check source of a long half-life (e.g., greater than five years) shall be used to obtain a radiation monitoring instrument response by the licensee. The reading shall be taken with the check source placed in a specific geometry relative to the detector and:

- a. Shall be taken before use on each day the instrument is used;
- b. Shall be taken after calibration by the licensee or after return to the licensee of a radiation monitoring instrument sent for calibration by a specifically licensed firm authorized to perform radiation monitoring instrument calibrations as a customer service;
- c. Shall be taken after maintenance and/or each battery change; and
- d. Shall be taken at least quarterly.

If any operational check reading using the reference check source, with the same geometry, is not within $\pm 20\%$ of the reading measured immediately after calibration (or upon receipt from a calibration firm), the radiation monitoring instrument shall be removed from service and recalibrated.

4. Records

Records for Items 2, 3.b and 3.c, of this procedure shall be maintained.

- a. Records for Item 2 shall include, at a minimum:
 - 1) Radionuclide used;
 - 2) Activity and assay date of source;
 - 3) Present activity;
 - 4) Calculated and measured radiation values, including the percent of difference;
 - 5) Respective distance from source for each calculated and measured radiation value;

- 6) Necessary scale correction factors (required if calculated and measured radiation values do not agree within $\pm 10\%$);
 - 7) Make, model and serial number of radiation monitoring instrument being calibrated;
 - 8) Name of individual performing the calibration; and
 - 9) Date radiation monitoring instrument calibration was performed.
- b. Records for Items 3.b and 3.c, of this procedure shall include, at a minimum:
- 1) Radionuclide used;
 - 2) Activity and assay date of the radionuclide used;
 - 3) Reading of check source at time of calibration;
 - 4) Geometry of check source relative to detector (position);
 - 5) Date of calibration;
 - 6) Make, model and serial number of the radiation monitoring instrument;
 - 7) Date reference check was performed; and
 - 8) Name of individual who performed the reference check.

5. Use of Inverse Square Law and Radioactive Decay Law

- a. A calibrated source will have a calibration certificate giving its output at a given distance measured on a specific date by the manufacturer or National Institute of Standards and Technology (NIST).
- 1) The Inverse Square Law may be used with any point source to calculate the exposure rate at other distances.
 - 2) The Radioactive Decay Law may be used to calculate the output at other times after the specified date.

b. INVERSE SQUARE LAW:

$$S \quad (R_1) \quad (R_2)$$

$$* \quad - \quad - \quad - \quad P_1 \quad \text{-----} \quad P_2$$

Exposure rate at P2:

$$R_2 = \frac{(P_1)^2 \times (R_1)}{(P_2)^2}$$

where:

S is the point source

R_1 and R_2 are the exposure rates at P_1 and P_2 in the same units (e.g., mR/hr or R/hr).

P_1 and P_2 are the distances from the point source in the same units (e.g., centimeters, meters, feet, etc.)

c. RADIOACTIVE DECAY LAW:

$$R_t = R_o e^{-(0.693 t / T_{1/2})}$$

where:

R_o and R_t are in the same units (e.g., mR/hr or R/hr)

R_o is exposure rate on specified calibration date (i.e., time zero)

R_t is exposure rate "t" units of time later

$T_{1/2}$ and t are in the same units (e.g., years, months, days, etc.)

$T_{1/2}$ is the half-life of the radionuclide

t is the time elapsed between the source calibration (assay) date and the radiation monitoring instrument calibration date (i.e., present time)

d. Example: Source output is given by calibration certificate as 100 mR/hr at 1 foot on December 10, 2008. Radionuclide half-life is 5.27 years.

Question: What is the output at 3 feet on December 10, 2010 (2.0 years later)?

1) Output at 1 foot, 2.0 years after calibration date:

$$R_{(1 \text{ ft})} = 100 \text{ mR/hr } [\exp^{-(0.693 \times 2.0)/5.27}]$$

$$= 100 \text{ mR/hr } (0.77)$$

$$= 77 \text{ mR/hr at 1 foot on December 10, 2010}$$

2) Output at 3 feet, 2.0 years after calibration date:

$$R_{(3\text{ ft})} = \frac{(1\text{ foot})^2}{(3\text{ feet})^2} (77\text{mR} / \text{hr})$$

$$= 1/9 (77 \text{ mR/hr})$$

$$= 8.6 \text{ mR/hr at 3 feet on December 10, 2010}$$

APPENDIX I

GUIDANCE FOR DEMONSTRATING THAT INDIVIDUAL MEMBERS OF THE PUBLIC WILL NOT RECEIVE DOSES EXCEEDING THE ALLOWABLE LIMITS

Licensees must ensure that:

- The radiation dose received by individual members of the public does not exceed 1 millisievert (1 mSv) [100 millirems (100 mrem)] in one calendar year resulting from the licensee's possession and/or use of licensed materials.
- The radiation dose in unrestricted areas does not exceed 0.02 mSv (2 mrem) in any one hour.

Licensees must show compliance with the regulations. Calculations or a combination of calculations and measurements (e.g., using an environmental TLD) are often used to prove compliance.

Members of the public include persons who live, work, or may be near locations where portable devices are used or stored. Employees whose assigned duties do not include the use of licensed materials but who work in the vicinity where devices are used or stored are considered members of the public.

Typical unrestricted areas may include offices, shops, laboratories, areas outside buildings, property, nonradioactive equipment storage areas, and occupied areas of personal residences. The licensee does not control access to these areas for purposes of controlling exposure to radiation or radioactive materials. However, the licensee may control access to these areas for other reasons such as security.

CALCULATIONAL METHOD*

The calculational method takes a realistic approach, assuming use/storage situations most likely to occur in the work place. Conservative assumptions should be used when performing the calculations. The calculations make the following simplifications: (1) each device is a point source; (2) typical radiation levels are taken from either the Sealed Source & Device (SSD) Registration Sheet or the manufacturer's literature; and (3) no credit is taken for any shielding found between the devices and the unrestricted areas.

*For ease of use by most portable device licensees, the examples in this appendix use conventional units. The conversions to SI units are as follows: 1 ft = 0.305 m; 1 mrem = 0.01 mSv.

The calculations use the hourly exposure rates measured from the device or as stated by the manufacturer in the Sealed Source and Device Registry and considers the distance and the amount of time that both the device and the affected member of the public are present. Using this approach, licensees make only those calculations that are needed to demonstrate compliance. Note that worst case scenarios should be used in the calculations (e.g., If the devices are in the office as opposed to out in the field during certain parts of the year then those time frames should be used in the calculations.) Licensees can perform additional calculations as storage/use scenarios change throughout the year. The results of these calculations provide a method for estimating conservative doses that could be received. Note that the following is merely an example and that the licensee needs to use exposure rates, time frames and distances that are relative to their own operations.

Example 1

To better understand the calculational method, we will look at Moisture-Density Measurements, Inc., a portable gauge licensee. Yesterday, the company's president noted that the new gauge storage area is very close to his secretary's desk and he asked Joe, the Radiation Safety Officer (RSO), to determine if the company is complying with IEMA regulations.

The secretary's desk is near the wall separating the reception area from the designated, locked, gauge storage area, where the company stores its three gauges. Joe measures the distances from each gauge to the wall and looks up in the manufacturer's literature the radiation levels that individuals are expected to encounter for each gauge. Figure I.1 is Joe's sketch of the areas in question, and Table I.2 summarizes the information Joe has on each gauge.

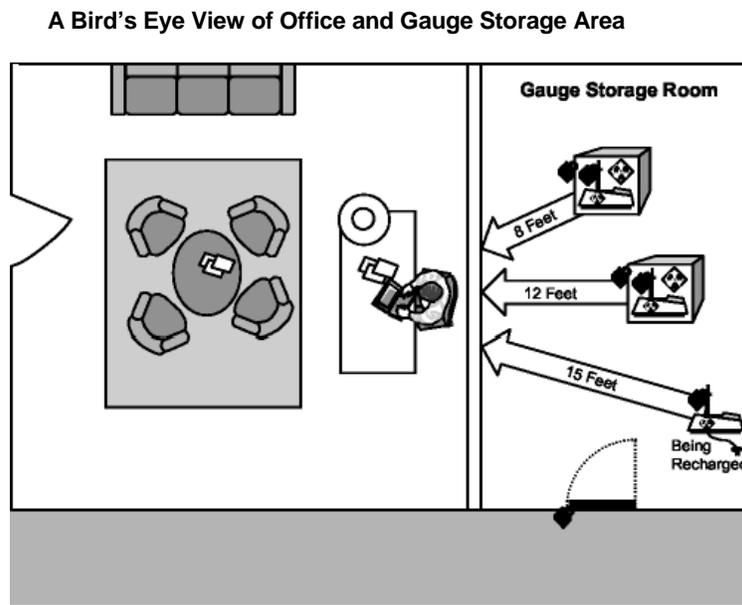


Figure I.1 Diagram of Office and Gauge Storage Area.

Table I.2 Information Known about Each Gauge

DESCRIPTION OF KNOWN INFORMATION	GAUGE 1	GAUGE 2	GAUGE 3
How gauge is stored	Gauge in transport container	Gauge in transport container	Gauge out of transport container and being recharged
Dose rate in mrem/hr encountered at specified distance from the gauge (from manufacturer's literature)	2 mrem/hr at 1 ft	8 mrem/hr at 1 ft	2 mrem/hr at 3 ft
Distance in ft to secretary's chair	8 ft	12 ft	15 ft

INFORMATION ON WHEN GAUGES ARE PRESENT IN THE STORAGE AREA:

GAUGE 1: an old gauge located in the storage area continuously (24 hours per day).

GAUGE 2: a new gauge located in the storage area continuously (24 hours per day) for 32 weeks of the year; for the remaining 20 weeks of the year it is at temporary job sites.

GAUGE 3: a new gauge located in the storage area overnight; it is used every day at temporary job sites all year and returned to the storage location at the end of each day. The gauge is usually present during the secretary's first and last hours of work each day.

INFORMATION FROM THE EXAMPLE ON WHEN THE SECRETARY IS SITTING AT THE DESK:

- 5 hours per day
- 3 days per week
- 50 weeks per year

Table I.3. Calculational Method, Part 1 – Hourly and Annual Dose Received from Gauge 1

Step No.	Description	GAUGE 1	
		Input Data	Results
1	Dose received in an hour at known distance from gauge (e.g., from manufacturer's data), in mrem/hr.	2	2
2	Square of the distance (ft) at which the Step 1 rate was measured, in ft ² .	(1) ²	1
3	Square of the distance (ft) from the gauge to the secretary's desk in an unrestricted area, in ft ² .	(8) ²	64
4	Multiply the results of Step 1 by the results of Step 2 (this is an intermediate result).	2 x 1 = 2	
5	Divide the result of Step 4 by the result of Step 3 to calculate the dose received by an individual at the secretary's desk = HOURLY DOSE RECEIVED FROM GAUGE 1, in mrem in an hour.	2/64 = 0.031	
6	Multiply the result of Step 5 by 5 hours/ day x 3 days/ week x 50 weeks/year = MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGE 1, in mrem in a year.	0.031 x 5 x 3 x 50 = 93 mrem/year	

Table I.4. Calculational Method, Part 1 – Hourly and Annual Dose Received from Gauge 2

Step No.	Description	GAUGE 2	
		Input Data	Results
1	Dose received in an hour at known distance from gauge (e.g., from manufacturer's data), in mrem/hr.	8	8
2	Square of the distance (ft) at which the Step 1 rate was measured, in ft ² .	(1) ²	1
3	Square of the distance (ft) from the gauge to the secretary's desk in an unrestricted area, in ft ² .	(12) ²	144
4	Multiply the results of Step 1 by the results of Step 2 (this is an intermediate result).	8 x 1 = 8	
5	Divide the result of Step 4 by the result of Step 3 to calculate received in an hour by an individual at the secretary's desk = HOURLY DOSE RECEIVED FROM GAUGE 2, in mrem in an hour.	8/144 = .056 dose	
6	Multiply the result of Step 5 by 5 hours per day x 3 days per week x 32 weeks/year = MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGE 2	0.056 x 5 x 3 x 32 = 26.9 mrem	

Table I.5. Calculational Method, Part 1 – Hourly and Annual Dose Received from Gauge 3

		GAUGE 3	
Step No.	Description	Input Data	Results
1	Dose received in an hour at known distance from gauge (e.g., from manufacturer’s data), in mrem/hr.	2	2
2	Square of the distance (ft) at which the Step 1 rate was measured, in ft ² .	(3) ²	9
3	Square of the distance (ft) from the gauge to the secretary’s desk in an unrestricted area, in ft ² .	(15) ²	225
4	Multiply the results of Step 1 by the results of Step 2 (this is an intermediate result).	2 x 9 = 18	
5	Divide the result of Step 4 by the result of Step 3 to calculate dose received by an individual at the secretary’s desk = HOURLY DOSE RECEIVED FROM GAUGE 3, in mrem in an hour.	18/225 = 0.08	
6	Multiply the hourly dose received by the number of hours per year the secretary is exposed to the gauge (e.g., 2 hours/day and 3 days/week x 50 weeks/year= MAXIMUM ANNUAL DOSE RECEIVED FROM	0.08 x 2 x 3 x 50 = 24 mrem/year	

To determine the total hourly and total annual dose received, Joe adds the pertinent data from the preceding tables.

Table I.6. Calculational Method, Part 1 – Total Hourly and Annual Dose Received from Gauges 1, 2, and 3

Step No.	Description	Gauge 1	Gauge 2	Gauge 3	Sum
7	TOTAL HOURLY DOSE RECEIVED from Step 5 of Tables I.3, I.4, and I.5, in mrem in an hour.	0.031	0.056	0.08	0.167
8	TOTAL ANNUAL DOSE RECEIVED from Step 6 of Tables I.3, I.4, and I.5, in mrem in a year.	93	26.9	24	143.9

NOTE: The Sum in Step 7 demonstrates compliance with the 2 mrem in any one hour limit. Reevaluate if assumptions change. Since the Sum in Step 8 exceeds 100 mrem/yr, personnel monitoring is required.

Since the result in Step 8 exceeds 100 mrem/yr, then the licensee could have done one or more of the following:

- Consider whether the assumptions used to determine occupancy and the time each gauge is in storage are accurate, revise the assumptions as needed, and recalculate using the new assumptions;
- Calculate the effect of any shielding located between the gauge storage area and the secretarial workstation (see Combination method below);
- Take corrective action to increase the distance from the individual to the gauge storage area (e.g., move gauges within storage area, move the storage area, move the secretarial workstation) and perform new calculations to demonstrate compliance.

Note that in the example, the unrestricted area outside only one wall of the gauge storage area was calculated. Licensees also need to make similar evaluations for each unrestricted area, (i.e., above, beside and below the storage area) and to keep in mind the ALARA principle, taking reasonable steps to keep radiation dose received below regulatory requirements. In addition, licensees need to be alert to changes in situations (e.g., moving any of the gauges closer to the secretarial workstation, adding gauges to the storage area, or changing the estimate of the portion of time spent at the desk or longer storage periods) and to perform additional evaluations, as needed.

RECORDKEEPING: 32 Ill. Adm. Code 340.1170 requires licensees to maintain records demonstrating compliance with the dose limits for individual members of the public.

COMBINATION MEASUREMENT – CALCULATIONAL METHOD

This method, which allows the licensee to take credit for shielding between the gauge and the area in question, begins by measuring radiation levels in the areas, as opposed to using manufacturer-supplied rates at a specified distance from each gauge. These measurements must be made with calibrated survey meters sufficiently sensitive to measure background levels of radiation. A maximum dose of 1 mSv (100 mrem) received by an individual over a period of 2080 hours (40 hours per week for 52 weeks per year is equal to less than 0.5 microsievert (0.05 mrem) per hour.

Instruments used to make measurements for calculations must be sufficiently sensitive. An instrument equipped with a scintillation-type detector (e.g., NaI (Tl)) or a micro-R meter used in making very low gamma radiation measurements should be adequate.

Licensees may also choose to use environmental TLDs in unrestricted areas next to the gauge storage area for monitoring. This direct measurement method would provide a definitive measurement of actual radiation levels in unrestricted areas without any restrictive assumptions. Records of these measurements can then be evaluated to ensure that rates in unrestricted areas do not exceed the 1 mSv/yr (100 mrem/yr) limit.

Example 2

As in Example 1, Joe is the RSO for Moisture-Density Measurements, Inc., a portable gauge licensee. The company has three gauges stored in a designated, locked storage area that adjoins an unrestricted area where a secretarial workstation is located. See Figure I.1 and Table I.2 for information. Joe wants to see if the company complies with the public dose limits at the secretarial station.

During the winter, while all the gauges were in storage, Joe placed an environmental TLD badge in the secretarial workspace for 30 days. Joe chose a winter month so he did not have to keep track of the number of hours that each gauge was in the storage area. The TLD processor sent Joe a report indicating the TLD received 100 mrem.

Table I.10. Combination Measurement – Calculational Method

PART 1		
Step No.	Description	Input Data and Results
1	Dose received by TLD, in mrem.	100
2	Total hours TLD exposed.	24 hr/d x 30 d/mo = 720
3	Divide the results of Step 1 by the results of Step 2 to determine HOURLY DOSE RECEIVED, in mrem in an hour.	0.14
4	Multiply the results of Step 3 by 365 days per year x 24 hours per day = 8760 hours in one year = MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGES, in mrem in a year.	365 x 24 x 0.14 = 8760 x 0.14 = 1226

NOTE: For the conditions described above, Step 3 indicates that the dose received in any one hour is less than the 2 mrem in any one-hour limit. However, if there are any changes, then the licensee would need to reevaluate the potential doses that could be received in any 1 hour. Step 4 indicates that the annual dose received would be much greater than the 100 mrem in a year allowed by the regulations.

PART 2

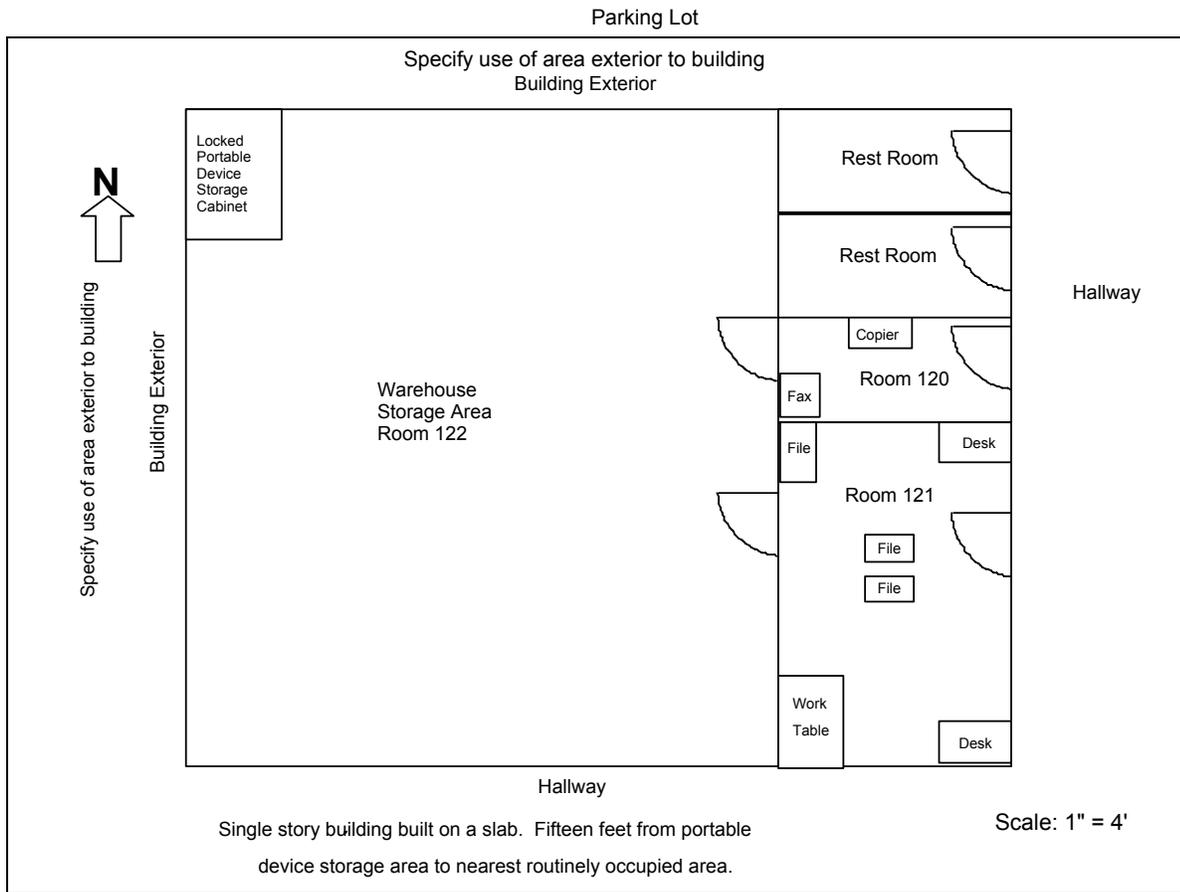
At this point Joe can adjust for a realistic estimate of the time the secretary spends in the area as he did in Part 2 of Example 1.

PART 3

If the results of Joe's evaluation in Part 2 show that the annual dose received in a year exceeds 100 mrem, then he can make adjustments for realistic estimates of the time spent in the area of concern while the gauges are actually in storage as in Part 3 of Example 1. (Recall that the TLD measurement was made while all the gauges were in storage, i.e., 24 hours per day for the 30 days that the TLD was in place.)

APPENDIX J

SAMPLE FACILITY DIAGRAM



Warehouse storage area

APPENDIX K

SAMPLE PROCEDURE FOR ORDERING, RECEIVING AND SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIAL

1. The Radiation Safety Officer (RSO) or qualified designee must approve or place all orders for radioactive material and must ensure that the requested material, quantities, manufacturer and model are authorized by the license and that possession limits are not exceeded.
2. During normal working hours, the RSO or designee must be notified immediately upon delivery of radioactive packages. The packages must be taken to the radioactive material storage area for inspection.
3. During off-duty hours, security or other designated trained personnel must accept delivery of radioactive packages in accordance with the procedure outlined in the sample memorandum below.

SAMPLE MEMORANDUM

MEMORANDUM FOR: Security Personnel

FROM: John Jones, Administrator

SUBJECT: RECEIPT OF PACKAGES CONTAINING
RADIOACTIVE MATERIAL

If the package appears to be damaged, immediately contact the facility's RSO. Ask the carrier to remain at the facility until it can be determined that neither the carrier nor the vehicle is contaminated.

Any packages containing radioactive material that arrive outside normal working hours shall be signed for by the Security guard or other designated trained individual on duty and taken immediately to the designated portable device storage area/room. Unlock the door, place the package in the designated secured storage area and relock the door.

RADIATION SAFETY OFFICER (RSO): _____

OFFICE PHONE: _____

CELL PHONE: _____

ILLINOIS EMERGENCY MANAGEMENT AGENCY 24-HOUR PHONE:
(217) 782-7860

For packages received under the specific license, authorized individuals shall implement procedures for opening each package as follows:

1. Visually inspect the package for any sign of damage (e.g., crushed). If damage is noted, stop and notify the Radiation Safety Officer (RSO). Accordingly, the licensee should implement their emergency procedures and obtain technical assistance from the Agency and arrange for a timely evaluation of the source integrity following receipt of a damaged package.
2. If there is evidence of degradation of package integrity, such as a package that is crushed or damaged, the monitoring for radiation levels and leakage shall be performed as soon as practicable after receipt of the package, but not later than three (3) hours after the package is received at the licensee's facility if it is received during the licensee's normal working hours; or if received outside normal working hours, no later than three (3) hours after the beginning of the next business day.
3. Open the outer package, if applicable, (following supplier's directions if provided) and remove packing slip to verify contents (compare requisition, packing slip and device label). Check integrity of the device (inspecting for damage). Check also that the shipment does not exceed license possession limits or differ in the form, type, manufacturer, model, etc. as that authorized by the radioactive material license. If anything is other than expected, stop and notify the RSO.
4. Place the portable device in its transportation container or package in the designated secured storage area.
5. Maintain records of receipt.

Appendix L

GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL AND SECURITY REQUIREMENTS

1. Each individual using the portable device will complete the training requirements prior to operation of the device.
2. Before removing the portable device from its place of storage, and for gauges with a movable rod containing a sealed source, the source rod is locked (e.g., keyed lock, padlock, mechanical control) in the shielded position, then lock the transport case.
3. For portable gauges, use a minimum of two independent physical controls that form tangible barriers to secure portable gauges from unauthorized removal whenever the portable gauges are not under the licensee's direct control and constant surveillance (i.e., in storage). When the portable gauge is not in use at a temporary job site, place the portable gauge in a secured storage location with two independent physical controls. Examples of two independent physical controls are: 1) securing the portable gauge in a locked storage facility located in a separate secured area in a warehouse; 2) securing the portable gauge inside a locked van and secured to the vehicle with a steel cable; 3) or storing the portable gauge inside a locked, non-removable box and further securing the box with a steel cable or chain. If chains or cables are used as a method of providing security, the locks, cables and chains must be physically robust enough to provide both a deterrence and a reasonable delay mechanism. Log the gauge into the daily use log when it is returned to storage.
4. The portable device must be stored and used in a manner to minimize the amount of radiation exposure to the operator and each individual in its vicinity.
5. The sample utilization log located in Appendix M of Instructional Set 65.0, Revision 2, April 2006 will be completed each time the portable device is moved and/or used and will be completed to document the physical inventory or a utilization log containing equivalent information will be used.
6. Only an approved transport container will be used to transport the portable device and it will be properly labeled and marked and containers will be braced, blocked and locked. Shipping papers will be completed and kept with the driver when transporting the portable device.
7. When transporting the device, fully secure the portable device within the vehicle and away from the passenger compartment or if transported in an open-bed vehicle, the portable device must be properly secured/locked to the vehicle. Use a minimum of two independent physical controls that form tangible barriers with

- locks to secure portable gauges from unauthorized removal. Block and brace the device to prevent movement during transport and follow all applicable Department of Transportation (DOT) requirements when transporting the device.
8. Use the device according to the manufacturer's instructions and recommendations.
 9. Do not touch the unshielded source or source rod near the source with your fingers, hands, or any part of your body and do not place hands, fingers, feet, or other body parts in close proximity to an unshielded source.
 10. Unless absolutely necessary, do not look under the gauge when the source rod is being lowered into the ground. If you must look under the gauge to align the source rod with the hole, follow the manufacturer's procedures to minimize radiation exposure.
 11. After completing each measurement in which the source is unshielded, immediately return the source to the shielded position and lock the handle.
 12. A portable device must be under the control and constant surveillance of an authorized user unless the device is secured from unauthorized access (e.g., locked within a room or transport vehicle (i.e., at a temporary job site) to which only authorized users have access). Note that a portable device locked within a hotel room where hotel personnel have access is not considered secured. During use of the device take action necessary to protect the device and yourself from danger of moving heavy equipment.
 13. Always keep unauthorized persons away from the gauge.
 14. Personnel monitoring devices, if required by the regulations or the radioactive material license, shall be worn during use of the portable device and shall not be worn during other non-occupational radiation exposure (e.g., medical or dental x-rays, etc.). They must be worn at chest or waist level where the highest exposure is expected. Each personnel monitoring device shall be assigned to only one individual and shall not be shared. They shall be stored in a low background area away from the radioactive material storage area. They shall not be stored in areas subject to extreme environmental conditions (e.g., a car during weather extremes).
 15. The source holder shall be locked in the "off" or closed position when the device is not in use.
 16. Sealed sources shall not be opened or removed from their source holders by the licensee.
 17. The licensee shall conduct routine cleaning of the device only in accordance with the manufacturer's instructions. Maintenance/repair involving dismantling,

- removal of sources or source holders, etc., must be performed only by the manufacturer or other persons specifically authorized to perform such services by the Agency, the U.S. Nuclear Regulatory Commission, or another Agreement State.
18. Current copies of the following documents shall be maintained at temporary job sites for Agency inspection:
 - a) The license, including all active amendments;
 - b) Manufacturer's instruction manual for the sealed sources and devices at the temporary job site;
 - c) The licensee's emergency procedures; and
 - d) The results of the latest test for leakage and/or contamination performed on the sealed source.
 19. Return the gauge to its proper locked storage location at the end of the work shift.
 20. If gauges are used for measurements with the unshielded source extended more than 3 feet beneath the surface, use piping, tubing, or other casing material to line the hole from the lowest depth to 12 inches above the surface. If the piping, tubing, or other casing material cannot extend 12 inches above the surface, cap the hole liner or take other steps to ensure that the hole is free of debris (and it is unlikely that debris will re-enter the cased hole) so that the unshielded source can move freely (e.g., use a dummy probe to verify that the hole is free of obstructions).

APPENDIX N

EMERGENCY PROCEDURES

1. Implement the following in the event of physical damage to a portable device:
 - a. Evaluate the situation to determine if any individuals have been exposed to radiation. If individuals are suspected to be contaminated, care for life threatening injuries first, then notify emergency personnel and the hospital staff about possible radioactive material contamination.
 - b. Secure the area around the portable device using a radius of at least 15 feet from the portable device. Maintain direct surveillance to protect against unauthorized entry into the area. Portable device users and other potentially contaminated individuals should not leave the scene until emergency assistance arrives, but should stand outside of the 15 foot radius unless medical reasons take priority.
 - c. As soon as possible, notify the Radiation Safety Officer and the Illinois Emergency Management Agency at (217) 782-7860 in accordance with 32 Ill. Adm. Code 340.1220. The licensee should obtain technical assistance from the Agency and arrange for a timely evaluation of the source integrity following an incident.
 - d. Evaluate the potential for contamination (if any) of any vehicle or equipment involved. Do not move the vehicle or equipment until the extent of contamination has been determined.
 - e. Visually inspect the portable device to determine whether any damage to the source housing or shield has occurred. Do not move the portable device until the extent of contamination has been determined.
 - f. If gauges are used for measurements with the unshielded source extended more than 3 feet below the surface, contact persons listed on the emergency procedures need to know the steps to be followed to retrieve a stuck source and to convey those steps to the staff on site.
2. Notify the Radiation Safety Officer and the Illinois Emergency Management Agency (IEMA) at (217) 782-7860 in accordance with 32 Ill. Adm. Code 340.1210 in the event of stolen, lost or missing sources of radioactive material. IEMA notification is required when portable devices containing licensed material are lost or stolen, when devices are damaged or involved in incidents that result in doses in excess of 32 Ill. Adm. Code 340.310 limits, and when it becomes apparent that attempts to recover a source stuck below the surface will be unsuccessful.

APPENDIX O

TESTING SEALED SOURCES FOR LEAKAGE AND/OR CONTAMINATION

Applicants who wish to perform their own tests for leakage and/or contamination (leak/wipe tests), including the procurement and the analysis of the test samples, must submit the following descriptive information in support of the application.

Training:

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

Classroom training may be in the form of lecture, videotape, or self-study, and will cover the following subject areas:

- a. Principles and practices of radiation protection;
- b. Radioactivity measurements, monitoring techniques, and the use of instruments;
- c. Mathematics and calculations basic to the use and measurement of radioactivity;
- d. Biological effects of radiation.

Appropriate on-the-job-training consists of:

Observing authorized personnel collecting and analyzing leak test samples and

Instrumentation:

Select an instrument that is sensitive enough to detect 185 Bq (0.005 microcurie) of the radionuclide contained in the device.

- a. A NaI(Tl) well counter system with a single or multichannel analyzer should be used to count samples from devices containing gamma-emitters (e.g., Cs-137, Co-60).
- b. A liquid scintillation or gas-flow proportional counting system should be used to count samples from devices containing beta-emitters (e.g., Sr-90) or alpha emitters (e.g., Am-241).

Describe all instrumentation, which will be used for the analysis of the test samples. The descriptive information should include:

- a. The manufacturer, model and serial number of each instrument;
- b. The types and energies of detectable radiation, as applicable to each instrument;
- c. 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. Accuracy of standards should be within +/-5 percent of the stated value and traceable to a primary radiation standard such as those maintained by the National Institutes of Standards and Technology (NIST).

Efficiency Calculation Example:

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

and

- d. The minimum sensitivity of each instrument, for each type of radioactive material to be tested, including the supportive calculations documenting such minimum sensitivity. At a minimum, the instrument used must be capable of detecting 185 Bq (0.005 μCi) of the radioactive material being tested. For radium-226, the instrument must be sensitive enough to detect 185 Bq (0.005 μCi) external radon-daughter contamination or the escape of radon at the rate of 37 Bq (0.001 μCi) per 24 hours.

Procedures:

1. Individuals conducting leak tests will use a calibrated and operable survey instrument to check leak test samples for gross contamination before they are analyzed.
2. Identify the calibration standards to be used in the analysis of each radioactive material to be tested. The identification shall include the manufacturer, model, radionuclide and activity of each standard. Such standards shall be traceable to a national standard.
3. Describe the calibration procedures and the frequency of calibration for each instrument.
4. Use a survey meter to monitor exposure.
5. For each source to be tested, list identifying information such as device/source serial number, radionuclide, and activity.

6. Describe the material or leak/wipe test kit to be used in collecting the leak/wipe test samples.
7. Prepare a separate wipe sample (e.g., cotton swab or filter paper) for each source.
8. 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.
9. Describe in detail the procedure for performing the analysis of the leak/wipe test samples.
10. Submit sample calculations showing the conversion of the raw counting data to units of becquerels or microcuries.
11. To ensure achieving the required sensitivity of measurements, leak tests will be analyzed in a low-background area.
12. Using the selected instrument, count and record background count rate.
where:
cpm = counts per minute
std = standard
bkg = background
Bq = Becquerel
13. Count each wipe sample; determine net count rate.
14. For each sample, calculate and record estimated activity in Bq (or microcuries).
$$\frac{[(\text{cpm from wipe sample}) - (\text{cpm from bkg})]}{\text{efficiency}} = \text{Activity on sample}$$
15. If the wipe test activity is 185 Bq (0.005 microcurie) or greater, notify the RSO so that the source can be withdrawn from use and disposed of properly. Also notify IEMA.
16. Describe the method for disposing of contaminated leak/wipe test samples.

Records:

1. Describe the records to be maintained for each leak/wipe test. These shall include:
 - a. The location of the source, which was leak/wipe tested;
 - b. The date the sample was collected;
 - c. The individual collecting the sample;

- d. The person performing the analysis;
- e. The date the analysis was performed;
- f. The unique identification of the source tested; e.g., manufacturer, model, serial number, etc.
- g. The radionuclide and the activity of radioactive material contained in the source; and
- h. The results of the test expressed in units of becquerels or microcuries.
Actual test results shall be reported unless such results are less than 185 Bq (0.005 μ Ci).

APPENDIX P

Guidance for Demonstrating that Unmonitored Individuals are Not Likely to Exceed 10 Percent of the Allowable Limits

Dosimetry is required for individuals likely to receive, in 1 year from sources external to the body, a dose in excess of 10 percent of the applicable regulatory limits in 32 Ill. Adm. Code 340.210. Thus, a licensee needs to evaluate the doses its workers receive in performing these tasks to assess whether dosimetry is required.

The most common way that individuals *might* exceed 10 percent of the applicable limits is by performing frequent routine cleaning, lubrication and use of devices. **Licensees are not authorized to remove the source from the device for cleaning, lubrication or maintenance without being specifically licensed to do so. For those licensees who are authorized to remove the source from the device for cleaning, lubrication or maintenance extremity monitoring will likely be required.** For licensees who will use the device and for those not removing the source for cleaning, lubrication, or maintenance, the licensee needs to evaluate the whole body and extremity doses its workers receive in performing these tasks. Note that the following example is for a portable gauge, but XRF licensees can use these same calculations substituting the appropriate information for radionuclide, activity and exposure rates pertinent to the XRF being used.

Example:

A gauge manufacturer has estimated the exposure rates received at various distances from the gauge. Each gauge in this example is authorized to contain up to 0.33 gigabecquerels (9 millicuries) of Cs-137 and either 1.63 gigabecquerels (44 millicuries) of Am-241 or 2.44 megabecquerels (66 microcuries) of Cf-252. The manufacturer stated its exposure rates were based on actual measurements with an appropriate radiation monitoring instrument. Using the exposure rates listed by the manufacturer and the amount of time and distance the individual user is from the device, the individual doses can be calculated.

- A. Whole body exposures can be calculated by estimating the time needed to use the device, based on the user lowering the source into the measurement area of interest, moving out of the area at least 15 feet away from the device during the actual measurement, and then returning to the device to retract the source into the safe position. The user should only be exposed to the source for a few minutes during each lowering and retracting the source and moving to and from the device during the actual measurement.
 1. Determine the expected dose rates received by the whole body of the individual associated with using the device and determined using measured or manufacturer-determined data (e.g., manufacturer's data

states the maximum exposure rate at one meter from the device is 0.65 mrem/hour);

2. Estimate the time the individual was exposed to the source during each measurement (e.g., 3 minutes to lower the source to conduct the measurement, walk to and from the device and to retract the source after completion of the measurement);
3. Determine how many measurements are performed each year (e.g., 10 measurements/day, 2 days/week for 26 weeks/year).
4. Using the exposure rate information for both the gamma and neutron sources supplied by the manufacturer, an example of the estimated whole body exposure to an individual routinely using the device follows:

$(0.65 \text{ mrem/hr} \div 60 \text{ minutes/hour} \times (3 \text{ minutes/measurement} \times 10 \text{ measurements/day} \times 2 \text{ days/week} \times 26 \text{ weeks/year})) = 16.9 \text{ mRem/year TEDE}$
(whole body) exposure.

The applicable TEDE (whole-body) limit is 50 mSv (5 rems) per year and 10 percent of that value is 5 mSv (500 millirems) per year. In the above example, personnel monitoring would not be required. Note that if the individual also cleans and lubricates the device as described below in Item B., additional whole body dose estimates must include these activities as well. Also note that increased use of the device would also require reevaluation of the doses expected to the individual.

- B. Extremity exposures can be calculated by estimating the time needed to clean or lubricate the device (without extending or removing the source) and should be based on the amount of time the individual is exposed to the source, the distance the extremities are from the source and the number of times per year the individual is exposed. The user should only be exposed to the source for a few minutes during each cleaning and lubrication of the device. The neutron exposures from the surface of the device supplied by the manufacturer plus the gamma exposures from the surface of the device should be used for calculating individual exposures.
1. Determine the expected dose rates received by the extremities of the individual associated with cleaning and lubricating the device (i.e., without extending or removing the source from the device) determined by using measured or manufacturer-determined data (e.g., manufacturer's data states the exposure rate on the surface of the bottom of the device for the neutron and gamma sources is 19.9 mrem/hour).
 2. Estimate the time the individual was exposed to the sources during each cleaning and lubrication. (e.g., Manufacturer's estimate it takes 10 minutes

to complete this procedure with the hands exposed to the source for 3 minutes to clean and lubricate the device;

3. Determine how many times the individual cleans and lubricates the device each year. (e.g., The licensee performs 10 measurements/day, 2 days/week for 26 weeks/year. So assume the device is cleaned once/day, 2 days/week for 26 weeks/year.)
4. Using the exposure rate information for both the gamma and neutron sources supplied by the manufacturer, an example of the estimated extremity and whole body exposure to an individual routinely cleaning and lubricating the device follows:

$(19.9 \text{ mrem/hr} \div 60 \text{ minutes/hour} \times (3 \text{ minutes/cleaning/lubricating procedure} \times 1 \text{ procedure/day} \times 2 \text{ days/week} \times 26 \text{ weeks/year})) = 51.74 \text{ mRem/year extremity dose.}$

The whole body dose should also be estimated using the manufacturer's stated maximum dose rate at one foot from the device of 3.2 mrem/hour and estimated for the entire 10 minute procedure:

$(3.2 \text{ mrem/hr} \div 60 \text{ minutes/hour} \times (10 \text{ minutes/cleaning/lubricating procedure} \times 1 \text{ procedure/day} \times 2 \text{ days/week} \times 26 \text{ weeks/year})) = 27.73 \text{ mRem/year TEDE whole body dose.}$

The applicable limit for the extremities is 500 mSv (50 rems) per year and 10 percent of that value is 50 mSv (5 rems or 5000 millirems) per year. Cleaning/lubrication of the device will create an extremity dose and licensees must calculate extremity doses in their calculations as well using the same equation above and compare it with the 5 rem limit requiring extremity monitoring.

In the above example, personnel monitoring would not be required. Note that the whole body dose received during cleaning and lubricating the device must be added to the whole body dose estimated in Item A. above to determine if personnel monitoring is required. In the above examples, the whole body dose estimated in Item A. is 16.9 mrem plus 27.73 mrem estimated in Item B. = 44.63 mrem/year, which is lower than the limit of 500 mrem requiring personnel monitoring. Note that increased use, cleaning and lubricating the device would also require reevaluation of the doses expected to the individual.

Note that the above examples only cover the cleaning/lubrication procedures and use of the device and one must also consider the dose received during storage of the device if the individual receives doses associated with device storage.

Guidance to Licensees:

Licensees who wish to demonstrate that they are *not* required to provide dosimetry to their workers must prepare a written evaluation similar to that shown in the examples above, which includes estimating the dose received from actual use/cleaning and lubricating and storage of the device.

The expected dose rates, times, and distances used in the above example may *not* be appropriate to individual licensee situations. In their evaluations, licensees must use information appropriate to the various types of devices on which they will actually use. This information is available from device manufacturers or the SSD Registration Sheet maintained by NRC and Agreement States.

Licensees should review evaluations periodically and revise them as needed. They should check assumptions used in their evaluations to ensure that the assumptions are up-to-date and accurate. For example, if workers became lax in following good radiation safety practices in the example used above, the extremities could be closer to the unshielded source, and the workers would receive a higher dose. Alternatively, workers could perform the task more slowly than the estimated 10 minutes total and 3 minutes with the hands near the unshielded source. Also, using new gauges containing sources of different activities, different radionuclides, or different cleaning/lubrication procedures requires a new evaluation.

EXHIBIT A



ILLINOIS EMERGENCY MANAGEMENT AGENCY
 DIVISION OF NUCLEAR SAFETY
 1035 OUTER PARK DRIVE
 SPRINGFIELD, ILLINOIS 62704

(217) 785-9947 telephone
 (217) 782-1328 telefacsimile

AUTHORIZING THE USE OF SEALED SOURCES IN PORTABLE DEVICES

Complete all items if this is an initial application or renewal of a license. Use supplementary sheets where necessary. Retain one copy and submit the original and one copy of the entire application to the Illinois Emergency Management Agency.

This State Agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under 32 Ill. Adm. Code 330. Disclosure of this information is required. Failure to provide any information may result in denial of a radioactive material license. This form has been approved by the State Forms Management Center.

ITEM 1. Type of Application (Check all that apply) NEW LICENSE

RENEWAL of License Number _____ AMENDMENT to License Number _____

Portable Gauge Portable X-Ray Fluorescence Analyzer (XRF) Portable Gauge and Portable XRF

ITEM 2. Applicant's Name and Mailing Address (Applicant must be the legal entity or individual responsible for the license.)	ITEM 3. Person to Contact Regarding This Application:
Phone #:	Phone #:
Fax #:	Fax #:
E-mail:	E-mail:

ITEM 4. Address(es) Where Radioactive Material Will Be Used **Stored** **Used and Stored**

Telephone #: Telephone #:

Request for TEMPORARY JOB SITES (\leq 180 days during any consecutive twelve-month period): Yes No

The applicant owns the facility/property where radioactive material is stored/used. Yes No

The applicant does not own the property/facility where radioactive material is stored/used, but the owner has been notified in writing. A copy of the notice is attached. Yes No

ITEM 5. Individual(s) Who Will Use Radioactive Material (Attach evidence of appropriate Training and Experience.)

List names and requested uses of material. (Check all that apply)

All authorized users for this license shall complete the manufacturer's training course or an equivalent, Agency-accepted training course prior to unsupervised use of radioactive material. Evidence of training and experience for at least one authorized user is attached. Training records for all authorized users shall be maintained for Agency Inspection

Description of training program covering items described in Item 5 of Instruction Set 65.0, Revision 2, dated December 2010 is attached.

The authorized users for this license and evidence of their training and experience relative to radioactive material use are specified in an attachment to this application.

ITEM 6. Radiation Safety Officer (RSO) (Attach evidence of Training and Experience)

Name: _____ Phone #: _____

- Duties are stated in Appendix F of Instructional Set 65.0, Revision 2, dated December 2010.
- Duties and responsibilities are attached.
- We request authorization for the delegation of duties as stated in Appendix F.1 of Instructional Set 65.0, Revision 2, dated December 2010.

ITEM 7. Radioactive Material, Device and Use

Radionuclide/Device	Manufacturer and Model	Maximum Activity per Source	Number Requested	Use

ITEM 8. Instrumentation and Monitoring Procedures (Check one)

- Completed Exhibit B from Instructional Set 65.0, Revision 2, dated December 2010 or equivalent is attached.
- Not applicable.

ITEM 9. Instrument Calibration and Operability Checks (Check one)

- Radiation monitoring instruments will be calibrated by a service company authorized to perform such services. We will maintain a copy of the company's license authorizing such services.
- We will calibrate radiation monitoring instruments in accordance with the attached procedures, which contain all information requested in Appendix H, Items 1.a. - i., of Instructional Set 65.0, dated December 2010.
- Not applicable.

ITEM 10. Facilities and Equipment (Check all that apply)

- Diagrams of radioactive material use and storage areas are attached.

ITEM 11. Public Dose

- Public dose calculations are attached if > 2 gauges or > 10 XRF devices are requested to be possessed within the same storage/use location.
- Not applicable.

ITEM 12. Procedures for Ordering and Receiving Radioactive Material and Opening Radioactive Material Packages (Check one)

- We will use the procedure identified in Appendix K of Instructional Set 65.0, Revision 2, dated December 2010.
- Procedure for ordering, receiving and safely opening packages containing radioactive material is attached. Packages will not be received after normal working hours.

ITEM 13. General Rules for the Safe Use of Radioactive Material and Security Requirements (Check all that apply)

- We will use the procedure identified in Appendix L of Instructional Set 65.0, Revision 2, dated December 2010, not including maintenance/repair involving dismantling of shielding or shutter device or removal of sources or source holders.
- General safety instructions are attached.
- We request authorization to perform maintenance/repair involving dismantling of shielding or shutter device or removal of sources or source holders. Procedures are attached.
- We request authorization to perform maintenance procedures, which are attached.
- We will use the utilization log for device accountability and the six-month physical inventory identified in Appendix M of Instructional Set 65.0, Revision 2, dated December 2010.
- A utilization log for device accountability and the six-month physical inventory is attached.

ITEM 14. Emergency Procedures (Check all that apply)

- Emergency contact information is provided, including for other than normal working hours.
- We will use the procedure identified in Appendix N (for Items a-e of Item 14) of Instructional Set 65.0, dated December 2010.
- Emergency Procedure for Items a-e of Item 14 is attached.
- We request authorization for use of portable gauging devices requiring lowering of the sealed source into the ground more than three feet. Emergency procedure for stuck source recovery is attached.
- Emergency Procedure for stuck source recovery is not applicable.

ITEM 15. Portable Device Transfer and Waste Disposal (Check all that apply)

- Portable device and source transfer/waste disposal will be in accordance with 32 Ill. Adm. Code 340.1010. The licensee will obtain a copy of the transferee's license prior to transfer of the device.

ITEM 16. Testing Sealed Sources for Leakage and/or Contamination (Check one)

- We will use a commercial service to perform analysis of leakage and/or contamination samples. We will maintain a copy of the commercial service's license authorizing such services.
- We will perform our own sample analysis for source leakage and/or contamination using the procedures identified in Appendix O of Instructional Set 65.0 dated December 2010.
- We will perform our own sample analysis for source leakage and/or contamination. Procedure is attached.

ITEM 17. Personnel Monitoring (Check all that apply)

TYPE	EXCHANGE FREQUENCY	FILM	TLD	OSL
<input type="checkbox"/> Whole body	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Extremity	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Not applicable. Dose calculation is attached.				

ITEM 18. License Fees (Refer to 32 Ill. Adm. Code 331)

Please do not submit your fee payment. New applicants will be billed a prorated fee for the portion of the billing year remaining from the date the application is received. Licensees adding sites or changing fee categories will be billed when the license is amended. Existing licensees and applicants are also subject to annual bills as specified in 32 Ill. Adm. Code 331.

Fee Category _____

ITEM 19. Financial Assurance

The applicant must satisfy applicable financial assurance requirements as described in 32 Ill. Adm. Code 326.

NEW APPLICANT (Check one)

Exempt \$25,000 arrangement will be provided at a later date Reclamation plan/cost estimate attached

RENEWAL OR AMENDMENT (Check one)

Exempt Existing document reviewed – no changes necessary Limiting condition applies
 Updated reclamation plan/cost estimate attached

ITEM 20. Certification

EACH APPLICANT MUST COMPLETE SECTION A:

A. I have reviewed the above items and hereby certify that my radiation protection program meets the current 32 Ill. Adm. Code, radioactive materials license with active amendments, operating procedures and ALARA Program, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of my knowledge and belief.

SIGNATURE: _____ DATE: _____

NAME: _____ TITLE: _____
(Print or Type)

APPLICANT'S Federal Employer Identification Number (FEIN): _____

COMPLETE THIS SECTION IF THE APPLICANT IS AN INDIVIDUAL:

B. If you are applying as an individual, rather than as a corporation or other legal entity, you must provide the following information in order to process your application:

Have you defaulted on an educational loan guaranteed by the Illinois Student Assistance Commission?
Yes No

I certify, under penalty of perjury, that I am not more than 30 days delinquent in complying with a child support order. Failure to certify may result in a denial of the license and making a false statement may subject you to contempt of court. (5 ILCS 100/10-65)

I declare that all information either included with or appearing on this application is accurate and true to the best of my knowledge.

SIGNATURE: _____ DATE: _____

APPLICANT'S SOCIAL SECURITY NUMBER: _____

EXHIBIT A1



ILLINOIS EMERGENCY MANAGEMENT AGENCY
 DIVISION OF NUCLEAR SAFETY
 1035 OUTER PARK DRIVE
 SPRINGFIELD, ILLINOIS 62704

(217) 785-9947 telephone
 (217) 782-1328 telefacsimile

**EXPEDITED RENEWAL FORM FOR A RADIOACTIVE MATERIAL LICENSE
 AUTHORIZING THE USE OF SEALED SOURCES IN PORTABLE DEVICES**

Complete all items for renewal of a license. Use supplementary sheets where necessary. Retain one copy and submit the original and one copy of the entire application to the Illinois Emergency Management Agency.

This State Agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under 32 Ill. Adm. Code 330. Disclosure of this information is required. The Agency requests that each application for license renewal be voluntarily submitted by the licensee at least 120 days prior to the expiration date on the license to be renewed. This timeliness request is not a requirement. Please be aware, however, that Agency rules require that an application for renewal of a specific license be filed with the Agency at least 30 days prior to the expiration date. This allows for licensed activities lawfully to continue beyond the expiration date pending Agency review of the renewal application, should such review extend beyond the expiration date. Failure to provide all requested information may result in denial of your application for radioactive material license renewal.

ITEM 1. Type of Renewal Application (Check all that apply). License Number _____

- Portable Gauge Portable X-Ray Fluorescence Analyzer (XRF)

ITEM 2. Applicant's Name and Mailing Address
 (Applicant must be the legal entity or individual responsible for the license.)

ITEM 3. Person authorized to act on behalf of licensee

 Phone #:
 Fax #:
 E-mail:

 Phone #:
 Fax #:
 E-mail:

ITEM 4. Address(es) Where Radioactive Material Will Be Used **Stored** **Used and Stored**

 Phone #:

 Phone #:

Request for TEMPORARY JOBSITES (≤ 180 days during any consecutive twelve-month period): Yes No

(Check one block)

- The applicant/licensee owns each property/facility above.
 The applicant/licensee does not own the property/facility where radioactive material is stored/used, but the owner has been notified in writing. A copy is attached.

ITEMS 5. through 17.

For items 5. through 17. below, review your radiation protection program against the regulations, the license and the license conditions with all active amendments, your operating procedures and ALARA program to ensure that your program is reflective of current operations for the material to be used.

- | | |
|---|---|
| 5. Individual(s) Who Will Use Radioactive Material and Personnel Training Program | 12. Procedure for Ordering, Receiving and Safely Opening Packages Containing Radioactive Material |
| 6. Radiation Safety Officer (RSO) | 13. General Rules for the Safe Use of Radioactive Material and Security Requirements |
| 7. Radioactive Material | 14. Emergency Procedure |
| 8. Instrumentation and Monitoring Procedures | 15. Portable Device Transfer and Waste Disposal |
| 9. Instrument Calibration and Operability Checks | 16. Testing Sealed Sources for Leakage and/or Contamination |
| 10. Facilities and Equipment | 17. Personnel Monitoring |
| 11. Public Dose | |

(Check one block)

- No changes to above items.
- No changes to above items except as noted in attachments
(List items above that are attached: ____, ____, ____, ____, ____, ____, ____, ____).

ITEM 18. Fees

Please do not submit your fee payment. The licensee will be billed annually by the Agency for the appropriate fee category and number of job sites as specified in 32 Ill. Adm. Code 331.

Fee Category _____

ITEM 19. Financial Assurance (Check one)

The applicant must satisfy applicable financial assurance requirements as described in 32 Ill. Adm. Code 326.

- Exempt Existing document reviewed – no changes necessary Limiting condition applies
- Updated reclamation plan/cost estimate attached

ITEM 20. Certification

EACH APPLICANT MUST COMPLETE SECTION A:

A. I have reviewed the above items and hereby certify that my radiation protection program meets the current 32 Ill. Adm. Code, radioactive materials license with active amendments, operating procedures and ALARA Program, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of my knowledge and belief.

SIGNATURE: _____ DATE: _____

NAME: _____ TITLE: _____
(Print or Type)

APPLICANT'S Federal Employer Identification Number (FEIN): _____

COMPLETE THIS SECTION IF THE APPLICANT IS AN INDIVIDUAL:

B. If you are applying as an individual, rather than as a corporation or other legal entity, you must provide the following information in order to process your application:

Have you defaulted on an educational loan guaranteed by the Illinois Student Assistance Commission? Yes No

I certify, under penalty of perjury, that I am not more than 30 days delinquent in complying with a child support order. Failure to certify may result in a denial of the license and making a false statement may subject you to contempt of court. (5 ILCS 100/10-65)

I declare that all information either included with or appearing on this application is accurate and true to the best of my knowledge.

SIGNATURE: _____ DATE: _____

APPLICANT'S SOCIAL SECURITY NUMBER: _____

EXHIBIT B

INSTRUMENTATION FORM

1. Portable Radiation Monitoring Instruments

(0.1 mrem/hr to 50 mrem/hr or 1 μ Sv/hr to 500 μ Sv/hr):

Manufacturer: _____

Model: _____

Available: _____

Range: _____

Window Thickness: _____
(mg/cm²)

Detector Type: _____
(G-M, Ion Chamber, etc.)

2. Instrument Used for Analysis of Leakage and/or Contamination Samples*

(Generic Description): _____

Manufacturer: _____

Model: _____

Minimum Detectable Activity*: _____

* Submit calculations as described in Appendix D.

EXHIBIT C



ILLINOIS EMERGENCY MANAGEMENT AGENCY
 DIVISION OF NUCLEAR SAFETY
 1035 OUTER PARK DRIVE
 SPRINGFIELD, ILLINOIS 62704

IEMA is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under 420 ILCS 40/1-40/44. Disclosure of this information is required. Failure to provide any information will result in delay of termination of license.

**CERTIFICATE
 TERMINATION AND DISPOSITION OF RADIOACTIVE MATERIAL**

LICENSEE:	LICENSE NUMBER:
ADDRESS:	TELEPHONE NUMBER:

The following information is provided in accordance with 32 Ill. Adm. Code 330.325, "Termination Requirements for Specific Licenses and Locations of Use."

This regulation appears on the back of this form. Check all that apply below.

- 1. All use of radioactive material authorized under the above referenced license has been terminated.
- 2. Radioactive contamination has been removed to the level outlined in 32 Ill. Adm. Code 340.Appendix A, to the extent practicable.
- 3. All radioactive material previously procured and/or possessed under the authorization granted by the above referenced license has been disposed of as follows:
 - Transferred to (Name and Address): _____

 who is authorized to possess such material under License Number _____
 issued by (Licensing Agency): _____
 - Decayed, surveyed and disposed of as non-radioactive waste.
 - Licensed under License Number: _____
 issued by (Licensing Agency): _____
 - No radioactive material has ever been procured and/or possessed by the licensee under the authorization granted by the above referenced license.
 - Other (Attach additional pages).
- 4. Attached are radiation surveys or the equivalent as specified in 32 Ill. Adm. Code 330.325(b)(1)(F).
- 5. Records required to be maintained for the license requested to be terminated are available at the following location:
 - Name: _____
 - Address: _____

 - Telephone No.: _____ Contact Person: _____
- 6. Additional remarks. (Attach additional pages.)

THE UNDERSIGNED, ON BEHALF OF THE LICENSEE, HEREBY CERTIFIES THAT LICENSABLE QUANTITIES OF RADIOACTIVE MATERIAL UNDER THE JURISDICTION OF THE ILLINOIS EMERGENCY MANAGEMENT AGENCY ARE NOT POSSESSED BY THE LICENSEE. IT IS THEREFORE REQUESTED THAT THE ABOVE REFERENCED LICENSE BE TERMINATED.

SIGNATURE: _____ DATE: _____
 NAME: _____ TITLE: _____
 (print or type)

Section 330.325 Termination Requirements for Specific Licenses and Locations of Use

- a) To lawfully obtain termination of a specific license or a location of use, each licensee shall meet the requirements of this Section no later than the end of the expiration date on the specific license or on any applicable amendment to the specific license unless the licensee has filed an application for renewal in accordance with Section 330.320(a) of this Part prior to the expiration date.

AGENCY NOTE: If the licensee has filed a renewal application in accordance with Section 330.320(a) of this Part and the Agency subsequently denies the application, the Agency shall, in an order issued to the licensee in accordance with the Act, the Illinois Administrative Procedure Act [5 ILCS 100] and 32 Ill. Adm. Code 200, specify the time by which the licensee must meet the requirements of this Section.

- b) Requirements for Obtaining Termination of a Specific License, Removal of a Site or Location of Use from a Specific License
- 1) The licensee shall:
 - A) Cease use of radioactive material;
 - B) Remove radioactive contamination to levels considered acceptable for unrestricted use. A site will be considered acceptable for unrestricted use when:
 - i) Radioactive contamination is removed to levels outlined in 32 Ill. Adm. Code 340.Appendix A; or
 - ii) The residual radioactivity, excluding radon, thoron and their progeny, that is distinguishable from background radiation does not result in a total effective dose equivalent (TDE) to an average member of the critical group that exceeds 25 mrem (0.25 mSv) per year, including that from groundwater sources of drinking water, and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). Determination of the levels that are ALARA must take into account consideration of any detriments, such as deaths from transportation accidents, expected to potentially result from decontamination and waste disposal;
 - C) Properly transfer and/or dispose of radioactive material;
 - D) Submit a completed Agency Form KLM.007 (Certificate Termination and Disposition of Radioactive Material) or provide equivalent information;
 - E) For licensees authorized to possess sealed sources, submit evidence of transfer and/or disposal of all sealed sources authorized on the license and a copy of the most recent leak test; and
 - F) For licensees authorized to possess radioactive material in forms other than sealed sources, submit a radiation survey report to confirm the absence of radioactive materials or to establish the levels of residual radioactive contamination, unless the licensee demonstrates the absence of residual radioactive contamination in some other manner. The radiation survey report shall specify the date of the survey and the instrumentation used and shall certify that each instrument was properly calibrated and tested. The licensee shall, as applicable, report levels or quantities of:
 - i) Beta and gamma radiation at 1 centimeter from surfaces in units, multiples, or subunits of Sieverts or rem per hour;
 - ii) Gamma radiation at 1 meter from surfaces in units, multiples, or subunits of Sieverts or rem per hour;
 - iii) Removable radioactivity on surfaces in units, multiples, or subunits of Becquerels or Curies per 100 square centimeters of surface area, or in disintegrations (transformations) per minute per 100 square centimeters of surface area;
 - iv) Fixed radioactivity on surfaces in units, multiples, or subunits of Becquerels or Curies per 100 square centimeters of surface areas or in disintegrations (transformations) per minute per 100 square centimeters of surface area;
 - v) Radioactivity in contaminated liquids, such as water, oils or solvents, in units, multiples, or subunits of Becquerels or Curies per milliliter of volume; and
 - vi) Radioactivity in contaminated solids, such as soils or concrete, in units, multiples, or subunits of Becquerels or Curies per gram of solid.
 - 2) If no residual radioactive contamination attributable to activities conducted under the license is detected, the licensee shall submit a certification that no detectable radioactive contamination was found.
 - 3) If detectable levels or residual radioactive contamination attributable to activities conducted under the license are found, the licensee shall:
 - A) In addition to the information submitted under subsections (b)(1)(D) and (b)(1)(F) of this Section, submit for Agency approval a plan for reclaiming the facility, including decontamination and removal of residual radioactive contamination;
 - B) Limit actions involving radioactive material to those approved under the decontamination plan in subsection (b)(3)(A) of this Section;
 - C) Continue to control entry to restricted areas until they are suitable for release for unrestricted use; and
 - D) Implement and complete the plan approved under subsection (b)(3)(A) of this Section.
- c) When a licensee ends activities authorized under a specific license and has met the termination requirements of subsection (b) of this Section, the licensee shall immediately notify the Agency in writing and request that the license be terminated. This notification and request for termination shall include the documents required by subsection (b) of this Section and shall otherwise substantiate that the licensee has met all of the requirements in subsection (b) of this Section.
- d) After receiving a request for license termination pursuant to subsection (c) of this Section, the Agency shall confirm, through such inspections and record reviews as may be necessary, that the licensee has met the requirements of subsection (b) of this Section. Upon confirmation, the Agency shall issue an amendment to terminate the licensee. Until issued the termination amendment, the licensee shall maintain a valid specific license in accordance with Section 330.320 of this Part.
- e) A licensee who fails to comply with the pertinent requirements of this Section shall be subject to such civil penalties and sanctions as may be appropriate in accordance with the Act and 32 Ill. Adm. Code 310. The passing of the expiration date shall not relieve the licensee of the duties and responsibilities of applying for and maintaining a valid specific license in accordance with Section 330.320 of this Part, decommissioning, reclaiming, and meeting the license termination requirements of this Section. Immediately upon the passing of the expiration date, a licensee that fails to comply with subsection (a) of this Section shall comply with the requirements of Section 330.320(c) of this Part.

(Source: Added at 30 Ill. Reg. 8928, effective April 28, 2006)

IEMA Form 4
February 2006
PART 340

**Illinois Emergency Management Agency
Division of Nuclear Safety**

This State agency is requesting disclosure of information that is necessary to accomplish the statutory purpose described under Ill. Rev. Stat. 1991, ch. 111 1/2, par. 210-1 et seq. [420 ILCS 40]. Disclosure of this information is required. Failure to provide all information may result in enforcement action as provided by law. This form has been approved by the Forms Management Center.

CUMULATIVE OCCUPATIONAL DOSE HISTORY

1. NAME (LAST, FIRST, MIDDLE INITIAL)		2. IDENTIFICATION NUMBER		3. ID TYPE	4. SEX MALE <input type="checkbox"/> FEMALE <input type="checkbox"/>	5. DATE OF BIRTH	
6. MONITORING PERIOD		7. LICENSEE OR REGISTRANT NAME		8. LICENSE OR REGISTRATION NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>	10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODÉ
6. MONITORING PERIOD		7. LICENSEE OR REGISTRANT NAME		8. LICENSE OR REGISTRATION NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>	10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODÉ
6. MONITORING PERIOD		7. LICENSEE OR REGISTRANT NAME		8. LICENSE OR REGISTRATION NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>	10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODÉ
6. MONITORING PERIOD		7. LICENSEE OR REGISTRANT NAME		8. LICENSE OR REGISTRATION NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>	10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODÉ
6. MONITORING PERIOD		7. LICENSEE OR REGISTRANT NAME		8. LICENSE OR REGISTRATION NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>	10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODÉ
6. MONITORING PERIOD		7. LICENSEE OR REGISTRANT NAME		8. LICENSE OR REGISTRATION NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>	10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODÉ
6. MONITORING PERIOD		7. LICENSEE OR REGISTRANT NAME		8. LICENSE OR REGISTRATION NUMBER		9. RECORD ESTIMATE NO RECORD <input type="checkbox"/>	10. ROUTINE <input type="checkbox"/> PSE <input type="checkbox"/>
11. DDE	12. LDE	13. SDE, WB	14. SDE, ME	15. CEDE	16. CDE	17. TEDE	18. TODÉ
19. SIGNATURE OF MONITORED INDIVIDUAL		20. DATE SIGNED	21. CERTIFYING ORGANIZATION		22. SIGNATURE OF DESIGNEE		23. DATE SIGNED

**INSTRUCTIONS AND ADDITIONAL INFORMATION PERTINENT TO THE
COMPLETION OF IEMA FORM 4**

(Enter dose equivalents in centisieverts or rem.)

<p>1. Type or print the full name of the monitored individual in the order of last name (include "Jr," "Sr," "III," etc.), first name, middle initial (if applicable).</p> <p>2. Enter the individual's identification number, including punctuation. This number should be the 9-digit social security number if at all possible. If the individual has no social security number, enter the number from another official identification such as a passport or work permit.</p> <p>3. Enter the code for the type of identification used as shown below:</p> <table border="0"> <thead> <tr> <th><u>CODE</u></th> <th><u>ID TYPE</u></th> </tr> </thead> <tbody> <tr> <td>SSN</td> <td>U.S. Social Security Number</td> </tr> <tr> <td>PPN</td> <td>Passport Number</td> </tr> <tr> <td>CSI</td> <td>Canadian Social Insurance Number</td> </tr> <tr> <td>WPN</td> <td>Work Permit Number</td> </tr> <tr> <td>IND</td> <td>INDEX Identification Number</td> </tr> <tr> <td>OTH</td> <td>Other</td> </tr> </tbody> </table> <p>4. Check the box that denotes the sex of the individual being monitored.</p> <p>5. Enter the date of birth of the individual being monitored in the format MM/DD/YY.</p> <p>6. Enter the monitoring period for which this report is filed. The format should be MM/DD/YY - MM/DD/YY.</p> <p>7. Enter the name of the licensee, registrant, or facility not licensed by the Agency that provided monitoring.</p> <p>8. Enter the Agency license or registration number or numbers.</p>	<u>CODE</u>	<u>ID TYPE</u>	SSN	U.S. Social Security Number	PPN	Passport Number	CSI	Canadian Social Insurance Number	WPN	Work Permit Number	IND	INDEX Identification Number	OTH	Other	<p>9. Place an "X" in Record, Estimate, or No Record. Choose "Record" if the dose data listed represent a final determination of the dose received to the best of the licensee's or registrant's knowledge. Choose "Estimate" only if the listed dose data are preliminary and will be superseded by a final determination resulting in a subsequent report. An example of such an instance would be dose data based on self-reading dosimeter results and the licensee or registrant intends to assign the record dose on the basis of TLD results that are not yet available.</p> <p>10. Place an "X" in either Routine or PSE. Choose "Routine" if the data represent the results of monitoring for routine exposures. Choose "PSE" if the listed dose data represents the results of monitoring of planned special exposures received during the monitoring period. If more than one PSE was received in a single year, the licensee should sum them and report the total of all PSEs.</p> <p>11. Enter the deep dose equivalent (DDE) to the whole body.</p> <p>12. Enter the eye dose equivalent (LDE) recorded for the lens of the eye.</p> <p>13. Enter the shallow dose equivalent recorded for the skin of the whole body (SDE,WB).</p> <p>14. Enter the shallow dose equivalent recorded for the skin of the extremity receiving the maximum dose (SDE,ME).</p> <p>15. Enter the committed effective dose equivalent (CEDE).</p> <p>16. Enter the committed dose equivalent (CDE) recorded for the maximally exposed organ.</p>	<p>17. Enter the total effective dose equivalent (TEDE). The TEDE is the sum of items 11 and 15.</p> <p>18. Enter the total organ dose equivalent (TODE) for the maximally exposed organ. The TODE is the sum of items 11 and 16.</p> <p>19. Signature of the monitored individual. The signature of the monitored individual on this form indicates that the information contained on the form is complete and correct to the best of his or her knowledge.</p> <p>20. Enter the date this form was signed by the monitored individual.</p> <p>21. [OPTIONAL] Enter the name of the licensee, registrant or facility not licensed by the Agency, providing monitoring for exposure to radiation (such as a DOE facility) or the employer if the individual is not employed by the licensee or registrant and the employer chooses to maintain exposure records for its employees.</p> <p>22. [OPTIONAL] Signature of the person designated to represent the licensee, registrant or employer entered in item 21. The licensee, registrant or employer who chooses to countersign the form should have on file documentation of all the information on the IEMA Form 4 being signed.</p> <p>23. [OPTIONAL] Enter the date this form was signed by the designated representative.</p>
<u>CODE</u>	<u>ID TYPE</u>															
SSN	U.S. Social Security Number															
PPN	Passport Number															
CSI	Canadian Social Insurance Number															
WPN	Work Permit Number															
IND	INDEX Identification Number															
OTH	Other															

**INSTRUCTIONS AND ADDITIONAL INFORMATION PERTINENT TO THE
COMPLETION OF IEMA FORM 5**

(Enter dose equivalents in centisieverts or rem.)

<p>1. Type or print the full name of the monitored individual in the order of last name (include "Jr," "Sr," "III," etc.), first name, middle initial (if applicable).</p> <p>2. Enter the individual's identification number, including punctuation. This number should be the 9-digit social security number if at all possible. If the individual has no social security number, enter the number from another official identification such as a passport or work permit.</p> <p>3. Enter the code for the type of identification used as shown below:</p> <table border="0"> <thead> <tr> <th><u>CODE</u></th> <th><u>ID TYPE</u></th> </tr> </thead> <tbody> <tr> <td>SSN</td> <td>U.S. Social Security Number</td> </tr> <tr> <td>PPN</td> <td>Passport Number</td> </tr> <tr> <td>CSI</td> <td>Canadian Social Insurance Number</td> </tr> <tr> <td>WPN</td> <td>Work Permit Number</td> </tr> <tr> <td>IND</td> <td>INDEX Identification Number</td> </tr> <tr> <td>OTH</td> <td>Other</td> </tr> </tbody> </table> <p>4. Check the box that denotes the sex of the individual being monitored.</p> <p>5. Enter the date of birth of the individual being monitored in the format MM/DD/YY.</p> <p>6. Enter the monitoring period for which this report is filed. The format should be MM/DD/YY - MM/DD/YY.</p> <p>7. Enter the name of the licensee or registrant.</p> <p>8. Enter the Agency license or registration number or numbers.</p>	<u>CODE</u>	<u>ID TYPE</u>	SSN	U.S. Social Security Number	PPN	Passport Number	CSI	Canadian Social Insurance Number	WPN	Work Permit Number	IND	INDEX Identification Number	OTH	Other	<p>9A. Place an "X" in Record or Estimate. Choose "Record" if the dose data listed represent a final determination of the dose received to the best of the licensee's or registrant's knowledge. Choose "Estimate" only if the listed dose data are preliminary and will be superseded by a final determination resulting in a subsequent report. An example of such an instance would be dose data based on self-reading dosimeter results and the licensee or registrant intends to assign the record dose on the basis of TLD results that are not yet available.</p> <p>9B. Place an "X" in either Routine or PSE. Choose "Routine" if the data represent the results of monitoring for routine exposures. Choose "PSE" if the listed dose data represents the results of monitoring of planned special exposures received during the monitoring period. If more than one PSE was received in a single year, the licensee should sum them and report the total of all PSEs.</p> <p>10A. Enter the symbol for each radionuclide that resulted in an internal exposure recorded for the individual, using the format "Xx-###x," for instance, Cs-137 or Tc-99m.</p> <p>10B. Enter the lung clearance class as listed in Appendix B to 10 CFR 20 (D, W, Y, V, or O for other) for all intakes by inhalation.</p> <p>10C. Enter the mode of intake. For inhalation, enter "H." For absorption through the skin, enter "B." For oral ingestion, enter "G." For injection, enter "J."</p> <p>10D. Enter the intake of each radionuclide.</p> <p>NOTE: Enter intakes in kilobecquerels or microcuries. Clearly indicate the units used. (1 μCi = 37 kBq)</p>	<p>11. Enter the deep dose equivalent (DDE) to the whole body.</p> <p>12. Enter the eye dose equivalent (LDE) recorded for the lens of the eye.</p> <p>13. Enter the shallow dose equivalent recorded for the skin of the whole body (SDE,WB).</p> <p>14. Enter the shallow dose equivalent recorded for the skin of the extremity receiving the maximum dose (SDE,ME).</p> <p>15. Enter the committed effective dose equivalent (CEDE) or "NR" for "Not Required" or "NC" for "Not Calculated".</p> <p>16. Enter the committed dose equivalent (CDE) recorded for the maximally exposed organ or "NR" for "Not Required" or "NC" for "Not Calculated".</p> <p>17. Enter the total effective dose equivalent (TEDE). The TEDE is the sum of items 11 and 15.</p> <p>18. Enter the total organ dose equivalent (TODE) for the maximally exposed organ. The TODE is the sum of items 11 and 16.</p> <p>19. COMMENTS.</p> <p>In the space provided, enter additional information that might be needed to determine compliance with limits. An example might be to enter the note that the SDE,ME was the result of exposure from a discrete hot particle. Another possibility would be to indicate that an overexposed report has been sent to the Agency in reference to the exposure report.</p> <p>20. Signature of the person designated to represent the licensee or registrant.</p> <p>21. Enter the date this form was prepared.</p>
<u>CODE</u>	<u>ID TYPE</u>															
SSN	U.S. Social Security Number															
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