

**Regulatory Guide 3.4
(Rev. 8) – July 2014**

Regulatory Guide 3.4



Radioactive Material Guidance for

Portable Gauges and X-ray Fluorescence Analyzers

**Nebraska Department of Health and Human Services
Radioactive Material Program
P.O Box 95026
Lincoln, NE 68509**

Regulatory Guide 3.4
Revision 8 –2014

Nebraska Department of Health and Human Services , Regulatory Guides

Regulatory Guides are issued to describe and make available to the public acceptable methods of implementing specific parts of 180 NAC (Nebraska Regulations for Control of Radiation-Ionizing), to delineate techniques used by the staff in evaluating specific problems or postulated accidents, or to provide guidance to applicants, licensees, or registrants. Regulatory Guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the Nebraska Department of Health and Human Services, Division of Public Health, Radiological Health to make necessary determination to issue or continue a license or certificate of registration.

Comments and suggestions for improvements in these Regulatory Guides are encouraged at all times and they will be revised, as appropriate, to accommodate comments and to reflect new information or experience. Comments should be sent to Nebraska Department of Health and Human Services , Division of Public Health, Radiological Health, 301 Centennial Mall South, P.O. Box 95026, Lincoln, NE 69509-5026.

Requests for single copies of issued guides (which may be reproduced) can be made in writing to Nebraska Department of Health and Human Services , Division of Public Health, Radiological Health, 301 Centennial Mall South, P.O. Box 95026, Lincoln, NE 69509-5026 or refer to. <http://www.dhhs.ne.gov/rad/>

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Abbreviations

AU	Authorized User
ALARA	As Low As Reasonably Achievable
Bq	Becquerel
DHHS	Nebraska Department of Health and Human Services (Department)
DOT	United States Department of Transportation
GPO	Government Printing Office
mrem	Millirem
mSv	Millisievert
NIST	National Institute of Standards and Technology
NRC	United States Nuclear Regulatory Commission
RSO	Radiation Safety Officer
SSD	Sealed Source and Device
Sv	Sievert
TEDE	Total effective dose equivalent
TI	Transportation Index
TLD	Thermoluminescent dosimeters

Definition

Department Nebraska Department of Health and Human Services

Contact the Agency at:

Nebraska Department of Health and Human Services
Radioactive Materials Program
301 Centennial Mall South
P.O. Box 95026
Lincoln, NE 68509

(402)471-2079

Regulatory Guide Summary

This Regulatory Guide 3.4 has been developed to streamline the application process of a portable gauging device or XRF for the applicant. A copy of the application NRH-5 "Application for Material License." is located in Appendix A of this Guide.

"Supporting Information Requested in Items 4 through 14 of NRH Form 5" located in Appendix B is a checklist to help the applicant complete NRH-5. Appendix B should be completed and attached to the application NRH-5 when submitting it. Each section of the checklist (Appendix B) refers to a number on the application NRH-5. Part III of this guide gives detailed explanation concerning how to complete each part and an explanation.

Appendix C through U provide examples, models and additional information that can be used when completing the application. Appendix C is an example of a portable gauge license. It contains the conditions most often found in portable gauging devices or XRF's. However all licenses will not have the same conditions.

It typically takes 60-90 days for a license to be issued plus additional time if the application is not complete. Appendix D is a checklist that is used by the Department to review the applications. When submitting the application be sure to include the appropriate application fee for a portable gauge device or XRF.

In summary the applicant will need to do the following to submit an application for a portable gauging device or XRF.

- Use this regulatory guide to prepare the application NRH-5.
- Complete the application NRH-5 (Appendix A) and the checklist (Appendix B). See Part III of the guide for additional information.
- In addition to Appendix A and B each application will need to include the following appendixes or alternative procedures:
 - Appendix E "Duties of the Radiation Safety Officer"
 - Appendix F "Operating and Emergency Procedures"
 - Appendix G "Facility Diagram"

Include any additional attachments.

All supplemental pages should be typed on 8 1/2" x 11" paper.

Please identify all attachments with the applicants name and license number (if a renewal), item number which it relates to on Appendix B, page number and application date.

- Avoid submitting proprietary information unless it is absolutely necessary.
- Submit an original signed application along with attachments and if possible an electronic copy on a diskette or CD.
- Submit the application fee.
- Retain one copy of the license application and attachments for future reference.
- The license will require that radioactive material be possessed and used in accordance with statements, representation and procedures provided in the application and supporting documentation.

If you have any questions about the applications process please contact this office at (402)471-2168.

Our website is located at: <http://www.dhhs.ne.gov/rad/>

I. Introduction

A. General

Nebraska signed an agreement with the Atomic Energy Commission (now the U.S. Nuclear Regulatory Commission (NRC)) on October 1, 1966. The agreement gave Nebraska the authority to license and regulate radioactive material users in the State of Nebraska. With the exception of nuclear power plants and federally controlled facilities, the Nebraska Department of Health and Human Services (DHHS) or (Department), regulates the possession and use of radioactive material within the state. The NRC has signed similar agreement with other states. These states are referred to as Agreement States.

Under authority of the “Revised Statutes of Nebraska 1943 Article 35 (the Radiation Control Act), The Department issues licenses to users of radioactive material and performs inspections to ensure compliance with Title 180 Nebraska Administrative Code (NAC) Nebraska Regulations for Control of Radiation.

This document, “Regulatory Guide 3.4 "Guidance for Radioactive Material - Portable Gauge and X-ray Fluorescence Analyzers") is intended for use by applicants, licensees, DHHS license staff reviewers. It supersedes the guidance for applicants and licensees previously found in Regulatory Guide 3.4 (Rev 5) March 2011, "Radioactive Material Guidance for Portable Gauges and X-ray Fluorescence Analyzers.”

This guide uses current information found in the U.S. Nuclear Regulatory Commissions (NRC) NUREG 1556, Vol. 1 "Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Portable Gauge Licenses" and other sources.

B. Purpose of Guide

This guide provides instructions for preparing an application for a specific license authorizing possession and use of radioactive material in the form of sealed sources contained in portable moisture/density gauges, x-ray fluorescence (XRF) analyzers, and other portable devices.

Applicants or licensees wishing to renew their licenses should submit a complete application according to this Regulatory Guide 3.4.

Regulatory Guide 3.4, "Radioactive Material - Guidance for Portable Gauge and X-ray Fluorecence Analyzers", is also available electronically by visiting the Department’s Radioactive Materials Page (<http://www.dhhs.ne.gov/rad/>

This guide identifies the information needed to complete Form NRH 5 (Appendix A), "Application for Material License," for the use of sealed sources in portable gauging devices.

Appendix B “Supporting Information Requested in Items 4 through 14 of NRH Form 5” should be used as an attachment to Appendix A for portable gauging devices. The applicant should use this Appendix B as a checklist to ensure completeness of their submittal. Each sections of the

This regulatory guide addresses the variety of radiation safety issues associated with portable gauges or XRFs of many designs. As shown in Figure 1, portable gauges and XRFs are of many different designs based, in part, on their intended use (e.g., to measure moisture, density, thickness of asphalt, liquid level). Because of differences in design manufacturers provide appropriate instructions and recommendations for proper operation and maintenance. In addition, with gauges and XRFs of varying designs, the sealed sources may be oriented in different locations within the devices, resulting in different radiation safety problems.

Radioactive Material Licensee from other agreement states and NRC licensees who wish to conduct operations at temporary job sites in Nebraska should contact the Department. A licensee should request authorization well in advance of scheduled use to ensure compliance with Nebraska's reciprocity requirements.

C. Management Responsibility

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

To ensure adequate management involvement, a 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 information provided.
- Knowledge about the contents of the license and application;
- Committing adequate resources (including space, equipment, personnel, time, and if needed, contractors) to the radiation protection program to ensure that public and worker safety is protected from radiation hazards and compliance with regulations is maintained; and
- Selecting and assigning a qualified individual to serve as the Radiation Safety Officer (RSO) for their licensed activities.

Management must be committed to the As Low As Reasonably Achievable (ALARA) philosophy of maintaining occupational and public radiation does as low as reasonably achievable.

- All personnel using portable gauges or XRFs will be made aware of management's commitment to the ALARA philosophy and they will be instructed in the procedures necessary to keep their exposures as low as possible.
- The Radiation Safety Officer will be delegated authority to ensure adherence to ALARA principles. Management will support the RSO in stances where this authority must be asserted.
- All reasonable modifications will be made to procedures, equipment and facilities to reduce exposures, unless the cost is considered to be unjustified. Management will be

prepared to describe the reasons for not implementing modifications that have been recommended.

D. Applicable Regulations

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 this guide:

- 180 NAC 1 “General Provisions”
- 180 NAC 3 “Licensing of Radioactive Material”
- 180 NAC 4 “Standards for Protection Against Radiation”
- 180 NAC 10 “Notices, Instructions and Reports to Workers: Inspections”
- 180 NAC 13 “Transportation of Radioactive Material”
- 180 NAC 15 “Training and Experience Requirements for Use of Radiation Sources:
- 180 NAC 17 “Enforcement of Radiation Control Act and Rights to Hearing Procedures for Licensees and Registrants; Penalties”
- 180 NAC 18 “Fees for Certificates of Registration, Radioactive Material(s) Licenses, Environmental Surveillance, Emergency Response and other Regulatory Services”

The Department amends the regulations periodically. Notification of changes will be provided as they occur; when applicable, the changes should be incorporated into the radiation safety program.

To request copies of Nebraska’s Title 180 call the Nebraska Department of Health and Human Services, Radioactive Materials Program at (402)471-2079 or FAX (402)471-0169 or write to the Nebraska Department of Health and Human Services, Radioactive Materials Program, P.O. Box 95026, Lincoln, NE 68509. A current copy of Title 180 NAC., is also available on the Internet at http://dhhs.ne.gov/publichealth/Pages/puh_enh_rad_rg_regindex.aspx

To request a federal publication, call GPO’s order desk in Washington, DC at (202) 512-1800. Order the two-volume bound version of Title 10, Code of Federal Regulations, Parts 0-50 and 51-199 from the GPO, Superintendent of Documents, Post Office Box 371954, Pittsburgh, Pennsylvania 15250-7954. . They are also available on the Internet at <http://www.nrc.gov/reading-rm/doc-collections/cfr/>

Copies of U.S. Department of Transportation (DOT) regulations, 49 CFR can be ordered from the U.S. Government Printing Office by calling (904) 353-0569. The DOT’s regulations are also available on the Internet at <http://www.gpoaccess.gov/cfr/index.html>

II. Filing an Application

A. General

An application for a specific license for use of radioactive material in the form of sealed sources in portable devices should be submitted on NRH Form 5 (Appendix A), "Application For Radioactive Materials License" and Appendix B "Supporting Information Requested in Items 4 through 14 of NRH Form 5." Appendix B is a checklist for the applicant to ensure completeness of their submittal. Each section of the checklist refers to a number on the application (Appendix A). More detailed information about each item can be found in Part III of this Regulatory Guide 3.4.

The applicant should do the following:

- Be sure to use the most recent guidance in preparing an application.
- Complete Appendix A Items 1 through 3 and 15, on the form itself and items 4 through 14 should be completed on Appendix B.
- In addition to Appendix A and B each application will need to include the following Appendixes or alternative procedures:
 - Appendix E "Duties and Responsibilities of the Radiation Safety Officer"
 - Appendix F "Operating and Emergency Procedures"
 - Appendix G "Facility Diagram."
- If other supplemental pages are submitted with the application, identify and key them to the item number on the application or the topic to which it refers.
- Identify each supplementary page with applicants name and license number (if a renewal), item number which it relates to on Appendix B, page number and application date.
- Submit all documents, typed, on 8-1/2 x 11 inch paper.
- Avoid submitting proprietary information unless it is absolutely necessary.
- Submit an original, signed application and if possible a electronic copy on a diskette or CD.
- Retain one copy of the license application and attachments for future reference. When issued, the license will require that radioactive material be possessed and used in accordance with statements, representations and procedures provided in the application and supporting documentation.

All license applications are public information. If it is necessary to submit proprietary information, please contact the Department for specific information. Employee personal information, i.e., home address, home telephone number, social security number, date of birth, radiation dose¹ information, should not be submitted unless specifically requested by the Department.

¹ In this document, dose or radiation dose is used as defined in 180 NAC 1-002, i.e., a generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent. Terms are also defined in 180 NAC 1-002.

Mail the original application with all attachments to:

Nebraska Health and Human Services
Radioactive Materials Program
301 Centennial Mall South
P.O. Box 95026
Lincoln, NE 68509.

B. License Fees

The following fees are assessed:

Application fee A non-refundable fee for processing the license application. The amount is dependent on the category of license the applicant is seeking. Refer to 180 NAC 18-005 for the application fees. Review of the application will not begin until the proper fee is received.. Once technical review has begun, no fees will be refunded; application fees will be charged regardless of the Department's disposition of an application or the withdrawal of an application. An application fee is also required to process an application for a new license replacing an existing license due to a change of ownership.

Annual fee An annual fee covers department costs for administration of the materials licensing program. The amount is dependent on the license category. Refer to 180 NAC 18-005.05, item 22. Annual fees are due within 30 days of issuance of the new license; an invoice for this fee is included with the cover letter accompanying a new license.

Note: Fees are not charged for license renewals, amendment requests, inspections, license terminations, or requests for regulatory information (except for document copying costs).

Please make check or money order payable to “**Nebraska Department of Health and Human Services .**”

Direct all questions about the Department's fees to the Radioactive Materials Program in the Nebraska Department of Health and Human Services, Radioactive Materials Program.

III. Contents of an Application

1.a. Legal Name and Street Address

List the legal name and mailing address 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 applicant corporation or other legal entity must be specified by legal name as registered with the Nebraska's Secretary of State (402)471-4079 or http://www.sos.ne.gov/business/corp_serv/index.html An individual may be designated as the applicant only if the individual is acting in a private capacity and the use of the radioactive material is not connected with employment in a corporation or other legal entity.

Response from Applicant:

Provide the mailing address where correspondence should be sent. This may or may not be the same as the address at which the material will be used as specified in Item 1(b).

Note: The Department must be notified in the event of change of ownership or control and bankruptcy proceedings; see below for more details.

Timely Notification of Change of Ownership or Control:

Regulations: 180 NAC 3-025.

Criteria: *Licensees must provide full information and obtain the Department's prior written consent before transferring ownership or control of the license, or, as some licensees call it, "transferring the license."*

Changes in ownership may be the results of mergers, buyouts, or majority stock transfers. Although it is not the Department's intent to interfere with the business decisions of licensees, it is necessary for licensees to obtain prior Department written consent. This is to ensure the following:

- Radioactive materials are possessed, used, or controlled only by persons who have valid Department licenses;
- Materials are properly handled and secured;
- Persons using these materials are competent and committed to implementing appropriate radiological controls;
- A clear chain of custody is established to identify who is responsible for final disposal of the gauge(s) or XRF(s); and
- Public health and safety are not compromised by the use of such materials.

Response from applicant: None from an applicant for a new license; Appendix H identifies the information to be provided about changes of ownership or control.

Notification of Bankruptcy Proceedings

Regulation: 180 NAC 3-017.05

Criteria: *Immediately following filing of voluntary or involuntary petition for bankruptcy for or against a licensee, the licensee must notify the Department in writing, identifying the bankruptcy court in which the petition was filed and the date of filing.*

Even though a licensee may have filed for bankruptcy, the licensee remains responsible for all regulatory requirements. The Department needs to know when licensees 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.) The Department shares the results of its determination with other involved entities (e.g. trustee), so that health and safety issues can be resolved before bankruptcy actions are completed.

Response from applicant. None at time of application for a new license.

1.b. Street Address at Which Radioactive Material Will Be Used and/or Stored, If Different From 1a.

Response from Applicant:

Identify by street address any facilities or places of radioactive material use and/or storage other than described in Item 1.a. Do not list an address by post office box as this will not be sufficient for Department inspector to find the storage location.

Most applicants need to provide two types of information in response to Item 1b:

- Description of storage, use, and dispatch locations
- Specification of whether they intend to use the portable gauge or XRF at temporary job sites and
- Indicate whether they intend to store the portable gauge or XRF at temporary jobsites.

The Department does not consider long-term storage in vehicles or personal residences not listed on the license an acceptable practice. The license applicants should also include a description of those locations, such as personal residences where portable gauges or XFR may be stored by licensee staff for dispatch to customer sites.

An Department approved license amendment is required before receiving, using, and storing licensed material at an address or location not included with the application or already listed on the license.

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

Note: As discussed later under "Financial Assurance and Record keeping for Decommissioning," licensees need to maintain permanent records on where licensed material was used or stored while the license was in force. This is important for making future determinations about the release of these locations for unrestricted use (e.g., before the license is terminated). For portable gauge or XRF licensees, acceptable records are sketches or written descriptions of storage or use locations specifically listed on the license. Licensees do not need to maintain this information for temporary job sites where sources have never leaked.

2. Department To Use Radioactive Material – Contact Person

Response from Applicant:

Identify the individual who can answer questions about the application and include his or her telephone number. This is typically the radiation safety officer, unless the applicant has named a different person as the contact. The Department will contact this individual if there are questions about the application.

Notify the Department if the contact person or his or her telephone number changes so that the Department can contact the applicant or licensee in the future with questions, concerns, or information. This notice is for "information only" and does not require a license amendment.

3. License Action Type

Response from Applicant:

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

Note: Items 4-14 may be addressed by completing Appendix B “Supporting Information Requested in Items 4 through 14 of NRH Form 5.”

4. Individual User(s)

Regulations: 180 NAC 15-027

Criteria: *The Authorized User (AU) must be able to demonstrate competency in use, maintenance and transfer of a device by satisfactory completion of an eight hour course provided by the manufacturer of the device or an Department approved course.*

A portable gauge or XRF licensee does not have to list the name of each authorized users (AU) in the application. Radioactive material shall only be used by, or under the supervision and in the physical presence of, individuals who have successfully completed a manufacturer's or

Department approved training program for gauge or XRF users. Authorized users need to be approved in writing by the Radiation Safety Office

Maintaining documentation of training (including valid training certificates) for each user on file for inspection purposes is required to demonstrate that personnel are adequately trained.

The training program must provide that all AUs will complete either:

A manufacturer's training course consisting of 8 hours.

OR

An Department approved course. In order to approve a training course the Department will need a description of the training, including the topics covered in the training, the time to be spent on each topic, and the name and qualifications of the instructor. The training should be equivalent to that provided in the device manufacturer's training program. An instructor should have training in radiation safety and hands on experience. See Appendix I.

Response from Applicant:

- "The radiation safety officer will maintain documentation of training for authorized users and his/her approval of the authorized user."

5. Radiation Safety Officer (RSO)

Regulations: 180 NAC 3-011.01, 180 NAC 15-027

Criteria: *RSO's must have adequate training and experience. Have portable gauge or XRF manufacturer's course or equivalent course that meets Appendix I criteria.*

All licensees must have an RSO designated by and responsible to the corporation's management for the coordination of the radiation protection program and for ensuring compliance with the applicable regulations and license provision. As a minimum, the RSO shall have sufficient training and experience to be an Authorized User of the requested radioactive materials, unless otherwise specified in the license.

The RSO needs independent authority to stop operations that he or she considers unsafe. He or she must have sufficient time and commitment from management to fulfill certain duties and responsibilities to ensure that radioactive materials are used in a safe manner. Typical RSO duties are include:

- Stop unsafe licensed activities
- Proper use and maintenance of gauges or XRFs
- Personnel Training
- Incident response and investigation
- Gauge or XRF security and storage
- Material disposal
- Gauge or XRF transport
- Interactions with the Department
- Record maintenance
- Annual internal audit

See Appendix E for duties and responsibilities of the RSO.

The Department requires the name of the RSO on the license to ensure that the licensee management has identified a responsible, qualified person and that the named individual knows of his or her designation as RSO.

Response from Applicant: Provide either of the following:

- List name of the RSO and telephone number

And

- “The documentation for the training of the RSO are attached.”

And

- “The RSO will perform the duties and responsibilities of a RSO per Appendix E of Regulatory Guide 3.4, 'Radioactive Material –Guidance for Portable Gauges and X-ray Fluorescence Analyzers.’”

Or

- “Will provide alternate list of duties and responsibilities of the RSO per the criteria of Appendix E.”

Note:

- It is important to request an amendment to the license as soon as possible for changes in the designation of the RSO.

6. Radioactive Material Data

Regulation: 180 NAC 3-014

Criteria: *Licensees will only be authorized for sealed sources and devices registered by an Agreement State or the NRC.*

Agreement States and the NRC perform a safety evaluations of gauges or XRFs before authorizing manufacturers to distribute the gauges or XRFs to specific licensees. The safety evaluation is documented in a Sealed Source and Device (SSD) Registration Certificate, also called an SSD Registration Sheet. Each sealed source to be used in a given gauge or XRF or device should be specified by isotope (for example, cesium-137, americium-241, etc.) manufacturer and model number of the device, Sealed Source and Device Catalog manufacturer number and model number of each source and activity in either millicuries or microcuries.

Response from applicant:

- **Item 6.a:** Identify each radionuclide that will be used in each source in the gauging device(s).
- **Item 6.b:** Identify the manufacturer and model number of each sealed source that will be used in the gauging device or x-ray florescence analyzer. Confirm that each sealed source, device, and source/device combination is registered as an approved sealed source

or device by NRC or an Agreement State, and state Sealed Source and Device Catalog number.

- **Item 6.c:** Specify the maximum amount of radioactive material that will be in each sealed source. Confirm that the activity per source will not exceed the maximum activity listed on the approved Sealed Source and Device registration issued by NRC or an Agreement State.
- **Item 6.d:** Specify the purpose for use of the gauging device. For example, a moisture-density gauge is normally used for measuring moisture and density of construction materials. **AND** Identify the manufacturer and model number of the gauging device or XRF in which the sealed sources will be used.

Note: The NRC maintains the National Sealed Source and Device Registry (NSSDR). The Registry is a collection of registration certificates for sealed sources and devices which contain sealed sources. The registration certificates contain detailed information on the sources and devices, such as how they are permitted to be distributed and possessed (specific license, general license, or exempt), design and function, radiation safety, and limitations on use.

Financial Assurance and Record Keeping for Decommissioning

Regulations: 180 NAC 3-017.02, 180 NAC 3-018.

Criteria: *Portable gauge or XRF licensees possessing sealed sources containing radioactive material in excess of the limits specified in 180 NAC 3-018 must provide evidence of financial assurance for decommissioning.*

Licensees are required to maintain, in an identified location, decommissioning records related to structures and equipment where gauges or XRFs are used or stored and maintain records about any unusual occurrences (e.g. leaking sources or other indicants that involve spread of contamination). Licensees must transfer these records important to decommissioning either to the new licensee before licensed activities are transferred or assigned in accordance with 180 NAC 3-017.02 or to the Department before the license is terminated.

The requirements for financial assurance are specific to the types and quantities of radioactive material authorized on a license. Most portable gauge or XRF applicants and licensees do not need to comply with the financial assurance requirements because the thresholds for sealed sources are 3.7×10^6 gigabecquerels (100,000 curies) of cesium-137 or 3.7×10^3 gigabecquerels (100 curies) of americium-241 or californium-252. Thus, a licensee would need to possess hundreds of gauges or XRF's (typically containing about 0.30 gigabecquerels (8 millicuries) of cesium-137 and 1.5 gigabecquerels (40 millicuries) of americium-241) before the financial assurance requirements would apply. Since the standard portable gauge or XRF license does not specify the maximum number of gauges or XRFs that the licensee may possess (allowing the licensee flexibility in obtaining gauges or XRFs as needed without amending its license), it contains a condition requiring the licensee to limit its possession of gauges or XRFs to quantities not requiring financial assurance for decommissioning. Applicants and licensees desiring to possess gauges or XRFs exceeding the threshold amounts must submit evidence of financial assurance.

Note: For portable gauge or XRF licensees whose sources have never leaked, acceptable records important to decommissioning are sketches or written description of portable gauge or XRF storage or use locations specifically listed on the license. Similar information need not be maintained for temporary job sites.

Response from applicants: No response is needed from most applicants. If financial assurance is required, submit evidence.

7. & 8. Training of Individual and Experience

Regulations: 180 NAC 10-002, 180 NAC 1-003 item 1, 180 NAC 15-027.

Criteria: *Authorized users must have adequate training and experience. See item “4. Individual User(s)” and item “5. Radiation Safety Officer.”*

Response from Applicant: Provide the following:

- “Authorized users and the radiation safety officer will demonstrated competency in use, maintenance and transfer of the device(s) by satisfactory completion of eight (8) hour course- provided by the manufacturer of the gauge or XRF

Or

-Department approved course provided by licensee.” See Appendix I for course criteria

Note: The licensee will need to maintain training records on file for each authorized user and will maintain records showing the approval by the RSO of the authorized users. This will be reviewed at the time of inspection.

9. Radiation Detection Instruments

Regulations: 180 NAC 3-011, 180, NAC 4-021.04, 180 NAC 4-048

Criteria: *A radiation survey meter should be capable of detecting gamma radiation and be checked for functionality before use (e.g. with the gauge or XRF or a check source)*

Survey meters are not normally required if the applicant plans only to use the gauges or XRFs and devices for their intended use and does not perform non routine maintenance on the gauges or XRF and/or devices involving access to the sources and source holders.

However, if the applicant does intended to perform non-routine maintenance, the survey instrument(s) that will be available at each site where non-routine maintenance will be performed should be specified. At least one low range beta-gamma (0-20 or 0-50 mR/hr) survey meter should be available at each maintenance area for monitoring during and following the non-routine maintenance procedures. Approval of non-routine maintenance also requires submittal of personnel qualifications and non-routine maintenance procedures for review.

There are other situations where a survey meter is needed to determine whether a gauge’s or XRF’s shielding is intact or if the radioactive source has been breached (e.g., receipt of a

damaged gauge or XRF, incidents involving a gauge or XRF being run over at a construction site, etc.). In most cases, the source will remain intact. Nonetheless, such incidents necessitate seeking technical assistance to arrange for a timely evaluation of the source's integrity following an incident or receipt of a damaged package. Therefore, emergency procedures need to include instructions regarding access to a survey meter.

Appendix N "Guide to SI Units for Radiation Protection: may be helpful to you.

Response from Applicant: Provide the following:

- "We will possess and use, a radiation survey meter that meets the criteria in the section entitled 'Radiation Detection Instruments' in Regulatory Guide 3.4, 'Radioactive Material --Guidance for Portable Gauges and X-ray Fluorescence Analyzers' Revision 6, in the event of an incident."

OR

- "We have access to a radiation survey meter that meets the criteria in the section entitled 'Radiation Detection Instruments' in Regulatory Guide 3.4, 'Radioactive Material – Guidance for Portable Gauges and X-ray Fluorescence Analyzers' in the event of an incident " **And**
- Attach a plan of how an instrument will be obtained.

Note:

- Applicants who plan to perform non-routine maintenance that requires removing the source or source rod from the gauge will need to possess and use a radiation survey meter that meets more stringent criteria. Refer to the section on Radiation Protection Program - Maintenance and Appendix J for more information.

10. Calibration of Instruments Listed in Item 9

If radiation detection instruments will be used, mark the appropriate box to indicate how calibrations will be performed. Calibrations should be sensitive enough to detect all types of radiation emitted from the gauge or XRF sources, and should meet all requirements identified in Appendix J.

Response from Applicant:

Calibration by Service Company

- "We will possess a survey meter and will have the instrument calibrated annually. The calibration service company's name, address, license number and the state or federal Department that issued the company's license is provided below."

Name _____

Address _____

License number _____

Issuing Agency _____

Or

Calibration By Applicant

- “We will calibrate the survey instruments in-house annually. We have submit detailed information describing the facilities, equipment, personnel, and procedures to be used to perform the calibrations.” **And**
- Provide an in-house calibration procedure for Department approval.

Note: Contact the Department for criteria for in house calibrations.

Or

- NA if you plan to access a survey meter.

11. Personnel Monitoring Devices

Regulations: 180 NAC 4-005, 180 NAC 4-006, 180 NAC 4-011, 180 NAC 4-012, 180 NAC 4-022.

Criteria: *Applicants must do either of the following:*

- *Provide dosimetry processed and evaluated by a National Voluntary Laboratory Accreditation Program (NVLAP) approved processor that is exchanged at a frequency recommended by the processor.*

Or

- *Maintain, for inspection by the Department, documentation demonstrating that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10 percent of the allowable limits. Annual Dose limits for radiation workers 180 NAC 4-004:*

Skin 0.50 Sv (50 rems)

Eyes 0.15 Sv (15 rems)

Elbows to hands 0.50 Sv (50 rems)

Knees to feet 0.50 Sv (50 rems)

Total effective dose equivalent TEDE (whole body) 0.05 Sv (5 rems)

Normally, personnel using portable moisture-density gauges or XRFs wear personnel monitoring devices although under conditions of routine for most users this is not required. Users of devices exhibiting low radiation levels at the surface of the device, such as x-ray fluorescence analyzers, etc. are not usually required to wear personnel monitoring devices.

Part 1 of Appendix K provides guidance on preparing a written evaluation demonstrating that users are not likely to exceed 10 percent of the applicable limits and thus, are not required to have personnel dosimetry.

Most licensees use either film badges or thermoluminescent dosimeters (TLDs) or Optically Stimulated Luminescence Dosimetry (OSLs) that are supplied by a NVLAP-approved processor. Applicants should verify that the processor is NVLAP-approved. A list of NVLAP accredited dosimetry vendors is available on the Internet at <http://ts.nist.gov/standards/scopes/dosim.htm>

Each order of badges includes a control badge for measuring the amount of background

radiation the badges receive each monitoring period and radiation received during shipping. This enables the control badge's reading to be subtracted from the total reading to provide an accurate record of each worker's occupational exposure. When not in use, personnel monitoring badges should be stored with the control badge to ensure accurate dosimetry records. The control badge must be returned with the other personnel monitoring badges each monitoring period.

Response from Applicant: Provide either of the following:

- “We will provide dosimetry processed and evaluated by a NVLAP approved processor that is exchanged at a frequency recommended by the processor.”

“We will be using the following type:

Film Badge TLD OSLD Other (Specify) _____

The supplier is: _____

The exchange frequency is:

Monthly Quarterly Other (Specify)

Or

- “We will maintain, for inspection by the Department, documentation demonstrating that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10 percent of the allowable limits of 180 NAC 4”

Note: See Appendix K for guidance on demonstrating that unmonitored individuals are not likely to exceed 10 percent of the allowable limits.

12. Facilities and Equipment

Regulations: 180 NAC 3-11 item 2, 180 NAC 3-017.06, and 180 NAC 4-031.

180 NAC 3-011 item 2 states that an application will be approved if, among other things, the applicant's proposed equipment, facilities, and procedures are adequate to minimize danger to the public health and safety. 180 NAC 4-031 states that (1) sources of radiation shall be secured against unauthorized removal from the place of storage, (2) sources of radiation in an unrestricted area and not in storage shall be tended under the constant surveillance and immediate control of the licensee or registrant and (3) each portable gauge licensee must use a minimum of two independent physical controls that form tangible barriers to secure portable gauges from unauthorized removal, whenever portable gauges are not under the control and constant surveillance of the licensee.

You should keep in mind that the device needs to be in storage or physically watched by authorized users at all times. It is not acceptable for a device to be chained to a post or left lying unattended at the place of use during lunch or breaks, because the device would then be accessible to unauthorized persons.

Response from Applicant:

- “A diagram of the permanent gauge or XRF facility is attached.”

Note: The diagram identifies all entrances and points of access, rooms, uses of the room, the location of the gauge or XRF storage area, and its distance from occupied work area. See Appendix G for an example diagram and a form.

- “As a portable gauge licensee we will use a minimum of two independent physical controls that form tangible barriers to secure portable gauges from unauthorized removal, whenever portable gauges are not under the control and constant surveillance of the licensee.”

Indicate how the storage area is secured to prevent unauthorized removal of portable gauges and/or XRF devices.

13. Radiation Protection Program

13A. Operating and Emergency Procedures

Regulations: 180 NAC 1-011, 180 NAC 3-016.02, 180 NAC 4-004, 180 NAC 4-031, 180 NAC 4-032, 180 NAC 4-057-059, 180 NAC 3-026 and 180 NAC 10.

Criteria: *Each applicant must do the following:*

- *Develop, implement, and maintain operating and emergency procedures which ensure compliance with 180 NAC 10 “Notices and Instructions and Reports to Worker, Inspections” and 180 NAC 4 “Standards for Protection Against Radiation.”: containing the following elements:*
 - *Instructions for using the portable gauge or XRF and performing routine maintenance, according to the manufacturer's recommendations and instructions*
 - *Instructions for maintaining security during storage and transportation. See Appendix V*
 - *Instructions to keep the gauge or XRF under control and immediate surveillance during use*
 - *Steps to take to keep radiation exposures ALARA*
 - *Steps to maintain accountability during use*
 - *Steps to control access to a damaged gauge or XRF and*
 - *Steps to take, and whom to contact, when a gauge or XRF has been damaged. Include the DHHS emergency response phone numbers which includes the Nebraska State Patrol’s 24 hour emergency number.*
 - *Safety measures to be used in transporting the device in the applicant’s vehicle (for example, fully secured within the transportation vehicle and away from the passenger compartment).*
 - *Specific instructions for performing leak tests.*
 - *Emergency procedures to be followed in case of accidents involving damage or loss of the gauges, XRF or devices, including names and telephone numbers of the individual(s) within the applicant’s organization who should be notified and who would, in turn, notify the local police and appropriate state personnel.*
 - *Specific instructions to users informing them that any maintenance on the gauges or XRFs involving dismantling, removal of source holder(s) etc., must not be performed by the user and must only be performed by the manufacturer of the device, unless the applicant has specifically requested authority for performing maintenance.*
- *If gauges are used for measurements with the unshielded source extended more than 3 feet beneath the surface, licensees must do the following:*

- *Require use of surface casing or alternative procedures to ensure the source can move freely in the holes provide instructions for procedures to follow to retrieve a stuck source, require reporting to the Department pursuant to 180 NAC 3-026.02 Item 2 when a stuck source cannot be retrieved .*
- *Provide copies of operating and emergency procedures to all gauge users and at each job site.*
- *Provide copies of operating and emergency procedures to all gauge users and at each job site.*

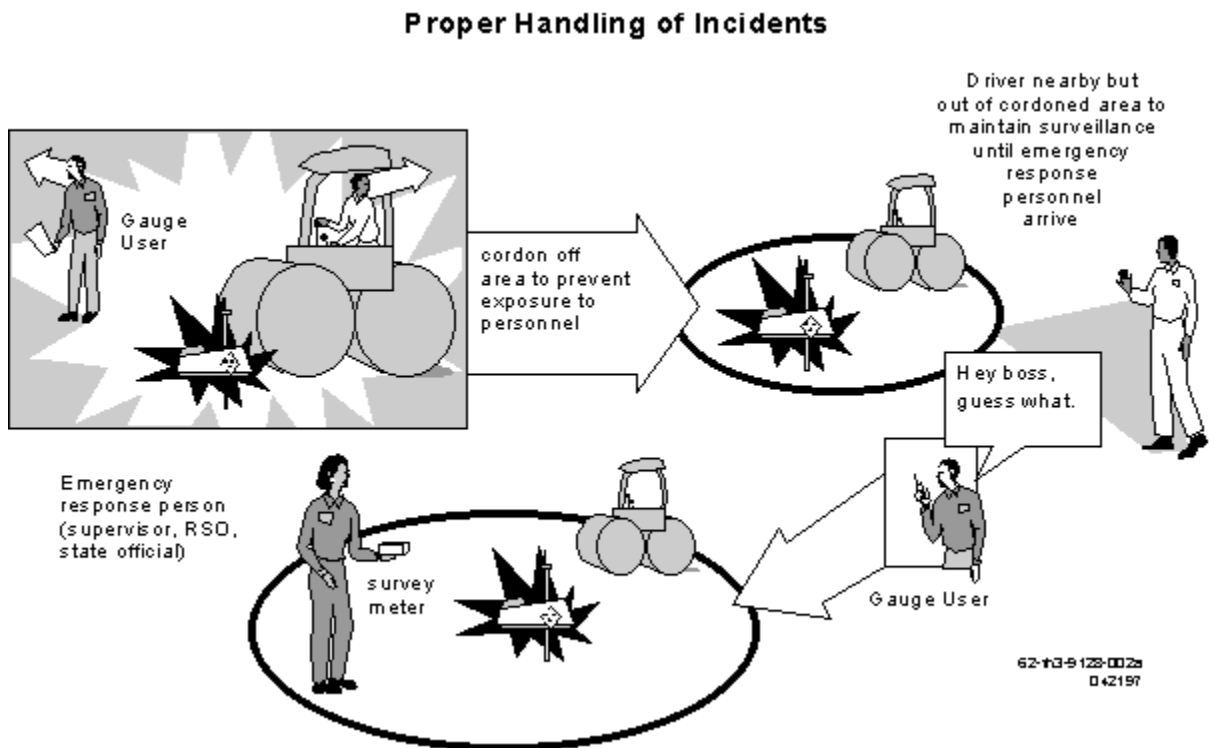


Figure 2 Proper Handling. Gauges or XRFs are often damaged by heavy equipment at job sites and emergency procedures need to minimize radiation safety risk.

Lost or stolen gauges or XRFs and, as illustrated in Figure 2, gauges or XRFs damaged by heavy equipment during use at job sites, are the most common occurrences that present a potentially significant radiation safety risk. Figure 3 illustrates steps that should be taken to prevent loss, theft, or unauthorized use. Operating and emergency procedures should be developed to minimize these risks. Use a minimum of two independent physical controls that form tangible barrier to secure portable gauges from unauthorized removal, whenever the gauges are not under the control and constant surveillance of the licensee. When gauges or XRFs are not in use, licensees are encouraged to:

- Keep gauges or XRFs locked in covered vehicle compartments; and
- Avoid parking vehicles in areas vulnerable to theft.

Operating and emergency procedures should be developed to minimize these risks. The Department considers security of gauges or XRF extremely important, and lack of security is a

significant violation for which gauge or XRF licensees are fined. See Appendix F for sample procedures and Appendix V.

Certain portable gauges are used to make measurements with the unshielded source extended more than 3 feet beneath the surface. Unless precautionary measures are taken, it is possible for the source to be buried under dirt or concrete that collapses around the source during the measurements. Precautionary measures need to be planned in advance to prevent these sources from being buried and to recover sources should they become stuck. To ensure that the hole is free of debris, it is not likely that debris will re-enter the cased hole, and the source will be able to move freely, it is acceptable for licensees to use surface casing from the lowest depth to 12 inches above the surface. If it is not feasible to extend the casing 12 inches above the surface, licensees may cap the hole and use dummy probes before making measurements with an unshielded source to ensure that the hole is free of obstructions.

XRF users are not required to have shipping papers however, a UN 2911 marking must be placed on the outside of the package 49 CFR 173.422(a) whenever it is transported or shipped. See 49 CFR 173.424 for DOT requirements concerning excepted packages for radioactive instrument and articles. See Appendix M for sample of UN 2911 label.

Notify the Department when gauges or XRFs are lost, stolen, or certain other conditions are met. Refer to the 180 NAC 4-057 to 059 for a description of when and where notifications are required.

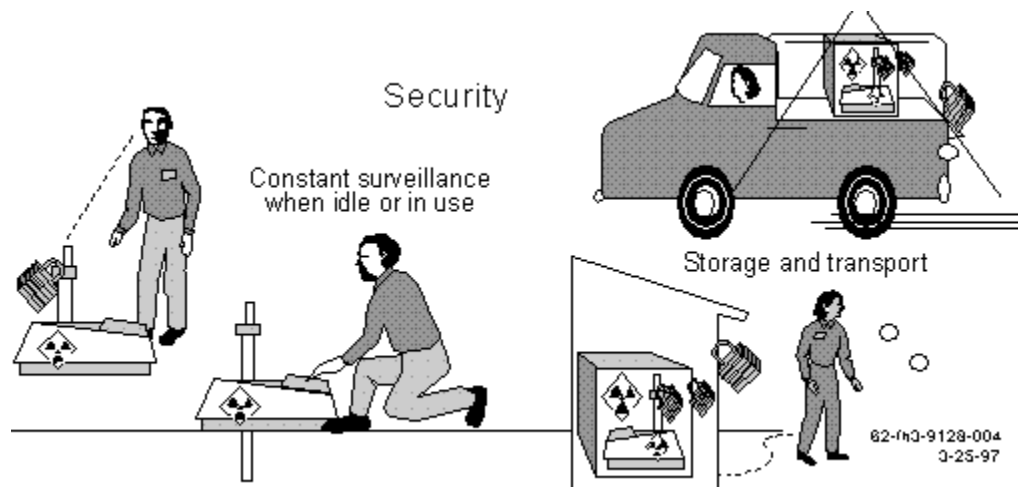


Figure 3 **Security.** To avoid lost or stolen gauges or XRFs, licensees must keep the gauges or XRFs under constant surveillance, or secured against unauthorized use or removal.

Response from Applicant: Do the following:

- “We have implemented and will maintain operating and emergency procedures in Appendix F Regulatory Guide 3.4 “Radioactive Material Guidance for Portable Gauges and X-ray Fluorescence Analyzers.” “Copies of these procedures will be provided to all authorized users and at each job site.”

(A copy of these Operating and Emergency Procedures will be copied from Regulatory Guide 3.4. The information to individualize the procedure will be completed.)

Or

- “We have implemented and will maintain operating and emergency procedures submitted with this application. They meet the criteria of section titled Radiation Protection Program – Operating and Emergency Procedures in Regulatory Guide 3.4 “Radioactive Material Guidance for Portable Gauges and X-ray Fluorescence Analyzers.”. Copies of these procedures will be provided to all authorized users and at each job site.”

13B. Leak Tests

Regulations: 180 NAC 1-006, 180 NAC 1-011.

Criteria: *The Department requires licensee to perform a leak test to determine whether or not there is any leakage from the radioactive source in the device. The Department finds testing to be acceptable if it is conducted by a Leak Test vendor that has been approved by the Department, the U.S. Nuclear Regulatory Commission or other Agreement State.*

The leak test is typically performed at 6 month intervals or alternative intervals offered by the Department, NRC or Agreement State as specified in the SS & D regulation sheet. The measurement of the leak-test sample is a quantitative analysis requiring that instrumentation used to analyze the sample be capable of detecting 185 becquerels (0.005 microcurie) of radioactivity.

Options for leak testing are:

- (1) Manufacturers, consultants, and other organizations may be authorized by the Department, the U.S. Nuclear Regulatory Commission or other Agreement State.
- (2) Use a commercial leak test kit. The licensee is expected to take the leak test sample according to the gauge or XRF manufacturer's and the kit supplier's instructions and return it to the kit supplier for evaluation and reporting results.
- (3) Licensees may also be authorized to conduct the entire leak test sequence themselves.

Response from Applicant:

- “Leak tests will be performed at 6 month intervals or approved by the Department, an Agreement State, or the U.S. Nuclear Regulatory Commission and specified in the Sealed Source and Device Registration Sheet.”

And

- “Leak tests will be performed by an organization authorized by the Department, an Agreement State or the U.S. Nuclear Regulatory Commission to provide leak testing services for other licensees and/or using a leak test kit supplied by an organization authorized by the Department, an Agreement State or U.S. Nuclear Regulatory Commission to provide leak test kits to other licensees and according to the kit supplier's instructions.”

Name of licensee and license # performing maintenance:

And/Or

Supplier of leak test kit _____

Model number of kit _____

Suppliers Address _____

Or

- “The licensee may be authorized to conduct the leak test and analysis by the Department.”
Note: Appendix L in Regulatory Guide 3.4 “Radioactive Material Guidance for Portable Gauges and X-ray Fluorescence Analyzers,” indicates the criteria and procedure for in house leak testing.

13C. Maintenance

Regulations: 180 NAC 4-004, 180 NAC 3-016.02.

Criteria: Licensees must routinely clean and maintain gauges or XRFs according to the manufacturer's recommendations and instructions. For gauges with a source rod, radiation safety procedures for routine cleaning and lubrication of the source rod and shutter mechanism (e.g., to remove caked dirt, mud, asphalt, or residues from the source rod; lubricate the shutter mechanism) must consider ALARA and ensure that the gauge functions as designed and source integrity is not compromised.

Non-routine maintenance or repair (beyond routine cleaning and lubrication) that involves detaching the source or source rod from the device and any other activities during which personnel could receive radiation doses exceeding Department limits must be performed by the gauge or XRF manufacturer or a person specifically authorized by the Department, the U.S. Nuclear Regulatory Commission or other Agreement State. Requests for specific authorization to perform non-routine maintenance such as detachment of the source or source rod from the device or repair (see Appendix J) must demonstrate that personnel performing the work do the following:

- Have adequate training and experience;
- Use equipment and procedures that ensure compliance with regulatory requirements, and consider ALARA; and
- Ensure that the gauge or XRF functions as designed and that source integrity is not compromised.

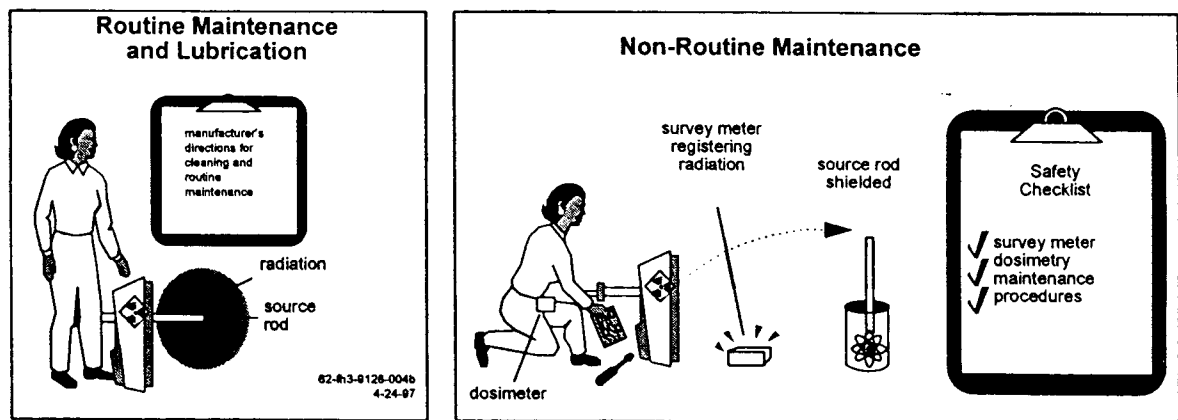


Figure 4 Maintenance. All licensees need to perform routine cleaning and lubrication to ensure proper operation of the gauge or XRF. For non-routine maintenance, most

licensees rely on the gauge or XRF manufacturer or other service companies.

Generally, the Department permits portable gauge or XRF **licensees** to perform routine maintenance of the gauges or XRFs provided that they follow the gauge or XRF manufacturer's recommendations and instructions. Although manufacturers may use different terms, "routine maintenance" includes, but is not limited to, cleaning, lubrication, changing batteries or fuses, repairing or replacing a handle. Routine maintenance does NOT include any activities that require removing the sealed source or source rod from the gauge.

The Department license will state that any cleaning, maintenance, or repair of gauges that requires detaching the source or source rod from the gauge shall be performed only by the manufacturer or other persons specifically licensed by the Department, the U.S. Nuclear Regulatory Commission or other Agreement State to perform such services. Most licensees do not perform non-routine maintenance or repair operations that require detaching the source or source rod from the gauge; they usually return the gauge to the manufacturer.

Response from applicant:

Routine cleaning and lubrication: Submit either of the following:

- "We will implement and maintain procedures for routine maintenance of our gauges or XRFs according to each manufacturer's recommendations and instructions."
- Or**
- Alternative procedures for the Department's review see Appendix J for the criteria to be used.

Non-routine maintenance or repair operations that require detaching the source or source rod from the gauge: Submit either of the following:

- "We will send the gauge to the manufacturer or other person authorized by the Department, the U.S. Nuclear Regulatory Commission or other Agreement State to perform non-routine maintenance or repair operations that require detaching the source or source rod from the gauge."
- Or**
- "We will provide needed information to support request to perform non-routine maintenance per Appendix J of Regulatory Guide 3.4 "Radioactive material Guidance for Portable Gauges and X-ray Fluorescence Analyzers." **And** Submit non-routine maintenance procedures for the Department's review. See Appendix J for the criteria to be used.

13D. Transportation

Regulations: 180 NAC 13-005, 49 CFR Parts 171-178, 180 NAC 4-004.

Criteria: *Applicants must develop, implement, and maintain safety programs for public transport of radioactive material to ensure compliance with U.S. Department of Transportation (DOT) regulations.*

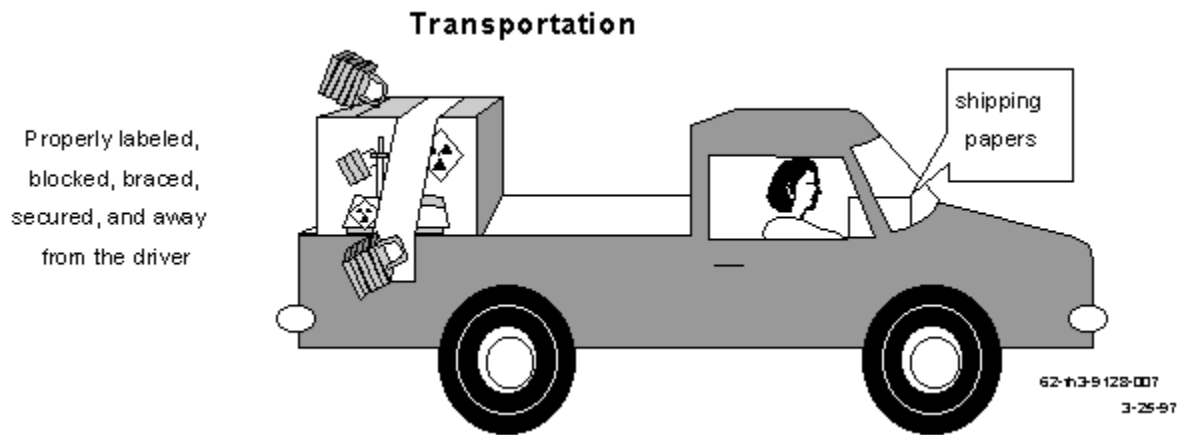


Figure 5 **Transportation.** Licensees often transport their gauges or XRF to and from job sites and must ensure compliance with Department of Transportation regulations.

Figure 5 illustrates some DOT requirements often overlooked by portable gauge or XRF licensees. During an inspection, the Department uses the provisions of 180 NAC 13-005 (which reference the DOT regulations.) to examine and enforce transportation requirements applicable to portable gauge or XRF licensees. Appendix M lists major DOT regulations and provides a sample shipping paper. Appendix N “Guide to SI Units for Radiation Protection” may be helpful to you when filling out the shipping papers.

Response from Applicant: No response is needed from applicants during the licensing process; this issue will be reviewed during inspection.

References: “*Radioactive Materials Regulations Review*” (RAMREG-001-98) U.S. Department of Transportation Research & Special Programs Administrative.

13E. Audit Program

Regulations: 180 NAC 4-004, 180 NAC 4-047.

Criteria: Licensees must review the content and implementation of their radiation protection programs annually to ensure the following:

- Compliance with the Department and DOT regulations, and the terms and conditions of the license;
- Occupational doses and doses to members of the public are as low as reasonably achievable (ALARA) (180 NAC 4-004); and
- Records of audits and other reviews of program content are maintained for 3 years.

Appendix O contains a suggested audit program that is specific to the use of portable gauges or XRFs and is acceptable to Department. All areas indicated in Appendix O may not be applicable to every licensee and may not need to be addressed during each audit.

Currently the Department’s emphasis in inspections is to perform actual observations of work in progress. As a part of their audit programs, applicants should consider performing unannounced

audits of gauge or XRF users in the field to determine if, for example, Operating and Emergency Procedures are available, are being followed, etc.

The RSO needs to ensure that the annual audits are conducted, but does not necessarily need to do it himself/herself. In fact, if the RSO is one of the authorized gauge or XRF users, it may be beneficial for a qualified individual (e.g., radiation safety consultant, the corporate radiation safety office) who is not associated with day-to-day operations to conduct the audit. Specify who will perform this function.

These audits may be conducted as “mini inspections” and may include observation of some or all of the licensee’s authorized users during actual or simulated use of portable gauges or XRFs. Inspections have identified the following as common violations among portable gauge or XRF licensees: failure to perform leak test or conduct inventories at the required frequency; failure to transport gauges or XRFs in compliance with DOT regulations; unauthorized personnel using gauges or XRFs independently; possession and use of sealed sources/device combinations other than those specified on the license; and unauthorized individual as RSO.

It is essential that once identified, problems be corrected comprehensively and in a timely manner. The Department will review the licensee's audit results and determine if corrective actions are thorough, timely, and sufficient to prevent recurrence. If violations are identified by the licensee and these steps are taken, the Department can exercise discretion and may elect not to cite a violation. The Department’s goal is to encourage prompt identification and prompt, comprehensive correction of violations and deficiencies.

With regard to audit records, 180 NAC 4-047.01 requires licensees to maintain records of "... audits and other reviews of program content and implementation." The Department has found audit records that contain the following information to be acceptable: date of audit, name of person(s) who conducted audit, persons contacted by the auditor(s), areas audited, audit findings, corrective actions, and follow-up.

Response From Applicant:

- “We will have an audit program.”

Note: See Appendix O for a sample audit program. The audit program will be reviewed during an inspection.

13F. Material Receipt and Accountability

Regulations: 180 NAC 3-016.02, 180 NAC 3-018, 180 NAC 3-025, 180 NAC 3-030, 180 NAC 4-038 and 4-038.5, 180 NAC 1-004.

Criteria: *Licensees must do the following:*

- *Maintain records of receipt, transfer, and disposal of gauges or XRFs and*
- *Conduct physical inventories at intervals not to exceed 6 months to account for all sealed sources.*

As illustrated in Figure 6 licensed materials must be tracked from "cradle to grave" in order to ensure gauge or XRF accountability, identify when gauges or XRFs could be lost, stolen, or misplaced, and ensure that, if the licensee possesses gauges or XRFs exceeding threshold

amounts, the licensee complies with financial assurance requirements in 180 NAC 3-018. Many licensees record daily use of gauges or XRFs in a log book as part of their accountability program. See, Appendix P for an example of a utilization log.

Each licensee must establish, and retain written procedures for safely opening packages in which radioactive material is received; and ensure that the procedures are followed and that due consideration is given to special instructions for the type of package being opened.

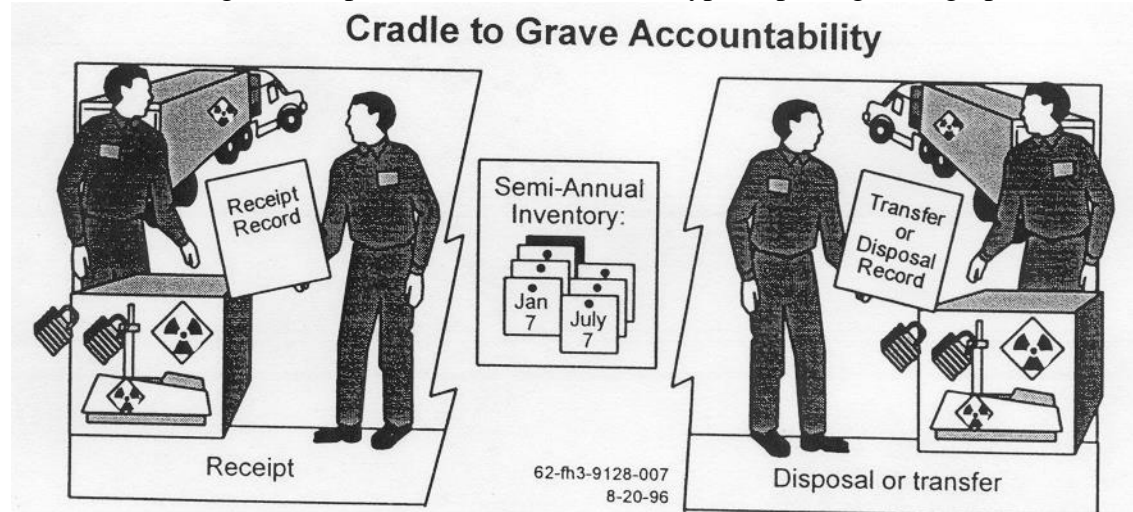


Figure 6 **Material Receipt and Accountability.** Licensees must maintain records of receipt and disposal and conduct semiannual inventories.

Response from Applicant: Provide either of the following:

- "Physical inventories will be conducted at intervals not to exceed 6 months, to account for all sealed sources and devices received and possessed under the license."

Note: See Appendix Q for a sample inventory procedure, Appendix R for inventory form and Appendix P for a utilization log.

- These items will be reviewed during an inspection.

Or

- A description of the frequency and procedures for ensuring that no gauge or XRF has been lost, stolen, or misplaced and that, if the licensee possesses gauges or XRFs exceeding threshold amounts, the licensee complies with financial assurance requirements in 180 NAC 3-018.

Note:

- Alternative responses will be evaluated against the criteria listed above.
- Inventory records should be maintained and contain the following types of information:
 - Radionuclide and amount (in units of becquerels or curies) of byproduct material in each sealed source;
 - Manufacturer's name, model number, and serial number (if appropriate) of each device containing byproduct material;
 - Location of each sealed source and device;
 - Date of the inventory.

13G. Public Dose

Regulations: 180 NAC 4-013, 180 NAC 4-014, 180 NAC 1-002, 180 NAC 4-031, 180 NAC 4-032, 180 NAC 4-053.

Criteria: Licensees must do the following:

- Ensure that licensed gauges or XRFs 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 millisievert (mSv) [2 mrem (millirem)] in any one hour, from licensed operations.
- Control and maintain constant surveillance over gauges or XRFs that are not in storage and secure stored gauges or XRFs from unauthorized removal or use.

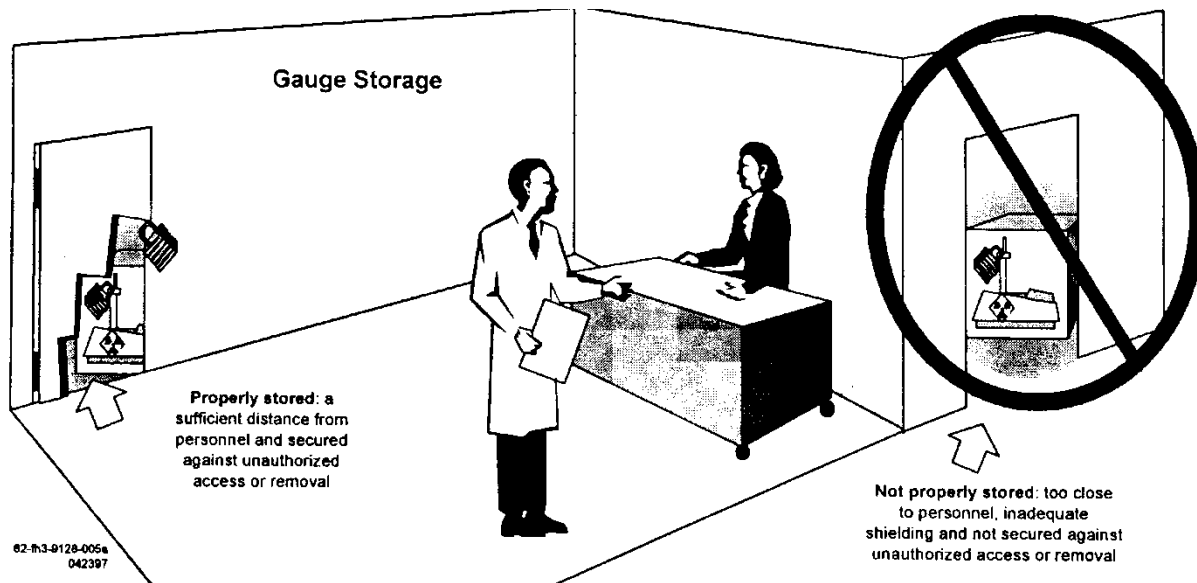


Figure 7 **Storing Gauges or XRFs. Gauges or XRFs should be stored away from occupied areas and secured against unauthorized removal.**

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

Operating and emergency procedures regarding security and surveillance specified under that section of this document should be sufficient to limit the exposure to the public during use or storage and after accidents. Public dose is controlled, in part, by ensuring that gauges or XRFs not in use are stored securely (e.g., stored in a locked area) to prevent unauthorized access or use. See Figure 7. If gauges or XRFs are not in storage, then authorized users must maintain constant surveillance to ensure that members of the public, who could be co-workers, cannot get near the gauges or XRFs nor use them, and thus receive unneeded radiation exposure.

Public dose is also affected by the choice of storage location and conditions. Since a gauge or XRF presents a radiation field during storage, it must be stored so that the radiation level in an unrestricted area (e.g., an office or the exterior surface of an outside wall) does not exceed 1 mSv (100 mrem) in a year or 0.02 mSv (2 mrem) in any one hour. Use the concepts of time, distance, and shielding when choosing a permanent or temporary storage location. Decreasing the time

spent near a gauge or XRF, increasing the distance from the gauge or XRF, and using shielding (i.e., brick, concrete, lead, or other solid walls) will reduce the radiation exposure. As a rule of thumb, gauges or XRFs should be stored as far away as possible from areas which are occupied by members of the public.

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 gauge(s) or XRF(s). See Part 2 of Appendix K for examples.

If, after making an initial evaluation, a licensee makes changes affecting the storage area (e.g., changing the location of gauges or XRFs within the storage area, removing shielding, adding gauges or XRFs, changing the occupancy of adjacent areas, moving the storage area to a new location), then the licensee must ensure that gauges or XRFs are properly secured, perform a new evaluation to ensure that the public dose limits are not exceeded, and take corrective action, as needed.

Response from Applicant:

The applicant is not required to submit a response to the public dose section during the licensing phase. This matter will be examined during an inspection. See Appendix K for more detailed instructions on how to make a public dose evaluation and document the evaluation.

14. Waste Disposal

Regulations: 180 NAC 1-004, 180 NAC 3-019, 180 NAC 3-025, 180 NAC 3-030, 180 NAC 4-039

Criteria: *Radioactive materials must be disposed of in accordance with Department requirements by transfer to an authorized recipient. Appropriate records must be maintained.*

Significant problems can arise from improper gauge or XRF transfer or failure to dispose of gauges or XRFs in a proper and timely manner. Such problems include the possession of radioactive materials by unauthorized individuals, which could result in exposure to members of the general public. When disposing of portable gauges or XRFs, licensees must transfer them to an authorized recipient. Authorized recipients are the original manufacturer of the device, a commercial firm licensed by an Agreement State or NRC to accept radioactive waste from other persons, or another specific licensee authorized to possess the licensed material (i.e., their license specifically authorizes the type, form, and quantity of the byproduct material).

Before transferring radioactive material, a licensee must verify that the recipient is properly authorized to receive it using one of the methods described in 180 NAC 3-025. In addition, all packages containing radioactive sources must be prepared and shipped in accordance with Department and DOT regulations. Records of the transfer must be maintained as required by 180 NAC 1-004.

Response from Applicant:

- “Disposal will be by transfer of the radioactive material to a licensee specifically authorized to possess it.”

NOTE: Because of the difficulties and costs associated with disposal of americium-241 sealed neutron sources, applicants should preplan the disposal. Applicants may want to consider contractual arrangements with the source supplier as part of a purchase agreement.

Item 15: Citizenship Attestation

180 NAC 7	Applicability
7-041	√
7-044	√
7-048	√
7-055	√
7-065	√
7-067	√
7-085	√

Item 15 must be completed by all applicants.

Check the first box if the application is for a corporation or other separate legal entity (Continue to Item 15), otherwise check the second box. If the second box is checked, continue to the next section under the “United State Citizenship Attestation Form.” Check the appropriate box and sign. Continue to item 15.

16: Certification

Item 15 must be completed on the form itself.

Individuals acting in a private capacity are required to date and sign NRH Form 5. Otherwise, representatives of the corporation or legal entity filing the application should date and sign NRH Form 5. Representatives signing an application must be authorized to make binding commitments and to sign official documents on behalf of the applicant such as the president, vice president, chief executive officer or principal/owner. As discussed previously in "Management Responsibility," signing the application acknowledges management's commitment and responsibilities for the radiation protection program. The Department will return all unsigned applications for proper signature.

See Appendix W for a sample of a delegation of authority form that must be completed and signed and attached to the application, if someone other than a corporate officer wants to correspond with the department as a certifying official.

IV. Amendments to a License

After you are issued a license, you must conduct your program in accordance with (1) the statement, representation, and procedures contained in your application, (2) the terms and conditions of the license, and (3) Title 180 NAC.

It is the licensee’s obligation to keep their license current. The license must be amended if any changes in the facilities, equipment, procedures, RSO or radioactive material used are planned. The license should anticipate the need for a license amendment insofar as possible. If any of the information provided in the application is to be modified or changed, submit an application for a license amendment. Submittal of an amendment request does not allow immediate implementation of proposed changes. Until the license has been amended to approve the change(s), the licensee must comply with the original terms and conditions of the license.

An application for a license amendment may be prepared either on the application Form NRH-5 or in letter form and should be submitted to the Department. The application should identify the license by number and should clearly describe the exact nature of the changes, additions, or deletions. Reference to previously submitted information and documents should be clear and specific and should identify the pertinent information by date, page and paragraph. The licensee must maintain a copy of the submitted and referenced documentation on file for inspection.

For amendment requests applicants must do the following:

- Be sure to use the most recent guidance in preparing an amendment request.
- Submit one original copy of the application on a Form NRH-5 and if possible one electronic copy on a diskette or CD. The licensee should maintain a copy of the submitted and referenced documentation on file.
- Provide the license number.

V. License Renewal

Regulations: 180 NAC 3-20

Absent any actions by the department or the licensee, a license remains in effect for five years. An application for license renewal must be received by the department at least 30 days prior to the expiration date to avoid a new application fee. If the licensee files the application for license renewal at least 30 days before the expiration date of the license, the present license will automatically remain in effect until the Department takes final action on the renewal application. However, if the licensee files an application less than 30 days before the expiration date and the Department cannot process it before that date, the licensee will be without a valid license when the license expires.

Renewals require submittal of an entire new application, completed as if it were an application for a new license. Renewal applications should be submitted without reference to documentation and information submitted previously.

For renewal and amendment requests applicants must do the following:

- Be sure to use the most recent guidance in preparing an amendment request.
- Provide the license number.
- For renewals submit an entire new application on Form NRH-5 and Appendix B of this guide, completed as if it were an application for a new license, with appropriately supplemented, complete and up-to-date information about the applicant's radiation protection program, demonstrating compliance with all licensing and regulatory requirements in effect at the time of renewal.
- Submit one original copy of the application on a Form NRH-5 and if possible one electronic copy on a diskette or CD. The licensee should maintain a copy of the submitted and referenced documentation on file.

VI. License Termination

Regulations: 180 NAC 3-017.02, 180 NAC 3-018.07, 180 NAC 3-019.04 and 3-019.10, 180 NAC 1-004.

Prior to license termination, the licensee must properly dispose of all licensed radioactive material possessed. The licensee will need to send a notification of disposition of the materials with a request for license termination before the expiration date. (See 180 NAC 3-019) NRH Form 60 "Certificate of Disposition of Materials" will need to be submitted.

If the licensee cannot dispose of all the licensed radioactive material in possession before the expiration date, the licensee will need to submit a license renewal for storage only of the radioactive material. The renewal is necessary to avoid violating Department regulations that do not allow the licensee to possess licensable material without a valid license.

The licensee must do the following:

- Notify the Department, in writing, when a decision is made to permanently cease licensed activities.
- Certify the disposition of radioactive materials by submission of NRH Form 60, "Certificate of Disposition of Materials." (See Appendix U)
- Before a license is terminated, send the records important to decommissioning (as required by 180 NAC 3-018.07) to the Department. If licensed activities are transferred or assigned in accordance with 180 NAC 3-017.02, transfer records important to decommissioning to the new licensee.

Appendix A

NRH –5 Application for Radioactive Material License

Nebraska's Health and Human Services Regulation and Licensure

Radioactive Material Program



**NEBRASKA DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH - RADIOACTIVE MATERIALS PROGRAM
APPLICATION FOR RADIOACTIVE MATERIAL LICENSE**

INSTRUCTIONS - (Use additional sheets where necessary.)

New or Renewal Application - Complete Items 1. through 15.

Amendment to License - Complete Items 1.a, 3., and 15. And indicate other changes as appropriate.

Retain one copy for your files and submit original application to: Department of Health and Human Services, Division of Public Health, Radiological Health, 301 Centennial Mall South, P.O. Box 95026, Lincoln, NE 68509-5026.

Upon approval of this application, the applicant will receive a Radioactive Material License, issued in accordance with the requirements contained in Title 180, Regulations for the Control of Radiation and the Nebraska Radiation Control Act.

<p>1.a Legal Name and Street address of Applicant (Institution, Firm, Person, etc.)</p> <p>Applicant Name: _____</p> <p>Address: _____</p> <p>City, State Zip +4: _____</p> <p>Telephone #: _____</p> <p>FAX #: _____</p> <p>E-Mail Address: _____</p>							
<p>1.b Street address(es) at which Radioactive Material will be used. (If different than 1.a)</p> <p>(1) <u>Permanent</u> Address: _____</p> <p>City, State Zip+4: _____</p> <p>(2) <u>Temporary Job Sites Throughout Nebraska?</u> <input type="checkbox"/> Yes <input type="checkbox"/> No</p>							
<p>2. Department to Use Radioactive Material</p> <p>_____</p> <p>Person to Contact: _____</p> <p>Telephone #: _____</p>	<p>3. This is an application for:</p> <p><input type="checkbox"/> New License</p> <p><input type="checkbox"/> Amendment to License No. _____</p> <p><input type="checkbox"/> Renewal of License No. _____</p>						
<p>4. Individual User(s)</p> <p><input type="checkbox"/> <u>Individual users approved by the Licensee's radiation safety committee.</u></p> <p><input type="checkbox"/> <u>Individual users approved by the Licensee's radiation safety officer.</u></p> <p><input type="checkbox"/> <u>Individual users satisfy the requirements of 180 NAC 3-013</u></p> <p>OR</p> <p><input type="checkbox"/> <u>Name and Title of individual(s) who will use or directly supervise use of Radioactive Materials. Give training and experience in Items 7. And 8.</u></p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:33%; border-bottom: 1px solid black;">First Name + Middle Initial</td> <td style="width:33%; border-bottom: 1px solid black;">Last Name</td> <td style="width:33%; border-bottom: 1px solid black;">Title</td> </tr> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> </table>	First Name + Middle Initial	Last Name	Title				<p>5. Radiation Safety Officer (RSO) (Name and Title of Individual designated as Radiation Safety Officer.)</p> <p>_____</p> <p>Telephone #: _____</p> <p>Attach documentation of his/her training and experience as in Items 7. and 8.</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*Department Use Only*</p> <p>Date Received Stamp</p> </div>
First Name + Middle Initial	Last Name	Title					

6. Radioactive Material Data

Type B Broad Scope, 180 NAC 3-013.01, item 2

Type C Broad Scope, 180 NAC 3-013.01, item 3

Specific License, Radioactive Material Listed below:

<u>6.a. Element and Mass Number</u>	<u>6.b. Chemical or Physical Form (Make and Model if sealed source)</u>	<u>6.c. Maximum Activity Requested (Expressed as Curies, Millicuries or Microcuries)</u>	<u>6.d. Use of Each Form (If sealed source, also give Make and Model Number of the storage and/or device in which sealed source will be stored and/or used)</u>

7. Training of Individuals in Items 4. and 5.

Name of Individual:

	<u>Formal Course Title</u>	<u>Location and Date(s) of Training</u>	<u>Clock Hours in Lecture or Laboratory</u>
<u>7.a. Radiation Physics and Instrumentation</u>			
<u>7.b. Radiation Protection</u>			
<u>7.c. Mathematics Pertaining to the Use and Measurement of Radioactivity</u>			
<u>7.d. Biological Effects of Radiation</u>			

8. Experience with Radiation of Individuals in Items 4. and 5.

(Actual use of Radioisotopes or Equivalent Experience)

Name of Individual:

<u>Isotope</u>	<u>Maximum Activity</u>	<u>Where Experience Was Gained</u>	<u>Months/Years</u>	<u>Type of Use</u>

9. Radiation Detection Instruments					
<u>Type of Instrument</u>	<u>Manufacturers Name</u>	<u>Model Number</u>	<u>Number Available</u>	<u>Radiation Detected</u>	<u>Sensitivity Range</u>
10. Calibration of Instruments Listed in Item 9.					
<input type="checkbox"/> <u>a. Calibrated by Service Company</u> Name and Address of Service Company and Frequency of Calibration			<input type="checkbox"/> <u>b. Calibrated by Applicant</u>		
11. Personnel Monitoring Devices (Check and/or complete as appropriate)					
<u>Type</u>	<u>Supplier</u> (<u>Service Company</u>)	<u>Exchange Frequency</u>			
<input type="checkbox"/> Film Badge <input type="checkbox"/> TLD <input type="checkbox"/> DOSL <input type="checkbox"/> Other (Specify) <input type="checkbox"/> _____		<input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> Other (specify) _____			

Information to be Submitted on Additional Sheets

12. Facilities and Equipment

Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Attach an explanatory sketch of the facility.

13. Radiation Protection Program

Describe the radiation protection program as appropriate for the material to be used, including: the duties and responsibilities of the Radiation Safety Officer (RSO); control measures; bioassay procedures (if needed); day-to-day general safety instructions to be followed; etc. If the application is for sealed sources also submit leak testing procedures, or if leak testing will be performed using a leak test kit, specify manufacturer and model number of the leak test kit.

14. Waste Disposal

If a commercial waste disposal service is employed, specify the name and address of the company. Otherwise, submit a detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. If the application is for sealed sources and devices and they will be returned to the manufacturer, so state.

15. CITIZENSHIP ATTESTATION

It is not necessary to complete the Attestation part of this application below if the application is for a corporation or other separate legal entity. **Explain why:** (For example: This application is for a corporation, partnership, etc.) _____

OR

If the entity is owned by an individual, complete the United States Citizenship Attestation Form below.

UNITED STATES CITIZENSHIP ATTESTATION FORM

For the purpose of complying with Neb. Rev Stat. §§ 4-108 through 4-114, I attest as follows:

I am a citizen of the United States **OR**

I am a qualified alien under the Federal Immigration and Nationality Act, my Immigration status and alien number are as follows and I am providing a copy of my USCIS documentation.

I hereby attest that my response and the information provided on this form and any related application for public benefits are true, complete and accurate and I understand that this information may be used to verify my lawful presence in the United States.

Name (Type or print first, middle, last)

Signature

Date

16. CERTIFICATION

(This item must be completed by applicant.)

The applicant and any official executing this document on behalf of the applicant named in Item 1.a., certify that this application is prepared in conformity with the Nebraska Department of Health and Human Services , Title 180, Regulations for the Control of Radiation and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief. . I am authorized to make binding commitments and to sign official documents on the behalf of the applicant.

Applicant Name From Item 1.a.

By: _____
Signature

Date: _____

Print Name and Title of certifying official authorized to act on behalf of the applicant

Appendix B

Information Requested in Items 4 through 14 of NRH FORM 5

Appendix B

Supportive Information Requested in Items 4 through 14 of NRH FORM 5

For the convenience of applicants and for streamline handling of portable gauge or XRF applications this appendix should be used to provide supporting information. It is attached to Form NRH – 5.

Please refer to “Regulatory Guide 3.4, "Guidance for Radioactive Material - Portable Gauge and X-ray Fluorecence Analyzers") for more detail concerning each item and other options available.

- Complete item 1 thru 3 and 15 on NRH-5. Use this Appendix B to complete items 4-14. Please indicate the following on the NRH-5 “**See attachment for items 4-14**”.
- Please check the appropriate box(es) below and submit a detailed description of all the requested information. For additional information begin each item on a separate sheet, identifying the item number and the date of the application on each page.

Item #4 & 5

ITEM NO. AND TITLE	RESPONSE	YES (need to check one item per box)	ATTACHMENTS AND/OR ALTERNATIVE PROCEDURES ATTACHED (If item to left is checked then check and attach item requested in this column.)
4. Individual User(s)	“The radiation safety officer will maintain documentation of training for authorized users and his/her approval of the authorized user.”	<input type="checkbox"/>	
5. Radiation Safety Officer (RSO)	Radiation Safety Officer. Name _____ Telephone # _____	<input type="checkbox"/>	
	“The documentation for the training of the RSO are attached.”	<input type="checkbox"/>	<input type="checkbox"/> Training Records of RSO
	“The RSO will perform the duties and responsibilities of a RSO per Appendix E of Regulatory Guide 3.4, 'Radioactive Material –Guidance for Portable Gauges and X-ray Fluorescence Analyzers.’”	<input type="checkbox"/>	
	Or “Will provide alternate list of duties and responsibilities of the RSO per the criteria of Appendix E.”	Or <input type="checkbox"/> and	<input type="checkbox"/> Alternate List of duties and responsibilities of the RSO

ITEM NO. AND TITLE	RESPONSE	YES (need to check one item per box)	ATTACHMENTS AND/OR ALTERNATIVE PROCEDURES ATTACHED (If item to left is checked then check and attach item requested in this column.)
6. Radioactive Material 6.a. Element and Mass Number 6b. Chemical and/or physical form 6c. Maximum amount to be possessed at any one time 6d. Authorized use AND Manufacturer and model number of the gauging device	List each radioisotope that will be used in the gauge or XRF Identify the manufacturer and model number of each sealed source that will be used in the gauge or XRF. Complete for each radioactive material requested. Indicate maximum activity per source Specify the purpose for the use of the gauging device. AND Identify the manufacturer and model number of the gauging device in which the sealed sources will be used.	Complete item 6 below []	

Please enter the necessary information for item 6 below. If you need additional space please add an attachment

6.a. Element and Mass Number	6.b. Chemical or Physical Form (Make and Model if sealed source)	6.c. Maximum Activity Requested (Expressed as Curies, Millicuries or Microcuries)	6.d. Use of Each Form (If sealed source, also give Make and Model Number of the storage and/or device in which sealed source will be stored and/or used)

<p>7. Training of Individuals in Item 4. And 5.</p> <p>8. Experience with Radiation of Individuals in Item 4. And 5.</p>	<p>“Authorized users and the radiation safety officer will demonstrate competency in use, maintenance and transfer of the device(s) by satisfactory completion of an eight(8) hour course -provided by the manufacturer of the gauge or XRF Or -Department approved course.” Note: See Appendix I for course criteria</p> <p>Note: The licensee will need to maintain training records on file for each authorized user and will maintain records showing the approval by the RSO of the authorized users. This will be reviewed at the time of inspection. See Appendix S for a sample record retention schedule.</p>	<p>[]</p> <p>Or [] and</p>	<p>[] Course for Department approval</p>
<p>9. Radiation Detection Instruments</p>	<p>"We will possess and use a radiation survey meter that meets the criteria in the section entitled 'Radiation Detection Instruments' in Regulatory Guide 3.4, 'Radioactive Material –Guidance for Portable Gauges and X-ray Fluorescence Analyzers' in the event of an incident “</p> <p>Or “We have access to a radiation survey meter that meets the criteria in the section entitled 'Radiation Detection Instruments' in Regulatory Guide 3.4, 'Radioactive Material –Guidance for Portable Gauges and X-ray Fluorescence Analyzers' in the event of an incident ”</p>	<p>[]</p> <p>Or [] and</p>	<p>[]A plan of how an instrument will be obtained.</p>
<p>10. Calibration of Instruments Listed in Item</p> <p>10 a. Calibrated by Service Company</p> <p>10 b. Calibrated by Applicant</p>	<p>“We will possess a survey meter and will have the instrument calibrated annually. The calibration service company’s name, address, license number and the state or federal agency that issued the company’s license is provided below.”</p> <p>Name _____ Address _____ _____ _____</p> <p>License number _____ Issuing Agency _____</p> <p>Or “We will calibrate the survey instruments in-house annually. We have submitted detailed information describing the facilities, equipment, personnel, and procedures to be used to perform the calibrations.” Note: Contact the Department for criteria for in house calibrations. Or NA if you plan to access a survey meter.</p>	<p>[]</p> <p>Or [] and</p> <p>Or []</p>	<p>[]In house calibration procedure for Department approval.</p>

<p>11 Personnel Monitoring Devices</p>	<p>“We will provide dosimetry processed and evaluated by a NVLAP approved processor that is exchanged at a frequency recommended by the processor.”</p> <p>“We will be using the following type: <input type="checkbox"/> Film Badge <input type="checkbox"/> TLD <input type="checkbox"/> OSL <input type="checkbox"/> Other (Specify) _____”</p> <p>The supplier is: _____</p> <p>The exchange frequency is: <input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> Other (Specify) _____”</p> <p>Or “We will maintain, for inspection by the Department, documentation demonstrating that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10 percent of the allowable limits of 180 NAC 4”</p> <p>Note: See Appendix K for guidance on demonstrating that unmonitored individuals are not likely to exceed 10 percent of the allowable limits.</p>	<p>[]</p> <p>Or []</p>	
<p>12. Facilities and Equipment</p>	<p>“A diagram of the permanent gauge or XRF storage facility is attached.”</p> <p>Note: The diagram identifies all entrances and points of access, rooms, uses of the room, the location of the gauge or XRF storage area, and its distance from occupied work area. See Appendix K for an example diagram and a form</p>	<p>[]</p>	
	<p>“As a portable gauge licensee we will use a minimum of two independent physical controls that form tangible barriers to secure portable gauges from unauthorized removal, whenever portable gauges are not under the control and constant surveillance of the licensee.”</p>	<p>[]</p>	
<p>13. Radiation Protection Program 13.a. Operating and Emergency Procedures</p>	<p>“We have implemented and will maintain operating and emergency procedures in Appendix F Regulatory Guide 3.4 “Radioactive Material Guidance for Portable Gauges and X-ray Fluorescence Analyzers.” “Copies of these procedures will be provided to all authorized users and at each job site.”</p> <p>(A copy of these Operating and Emergency Procedures will be copied from Regulatory Guide 3.4. The information to individualize the procedure will be completed.)</p> <p>Or “We have implemented and will maintain operating and emergency procedures submitted with this application. They meet the criteria of section titled Radiation Protection Program – Operating and Emergency Procedures in Regulatory Guide 3.4 “Radioactive Material Guidance for Portable Gauges and X-ray Fluorescence Analyzers.” . Copies of these procedures will be provided to all authorized users and at each job site.”</p>	<p>[]</p> <p>Or [] and</p>	<p>[] In house operating and emergency procedures for Department approval.</p>

<p>13. Radiation Protection Program 13f. Material Receipt and Accountability</p>	<p>"Physical inventories will be conducted at intervals not to exceed 6 months, to account for all sealed sources and devices received and possessed under the license." Note: See Appendix Q for a inventory procedures, Appendix R for inventory form and Appendix P for a utilization log. These items will be reviewed during an inspection. Or A description of the frequency and procedures for ensuring that no gauge or XRF has been lost, stolen, or misplaced and that, if the licensee possesses gauges or XRFs exceeding threshold amounts, the licensee complies with financial assurance requirements in 180 NAC4-018.</p>	<p>[] Or []</p>	
<p>13. Radiation Protection Program 13g. Public Dose</p>	<p>"We will maintain documentation (calculations and/or measurements) to show that any member of the public does not exceed a radiation dose of 100 mrem per year and do not exceed 2 mrem in any one hour in an unrestricted area."</p>	<p>Need Not be Submitted with Application.</p>	
<p>14. Waste Disposal</p>	<p>"Disposal will be by transfer of the radioactive material to a licensee specifically authorized to possess it in accordance with Appendix T." Note: Due to difficulties and costs associated with disposal of Am-241 sealed neutron sources, applicants should preplan the disposal</p>	<p>[]</p>	
<p>15. Citizenship Attestation</p>	<p>Check the appropriate box(s), provide information that maybe requested and sign if required.</p>		
<p>16. Certification</p>	<p>Signed by management representative authorized to make binding commitments.</p>	<p>Item 16 needs to be signed on NRH-5.</p>	
<p>Termination of Activities</p>	<p>The applicant is not required to submit a response to the termination of activities during the initial application. However when the license expires when the licensee ceases operation, NRH 60 "Certification of Disposition of Materials" must be submitted.</p>	<p>Need Not be Submitted with Application.</p>	

Appendix C

Sample Portable Gauge and/or X-ray Fluorescent Analyzer License



**NEBRASKA DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH - RADIOACTIVE MATERIALS PROGRAM
APPLICATION FOR RADIOACTIVE MATERIAL LICENSE**

INSTRUCTIONS - (Use additional sheets where necessary.)

New or Renewal Application - Complete Items 1. through 15.

Amendment to License - Complete Items 1.a, 3., and 15. And indicate other changes as appropriate.

Retain one copy for your files and submit original application to: Department of Health and Human Services, Division of Public Health, Radiological Health, 301 Centennial Mall South, P.O. Box 95026, Lincoln, NE 68509-5026.

Upon approval of this application, the applicant will receive a Radioactive Material License, issued in accordance with the requirements contained in Title 180, Regulations for the Control of Radiation and the Nebraska Radiation Control Act.

1. Licensee	ABC, Inc.	3. License Number	00-00-00
2. Address	11 South 256th Street Anytown, NE 68130	4. Amendment Number	2
		License Amended In Its Entirety To Read As Follows:	
		5. Expiration Date	May 31, xxxx

6. Radioactive Material	7. Chemical And/Or Physical Form	8. Maximum Quantity Licensee May Possess At Any One Time Under This License	9. Authorized Use
A. Cesium-137	Sealed source (CPN Company Model CPN-131)	10 millicuries per source	To be used in a Boart Longyear company CPN Products Portaprobe Model MC Series or Model 500 Series Portable Moisture Density Gauge to measure density of construction material.
B. Americium-241:Beryllium	Sealed source (CPN Company Model CPN-131)	50 millicuries per source	To be used in a Boart Longyear company CPN Products Portaprobe Model MC Series or Model 500 Series Portable Moisture Density Gauge to measure moisture content of construction material.
C. Cesium-137	Sealed source (Amersham Corporation Model CDCW556 or Isotope Products Model HEG-0058)	9 millicuries per source	To be used in a Troxler Electronics Labs, Inc. Model 3400 Series Portable Moisture Density Gauge for measuring density of construction material.
D. Americium-241: Beryllium	Sealed source (Amersham Corporation Model AMNV.97 or Isotope Products Models 3021 or 3027)	44 millicuries per source	To be used in a Troxler Electronics Labs, Inc. Model 3400 Series Portable Moisture Density Gauge for measuring moisture content of construction material.
E. Americium-241: Beryllium	Sealed source (CPN Company Model CPN-131)	100 millicuries per source	To be used in a Boart Longyear company CPN Products Model AC-2 Hydrogenous Material Analyzer to measure moisture content of construction material.

**RADIOACTIVE MATERIAL LICENSE
supplemental sheet**

F. Americium-241: Beryllium	Sealed source (Amersham Model AMN.V340	100 millicuries per source	To be used in a Troxler Electronics Labs, Inc. Model 3241-C Asphalt Content Gauge for measuring asphaltic tar content in paving material.
G. Cesium-137 and Americium-241: Beryllium	Sealed source (CPN Company Model CPN-131)	10 millicuries and 50 millicuries per source	To be used in a Boart Longyear company CPN Products Model B(R) Series Portable Moisture Density Gauge to measure density and moisture content of construction material.
H. Cobalt-57	Sealed source (Isotope Products Labs Model 3901 Series or 3814; or North American Scientific Model IND	15 millicuries per source	To be used in a Radiation Monitoring Devices, Inc. Model LPA-1 Portable X-ray Fluorescence Device to measure lead content in paint.

CONDITIONS

10. Licensed Material shall only be used by, or under the supervision and in the physical presence of, individuals who have successfully completed a manufacturer's training program for portable gauge and/or XFR users, have been instructed in the licensee's routine and emergency procedures, and have been approved in writing by the Radiation Safety Officer.
11. The Radiation Safety Officer for this license is Randy Smith, RSO.
12. Licensed material shall be used only at the following locations:
 - A. Licensed material shall be used at the licensee's facilities located at 11 South 256th Street, Anytown, Nebraska and 21 North 257th Street, Suite 1, Town, Nebraska.
 - B. Licensed material may be used at temporary job sites, in areas not under exclusive Federal jurisdiction, throughout the State of Nebraska.
13. The licensee is authorized to transport licensed material only in accordance with the provisions of 180 NAC 13.
14. Each portable gauge and/or XRF shall have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The gauge and/or XRF or its container must be locked when in transport, storage, or when not under the direct surveillance of an authorized user.
15. Notwithstanding the requirements of 180 NAC 1-011.02, item 6, no sealed source shall be stored for a period of more than 3 years without being tested for leakage or contamination.
16. The licensee shall conduct a physical inventory every 6 months to account for all sources and/or devices received and possessed under the license. The records of the inventories shall be maintained for six (6) years from the date of the inventory for inspections by the Department and shall include the quantities and kinds of licensed material, location of the sealed sources and/or devices, and the date of inventory.

**RADIOACTIVE MATERIAL LICENSE
supplemental sheet**

17. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by inventory for inspection by the Department and shall include the quantities and kinds of licensed material, location of the sealed sources and/or devices, and the date of the inventory. the licensee.
18. Except for maintaining labeling as required by 180 NAC 4 or 180 NAC 13, the licensee shall obtain authorization from the Department before making any changes in the sealed source, device, or source-device combination that would alter the description or specifications as indicated in the respective Certificates of Registration issued either by the U.S. Nuclear Regulatory Commission or by an Agreement State.
19. Any cleaning, maintenance, or repair of the gauge(s) and/or XRF(s) that requires removal of the source shall be performed by the device manufacturer, or by other persons specifically licensed by the Department, an Agreement State, or the U.S. Nuclear Regulatory Commission to perform such services.
20. The licensee shall not use sealed sources or probes containing sealed sources at depths exceeding 3 feet below the surface.
21. The licensee shall maintain a utilization log where the gauges and/or XRF(s) are stored. The log shall contain the date(s) of use, temporary job site(s), serial number of the gauge and/or XRF(s), and the name(s) of the authorized user(s).
22. In addition to the possession limits in Item 8., the licensee shall further restrict the possession of licensed material to quantities below the minimum limit specified in 180 NAC 3-018.04 for establishing financial assurance for decommissioning.
23. Except as specifically provided otherwise by this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. 180 NAC 1 shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.
 - A. Application with attachments dated March 17, 20XX signed by Sam Jones.
 - B. Letter with attachments dated April 26, 20XX signed by Sam Jones.

Date: September 15, 20XX

FOR THE NEBRASKA DEPARTMENT OF HEALTH & HUMAN SERVICES

xxxxx xxxxx Manager
Radioactive Materials Program

Appendix D

Review Checklist for Portable Gauge/XRF Application

Appendix D

Review Checklist for Portable Gauge or XRF Application

This checklist can be used by the Department staff to review applications and the applicant can use it to check for completeness.

1.a.

1.a Legal Name and Street address of Applicant (Institution, Firm, Person, etc.)

Applicant Name: _____
Address: _____

City, State Zip +4: _____
Telephone #: _____
FAX #: _____
eMail Address: _____

1.b.

1.b Street address(es) at which Radioactive Material will be used. (If different than 1.a)

(1) Permanent Address: _____

City, State Zip+4: _____

(2) Temporary Job Sites Throughout Nebraska? Yes No

2.

2. Department to Use Radioactive Material

Person to Contact: _____
Telephone #: _____

3.

3. This is an application for:

- New License
 Amendment to License No. _____
 Renewal of License No. _____

Item Number and Title	Suggested Response	YES	NO	OTHER	
				YES	NO
4. Individual User(s)	“The radiation safety officer will maintain documentation of training for authorized users and his/her approval of the authorized user.”				
5. Radiation Safety Officer (RSO)	Radiation Safety Officer : _____ Name and Telephone Number _____				
	“The documentation for the training of the RSO are attached.”				
	“The RSO will perform the duties and responsibilities of a RSO per Appendix E of Regulatory Guide 3.4 ‘Radioactive Material-Guidance for Portable Gauges and X-ray Fluorescence Analyzers.’ Or “Will provide alternate list of duties and responsibilities of the RSO per the criteria of Appendix E. And List is attached.				
6. Radioactive Material 6.a. Element and Mass Number 6b. Chemical and/or physical form 6c. Maximum amount to be possessed at any one time 6d. Authorized use AND Manufacturer and model number of the gauging device	List each radioisotope that will be used in the gauge or XRF Identify the manufacturer and model number of each sealed source that will be used in the gauge or XRF. Complete for each radioactive material requested. Indicate maximum activity per source Specify the purpose for the use of the gauging device. AND Identify the manufacturer and model number of the gauging device in which the sealed sources will be used.				

6.

6.a. Element and Mass Number	6.b. Chemical or Physical form (Make and Model if sealed source)	6.c. Maximum Activity Requested (Expressed as Curies, Millicuries or Microcuries)	6.d. Use of Each Form (if sealed source, also give Make and Model Number of the storage and/or device in which sealed source will be stored and/or used)	Specify other uses not listed on SSD Certificate	YES	NO
Cesium-137	Sealed sources in compatible gauges as specified in Sealed Source and Device Registration Sheet	Not to exceed maximum activity per source as specified in Sealed Source and Device Registration Sheet	Measure Physical Properties of Materials	[] Not applicable [] Uses are:		
Americium-241	Sealed neutron sources in compatible gauges as specified in Sealed Source and Device Registration Sheet	Not to exceed maximum activity per source as specified in Sealed Source and Device Registration Sheet	Measure Physical Properties of Materials	[] Not applicable [] Uses are:		
Californium-252	Sealed neutron sources in compatible gauges or XRFs as specified in Sealed Source and Device Registration Sheet	Not to exceed maximum activity per source as specified in Sealed Source and Device Registration Sheet	Measure Physical Properties of Materials	[] Not applicable [] Uses are:		
Other (specify)						
<i>FINANCIAL ASSURANCE REQUIRED AND EVIDENCE OF FINANCIAL ASSURANCE PROVIDED</i>						

Item Number and Title	Suggested Response	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
<p>7. Training of Individuals in Item 4. And 5.</p> <p>8. Experience with Radiation of Individuals in Item 4. And 5.</p>	<p>“Authorized users and the radiation safety officer will demonstrated competency in use, maintenance and transfer of the device(s) by satisfactory completion eight(8) hour course</p> <p>-provided by the manufacturer of the gauge or XRF</p> <p>Or</p> <p>-Department approved course.”</p> <p>Note: See Appendix I for course criteria</p> <p>Note: The licensee will need to maintain training records on file for each authorized user and will maintain records showing the approval by the RSO of the authorized users. This will be reviewed at the time of inspection.</p> <p>Note: Do not need to include names of Authorized Users or training records with application but must maintain then on file.</p> <p>Criteria for Acceptable Training Courses for Radiation Safety Officer/Portable Gauge or</p>				

Item Number and Title	Suggested Response	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
ITEM 7 & 8 (CONTINUED)	<p>XRF Authorized Users</p> <p>See Appendix I of "Regulatory Guide 3.4 Radioactive Material Guidance for Portable Gauges and X-ray Fluorescence Analyzers" for Course Content, Course Examination and Course Instructor Qualifications</p> <p>Course Content</p> <p>Radiation Safety, Radiation Detection Instruments, State and Federal Regulations, Licensing and Inspections, Operating and Emergency Procedures, Transfer/Disposal Requirements, and Practical Training</p> <p>Course Examination</p> <p>25- to 50-question written (closed book) test -- 70 percent grade</p> <p>Course Instructor Qualifications</p> <p>Bachelor's degree in a physical or life science or engineering with successful completion of both a portable gauge or XRF user course and 8-hour radiation safety course and 8 hours hands-on experience with portable gauges or XRFs</p> <p style="text-align: center;">OR</p> <p>An individual with the following training:</p> <p> Successful completion of portable gauge or XRF user course</p> <p> Successful completion of 40-hour radiation safety course</p> <p> 30 hours of hands-on experience with</p>				
9. Radiation Detection Instruments	<p>"We will possess and use a radiation survey meter that meets the criteria in the section entitled 'Radiation Detection Instruments' in Regulatory Guide 3.4, 'Radioactive Material – Guidance for Portable Gauges and X-ray Fluorescence Analyzers' in the event of an incident "</p> <p style="text-align: center;">Optional Response</p> <p>"We have access to a radiation survey meter that meets the criteria in the section entitled 'Radiation Detection Instruments' in Regulatory Guide 3.4, 'Radioactive Material –Guidance for Portable Gauges and X-ray Fluorescence Analyzers' in the event of an incident "</p> <p>Have a plan of how an instrument will be obtained.</p>				

Item Number and Title	Suggested Response	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
<p>10. Calibration of Instruments Listed in Item 10 a. Calibrated by Service Company</p>	<p>“We will possess a survey meter and will have the instrument calibrated annually. The calibration service company’s, name, address, license number and the state or federal agency that issued the company’s license is provided below.” Name _____ Address _____ _____ _____ License number _____ Issuing Agency _____</p> <p>Optional Response “We will calibrate the survey instruments in-house annually. We have submit detailed information describing the facilities, equipment, personnel, and procedures to be used to perform the calibrations.”</p> <p>Note: Contact the Department for criteria for in house calibrations.</p>				
<p>10. Calibration of Instruments Listed in Item 10 b. Calibrated by Applicant</p>					
<p>11. Personnel Monitoring Devices</p>	<p>“ We will provide dosimetry processed and evaluated by a NVLAP approved processor that is exchanged at a frequency recommended by the processor.”</p> <p>“We will be using the following type: <input type="checkbox"/> Film Badge <input type="checkbox"/> TLD <input type="checkbox"/> OSL <input type="checkbox"/> Other (Specify) _____</p> <p>The supplier is: _____</p> <p>The exchange frequency is: <input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> Other (Specify) _____”</p> <p>Or “We will maintain, for inspection by the Department, documentation demonstrating that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10 percent of the allowable limits of 180 NAC 4”</p> <p>Note: See Appendix K for guidance on demonstrating that unmonitored individuals are not likely to exceed 10 percent of the allowable limits.</p>				

Item Number and Title	Suggested Response	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
12. Facilities and Equipment	<p>“A diagram of the permanent gauge or XRF storage facility is attached.”</p> <p>Note: The diagram identifies all entrances and points of access, rooms, uses of the room, the location of the gauge or XRF storage area, and its distance from occupied work area. See Appendix N for an example diagram and a form.</p>				
	<p>” “As a portable gauge licensee we will use a minimum of two independent physical controls that form tangible barriers to secure portable gauges from unauthorized removal, whenever portable gauges are not under the control and constant surveillance of the licensee.”</p>				
13. Radiation Protection Program 13a. Operating and Emergency Procedures	<p>“We have implemented and will maintain operating and emergency procedures in Appendix F Regulatory Guide 3.4 “Radioactive Material Guidance for Portable Gauges and X-ray Fluorescence Analyzers.” “Copies of these procedures will be provided to all authorized users and at each job site.”</p> <p>(A copy of these Operating and Emergency Procedures will be copied from Regulatory Guide 3.4. The information to individualize the procedure will be completed.)</p> <p>Optional Response</p> <p>“We have implemented and will maintain operating and emergency procedures submitted with this application. They met the criteria of section titled Radiation Protection Program – Operating and Emergency Procedures in Regulatory Guide 3.4 “Radioactive Material Guidance for Portable Gauges and X-ray Fluorescence Analyzers.”. Copies of these procedures will be provided to all authorized users and at each job site.”</p>				

Item Number and Title	Suggested Response	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
<p>13. Radiation Protection Program 13b. Leak Tests</p>	<p>“Leak tests will be performed at intervals approved by the Department, an Agreement State, or the U.S. Nuclear Regulatory Commission and specified in the Sealed Source and Device Registration Sheet.”</p> <hr/> <p>“Leak tests will be performed by an organization authorized by the Department, an Agreement State or the U.S. Nuclear Regulatory Commission to provide leak testing services for other licensees and/or using a leak test kit supplied by an organization authorized by the Department, an Agreement State or U.S. Nuclear Regulatory Commission to provide leak test kits to other licensees and according to the kit supplier's instructions.”</p> <p>Name of licensee and license # performing maintenance: _____</p> <p>And/Or</p> <p>Supplier of leak test kit, model number of kit, and suppliers address.</p> <p>Optional Response</p> <p>“The licensee may be authorized to conduct the leak test and analysis by the Department.”</p> <p>The licensee will be required to provide the following to support a request to conduct the leak test and analysis.</p> <ul style="list-style-type: none"> • Identify the individual who will make the analysis and provide his or her qualifications to make quantitative measurements of radioactivity. • Commit to performing leak testing at the frequency specified in the appropriate SSD Registration Certificate. • Specify how and where test samples will be taken on the gauge or XRF. Describe materials used and methods of handling samples to prevent or minimize exposure to personnel. • Specify the type of instrument(s) that will be used for measurement, the counting efficiency, and minimum levels of detection for each radionuclide to be measured. <p><i>Note:</i> An instrument capable of making quantitative measurements should be used; hand-held survey meters will not normally be considered adequate for measurements.</p> <ul style="list-style-type: none"> • Specify the standard sources used to calibrate the instrument; for each, specify the radionuclide, quantity, accuracy, and traceability to primary radiation standards. <p><i>Note:</i> Accuracy of standards should be within $\pm 5\%$ of the stated value and traceable to a primary radiation standard such as those maintained by the National Institutes of Standards and Technology (NIST).</p>				

Item Number and Title	Suggested Response	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
13. Radiation Protection Program 13c. Maintenance	<u>ROUTINE CLEANING & LUBRICATION</u> “We will implement and maintain procedures for routine maintenance of our gauges or XRF according to each manufacturer’s recommendations and instructions.”				
	<u>NON-ROUTINE MAINTENANCE</u> “We will send the gauge or XRF to the manufacturer or other person authorized by the NRC or an Agreement State to perform non-routine maintenance or repair operations that require the removal of the source or source rod from the gauge or XRF.” Optional Response “We will provide needed information to support request to perform non-routine maintenance per Appendix J of Regulatory Guide 3.4 “Radioactive Material Guidance for Portable Gauges and X-ray Fluorescence Analyzers.”				
13. Radiation Protection Program 13d. Transportation	The applicant is <u>not</u> required to submit a response during the licensing phase. This matter will be examined during an inspection	Need not be submitted with application			
	Portable Gauges a. DOT-7A or other authorized packages used? (<i>49 CFR 173.415, 49 CFR 173.416(b)</i>) b. Package performance test records on file? c. Special form sources documentation? (<i>49 CFR 173.476(a)</i>) d. Package has 2 labels (ex. Yellow-II) with TI, Nuclide, Activity, and Hazard Class? (<i>49 CFR 172.403, 49 CFR 173.441</i>) e. Package properly marked? (<i>49 CFR 172.301, 49 CFR 172.304, 49 CFR 172.310, 49 CFR 172.324</i>) f. Package closed and sealed during transport? (<i>49 CFR 173.475(f)</i>) g. Shipping papers prepared and used? (<i>49 CFR 172.200(a)</i>) 63 h. 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)} (<i>49 CFR 172.200, 49 CFR 172.201, 49 CFR 172.202, 49 CFR 172.203, 49 CFR 172.204, 49 CFR 172.604</i>) i. Shipping papers within drivers reach and readily accessible during transport? (<i>49 CFR 177. 817(e)</i>) j. Secured against movement? (<i>49 CFR 177. 834</i>)				

Item Number and Title	Suggested Response	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
	k. Placarded on vehicle, if needed? (<i>49 CFR 172.504</i>) l. Proper overpacks, if used? (<i>49 CFR 173.25</i>) m. Any incidents reported to DOT? (<i>49 CFR 171.15, 16</i>) n. Security two-barrier rule met? (<i>DHS 157.05(5)</i>)				
	XRF a. If shipping papers are not required (<i>49 CFR 173.422(a)</i>) is the package marked with UN 2911 when the XRF is transported?				
13. Radiation Protection Program 13e. Audit Program	"We will have an audit program." Note: See Appendix O for a sample audit program. The audit program will be reviewed during an inspection.				
13. Radiation Protection Program 13f. Material Receipt and Accountability	"Physical inventories will be conducted at intervals not to exceed 6 months, to account for all sealed sources and devices received and possessed under the license." Note: See Appendix Q for a inventory procedure, Appendix R for sample inventory form and Appendix P for a utilization log. These items will be reviewed during an inspection. Or A description of the frequency and procedures for ensuring that no gauge or XRF has been lost, stolen, or misplaced and that, if the licensee possesses gauges or XRFs exceeding threshold amounts, the licensee complies with financial assurance requirements in 180 NAC 3-018.				
13. Radiation Protection Program 13g. Public Dose	The applicant is not required to submit a response to the public dose section during the licensing phase. This matter will be examined during an inspection.	Need not be submitted with application.			
14. Waste Disposal	State that disposal will be by transfer of the radioactive material to a licensee specifically authorized to possess it.	Need not be submitted with application			
15. Citizenship Attestation	Appropriate box(s) checked, submit documents if required and signed if required.				
16. Certification	Signed by representative authorized to make binding commitments..				

Appendix E

Duties and Responsibilities of the Radiation Safety Officer

Appendix E Duties and Responsibilities of the Radiation Safety Officer

The RSO's duties and responsibilities include ensuring the following:

- Stopping licensed activities that the RSO considers unsafe
- Possession, use, storage, and maintenance of sources and gauges or XRFs are consistent with the limitations in the license, the Sealed Source and Device Registration sheet(s), and manufacturer's recommendations and instructions
- Individuals using gauges or XRFs are properly trained
- When necessary, personnel monitoring devices are used and exchanged at the proper intervals; records of the results of such monitoring are maintained and determine if unnecessary exposures are received.
- Provide written notifications of annual radiation exposures to all monitored personnel as required by 180 NAC 10-004
- Gauges or XRFs are properly secured
- Proper authorities are notified in case of accident, damage to gauges or XRFs, fire, or theft
- Unusual occurrences involving the gauge or XRF (e.g., accident, damage) are investigated, cause(s) and appropriate corrective action are identified, and corrective action is taken
- Radioactive material is transported in accordance with all applicable DOT requirements
- Radioactive material is disposed of properly
- Appropriate records are maintained
- Up-to-date license is maintained and amendment and renewal requests submitted in a timely manner
- Emphasize the ALARA philosophy to authorized users, instruct personnel on current procedures and provide guidance on relevant changes to reduce exposure levels.
- Review dosimetry reports for all monitored personnel to determine if unnecessary exposures are being received.
- Conduct a audit at least annually of the radiation protection program's content and implementation, as required by 180 NAC 4-004.03

Appendix F

Operating and Emergency Procedures

Name of Licensee_____

Operating Procedures

Training

Prior to handling and operating portable gauges or XRFs, authorized users will complete either a eight hour training course by the manufacturer of the device or any Department approved course.

Personnel Dosimetry

- If personnel dosimetry is provided:
 - Always wear your assigned thermoluminescent dosimeter (TLD) or film badge whenever handling, transporting or operating a nuclear gauge or XRF.
 - Never wear another person's TLD or film badge.
 - Personnel dosimetry will be worn at the chest or waist level. Badges will not be worn during non-occupational radiation exposures (e.g. medical or dental x-rays, etc.)
 - Never store your TLD or film badge near the gauge or XRF.
 - The RSP will be immediately notified if personnel dosimetry is lost or damaged.

Availability of Procedures

- A complete and current copy of the operating and emergency procedures will accompany portable gauges or XRF at all times.
- Copies of the manufacturer's operation manual are maintained on file by the RSO for ready reference.

ALARA Philosophy

- All personnel involved with portable gauges or XRFs will commit to practice the ALARA philosophy – keep radiation exposure As Low As Reasonably Achievable. The objective is to reduce occupational and public exposures as far below regulatory limits as possible by means of good work practices.
- The following methods will be used to reduce dose:
 - Minimize the **TIME** spent in close proximity to the gauge or XRF (the shorter the time, the lower the dose). Work quickly. Return the gauge or XRF to storage when not needed.
 - Maximize the **DISTANCE** from the gauge or XRF (do not get closer than necessary.) Transport the gauge or XRF away from the driver.
 - Make use of available **SHIELDING** to block out radiation

Security

- Before removing the gauge or XRF from its place of storage, ensure that, where applicable, each gauge or XRF source is in the fully shielded position and that in 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. Place the gauge or XRF in the transport case and lock the case.
- Always maintain constant surveillance and immediate control of the gauge or XRF when it is not in storage. At job sites, do not walk away from the gauge or XRF when it is left on the ground. Take actions necessary to protect the gauge or XRF and yourself from danger of moving heavy equipment.

- 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 with a lock or a chain with a lock; (3) or storing the portable gauge inside a locked, nonremovable box and further securing the transportation case with a steel cable or chain. See Appendix V.
- Always keep unauthorized persons away from the gauge or XRF.
- When the gauge is not in use at a temporary jobsite, place the gauge or XR in a secured storage location (e.g., locked in the trunk of a car or locked in a storage shed).
- Use a minimum of two independent physical controls that form tangible barrier to secure portable gauges from unauthorized removal, whenever the gauges is not under the control and constant surveillance of the licensee.
- Sign out the gauge or XRF in a log book (that remains at the storage location) including the date(s) of use, name(s) of the authorized users who will be responsible for the gauge or XRF, and the temporary jobsite(s) where the gauge or XRF will be used.

Transportation

Before transporting a gauge or XRF it should be checked to see that the case is in good condition and that it has all the required labels and shipping paper are accessible to the driver during transport. Refer to Appendix M – “Major DOT Regulations; Sample Bill of Lading” of Regulatory Guide 3.4 Radioactive, “Material Guidance for Portable Gauges and X-ray Fluorescence Analyzers” for additional transportation information.

- Prior to shipping the transport containers will be inspected to ensure proper packaging and that the case is in good condition.
- Block and brace the gauge or XRF to prevent movement during transport and lock the gauge or XRF in or to the vehicle. Follow all applicable Department of Transportation (DOT) requirements when transporting the gauge or XRF.
- The transport containers will be secured away from the passenger compartment, if possible.
- Prior to transporting the gauge or XRF, ensure that, where applicable, each gauge or XRF source is in the fully shielded position. Ensure that in gauges with a movable source rod, the source rod is locked in the shielded position (e.g., keyed lock, padlock, mechanical control). Place the gauge or XRF in the transport case and lock the case.
- Return the gauge or XRF to its proper locked storage location at the end of the work shift.
- Log the gauge or XRF into the daily use log when it is returned to storage.

General Rules of Use

- Use the gauge or XRF according to the manufacturer's instructions and recommendations.
- Do not touch the unshielded source rod with your fingers, hands, or any part of your body.
- Do not place hands, fingers, feet, or other body parts in the radiation field from an unshielded source.
- 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.
- After completing each measurement in which the source is unshielded, immediately return the source to the shielded position.
- 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).
- After making changes affecting the gauge or XRF storage area (e.g., changing the location of gauges or XRFs within the storage area, removing shielding, adding gauges, changing the occupancy of adjacent areas, moving the storage area to a new location), reevaluate compliance with public dose limits and ensure proper security of gauges or XRFs.

Posting Requirements

The following documents are posted at the permanent storage facility to permit the authorized users to view:

NRH-3 "Notice to Employees"

At the permanent storage facility the following documents are posted or a notice of where the authorized user can view the following:

Title 180 NAC

Operating and Emergency Procedures applicable to activities under the license
The license, conditions or documents incorporated into the license by reference and amendments

Any notice of violation involving radiological working conditions, proposed imposition of civil penalties, or order issued to 180 NAC 1 and any response from the licensee.

Radiation Warning Signs:

“Caution (or Danger), Radioactive Material” sign: are posted at permanent facility & job sites where gauges or XRF’s are stored (unless documentation kept describing eligibility for exception described 180 NAC 4-035)

“Caution (or Danger), Radiation Area” signs are posted at gauge or XRF storage areas. The manufacturers’ information is kept on file to demonstrate that gauge or XRF

radiation levels are too low to require posting of radiation area signs around gauge or XRF storage area as described in 180 NAC 4-034 or 4-035.

Routine Maintenance

- Perform routine cleaning and maintenance according to the manufacturer's instructions and recommendations. A copy of the appropriate manufacturer's operation manual will be on hand and the maintenance instructions will be strictly followed.
- Non-routine maintenance or repair that requires the removal of the source or source rod is prohibited. Such operations will only be performed by the manufacturer or other specifically authorized persons.

Radiation Surveys

If damage is suspected, immediately notify the RSO, who will make arrangements to have the gauge or XRF surveyed as soon as possible. Refer to the emergency procedures for further instructions.

Emergency Procedures

In the event of a stolen, lost or missing gauge or XRF, authorized users will immediately notify the Radiation Safety Office (RSO), who will contact the Department.

If the source fails to return to the shielded position (e.g., as a result of being damaged, source becomes stuck below the surface) or if any other emergency or unusual situation arises (e.g., the gauge or XRF is struck by a moving vehicle, is dropped, is in a vehicle involved in an accident):

- Immediately secure the area and keep people at least 15 feet away from the gauge or XRF until the situation is assessed and radiation levels are known. However, perform first aid for any injured individuals and remove them from the area only when medically safe to do so.
- If any heavy equipment is involved, detain the equipment and operator until it is determined there is no contamination present.
- Gauge or XRF users and other potentially contaminated individuals should not leave the scene until emergency assistance arrives.
- Notify the persons in the listed below of the situation:

***Radiation Safety Officer:** _____

***RSO Phone No.:** (w) _____ (H) _____

Nebraska Health and Human Services

Radioactive Materials Program (402)471-2168 (Monday-Friday 8AM – 5PM)

Off Hours: (State Patrol) (402) 471-4545 (Ask to speak to the NEMA Duty Officer as you have an incident to report involving radioactive materials.)

*Fill in with (and update, as needed) the names and telephone numbers.

- Follow the directions provided by the person contacted above.

If damage should occur during transport:

At the earliest practical moment, the U.S. Dept. of Transportation will be notified of an accident that occurs during the course of transport in which fire, breakage, spillage or suspected contamination occurs involving shipment of radioactive materials, in accordance with 49 CFR 171.15. U.S. Department of Transportation Notification No: (800)424-8802

RSO AND LICENSEE MANAGEMENT:

- Arrange for a radiation survey to be conducted as soon as possible by a knowledgeable person using appropriate radiation detection instrumentation. This person could be a licensee employee using a survey meter located at the jobsite or a consultant. To accurately assess the radiation danger, it is essential that the person performing the survey be competent in the use of the survey meter.

- If gauges or XRFs 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.
- Make necessary notifications to local authorities as well as the Department as required. (Even if not required to do so, you may report ANY incident to Department at (402) 471-2168 Department notification is required when gauges or XRF containing radioactive material are lost or stolen, when gauges or XRF are damaged or involved in incidents that result in doses in excess of 180 NAC 4-059 limits, and when it becomes apparent that attempts to recover a source stuck below the surface will be unsuccessful.
- Reports to the Department must be made within the reporting timeframes specified by the regulations.

Reporting requirements are found in 180 NAC 4-057-059 and 180 NAC 3-026.

Portable Gauge or XRF Emergency Response Information

This form with shipping papers will be in the vehicle and immediately accessible to the driver during transport.

1) **SHIPPING NAME AND HAZARD CLASS:** RQ, Radioactive Material, Type A Package, Special form, 7, UN3332
POTENTIAL HAZARDS

2) **IMMEDIATE HAZARDS TO HEALTH**

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

3) **FIRE OR EXPLOSION**

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

EMERGENCY PROCEDURES

4) **IMMEDIATE PRECAUTIONS**

- Isolate hazard area to within a 10-15 foot radius of the gauge or XRF and restrict access.
- Emergency response actions may be performed prior to any measurement of radiation; limit entry to shortest time possible.
- Notify local authorities and Nebraska's Health and Human Services Regulation and Licensure, Radiological Health Division of accident conditions.
- Detain uninjured persons, isolate equipment with suspected contamination, and delay cleanup until receiving instruction from Nebraska's Health and Human Services Regulation and Licensure, Radiological Health Division.

5) **FIRE**

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

6) **SPILL OR LEAK**

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

7) **FIRST AID**

- Use first aid treatment according to the nature of the injury.
- Advise medical personnel that victim may be contaminated with low-level radioactive material.
Except for the injured, detain persons exposed to radioactive material until arrival or instruction of Nebraska's Health and Human Services Regulation and Licensure, Radioactive Materials Division.

CALL THE FOLLOWING FOR EMERGENCY ASSISTANCE:

RADIATION SAFETY OFFICER:

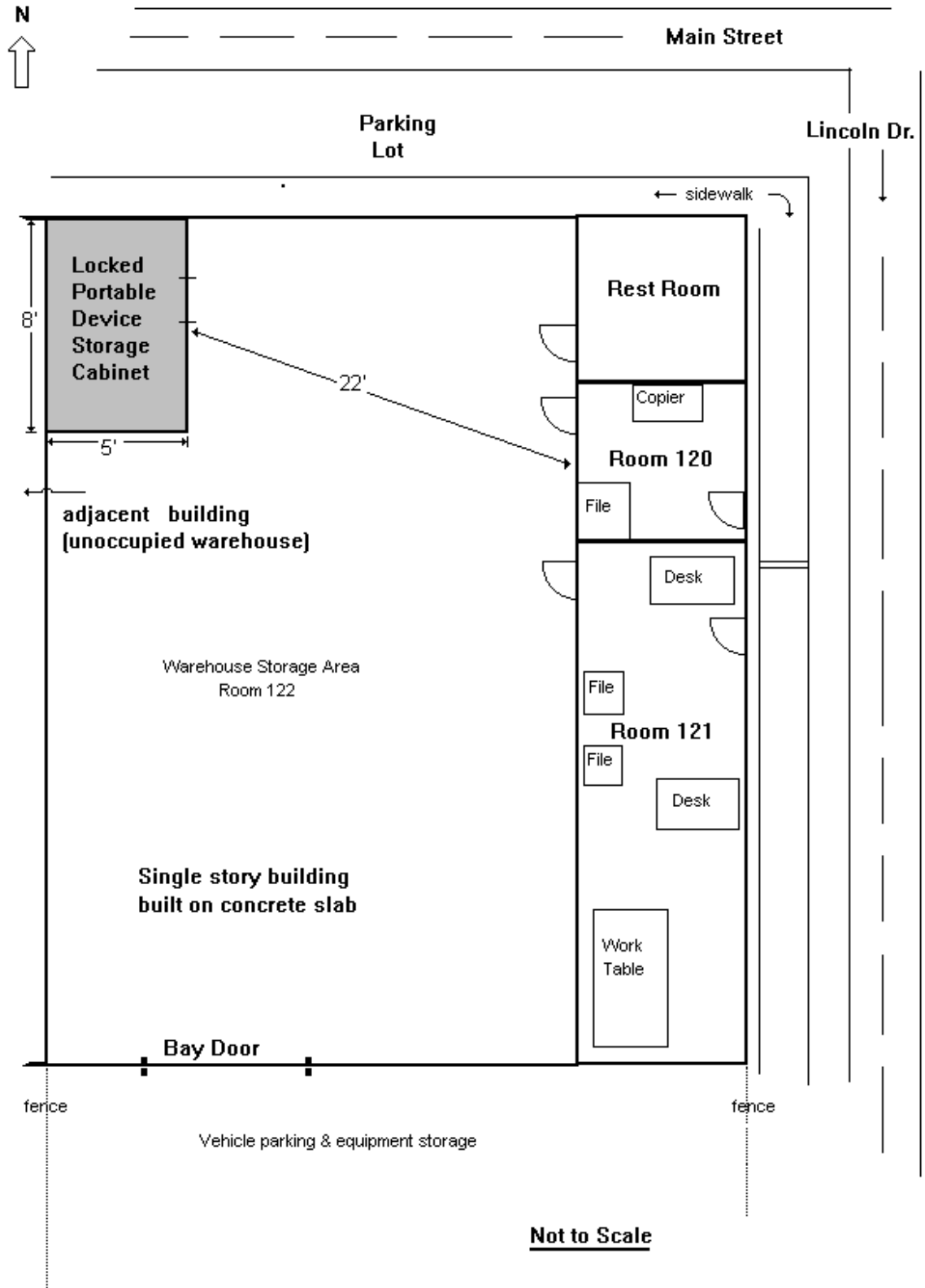
RSO TELEPHONE #:

Nebraska's DHHS, Radiological Health(402) 471-2168 (M-F 8Am to 5PM)
After hours- Nebraska State Patrol..... (402) 471-4545 (Ask to speak to
the NEMA Duty Officer as you have an incident to report involving radioactive materials.)
U.S. DEPT. OF TRANSPORTATION.....(800) 424-8802
CPN INTERNATIONAL, INC.....(800) 535-5053
HUMBOLDT SCIENTIFIC, INC.....(800) 992-4589
SEAMAN NUCLEAR CORPORATION.....(414) 762-5100
TROXLER ELECTRONIC LABORATORIES, INC.....(919) 839-2676

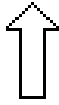
Appendix G

Model Facility Diagram

EXAMPLE OF A FACILITY DIAGRAM

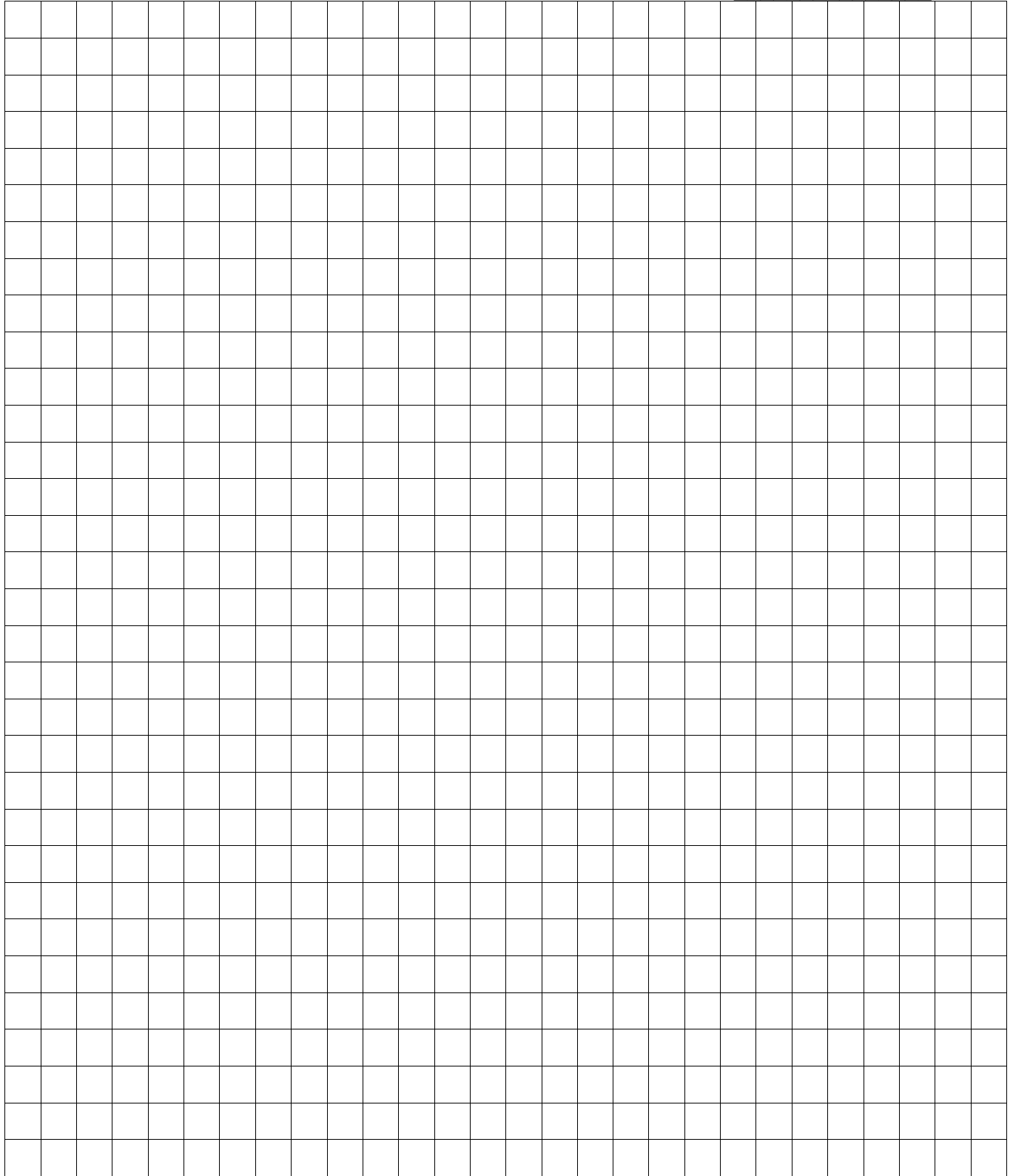


N



Facility Diagram

Scale 1/4" = _____



Appendix H

Information Needed for Change of Ownership or Control Application

Appendix H

Information Needed for Change of Ownership or Control Application

The Department needs to be notified at least sixty days in advance of change of ownership or control. Licensees must provide full information and obtain the Department's prior written consent before transferring ownership or control of the license; some licensees refer to this as "transferring the license." The Department will review the responses to the information below and will then be able to determine if the licensee can submit a request for an amendment to the current license or if the licensee will need to submit a new application. This will be determined by the Department on a case by case bases. 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, 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 and telephone number(s) 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 radiation safety officer, authorized users, or any other persons identified in previous license applications as responsible for radiation safety or use of radioactive 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 and changes of 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 radioactive materials.
8. Any changes in organization, location, facilities, equipment, procedures, or personnel that would require a license amendment even without the change of ownership.
9. An indication of whether all surveillance items and records (e.g., calibrations, leak tests, surveys, inventories, and accountability requirements) will be current at the time of transfer. Provide a description of the status of all surveillance requirements and records.
10. Confirmation that all records concerning the safe and effective decommissioning of the facility, pursuant to 180 NAC 3-018.07; 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 the Department for license terminations.

11. 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?
12. A description of any decontamination plans, including financial assurance arrangements of the transferee, as specified in 180 NAC 3-018. 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.
13. Confirmation that the transferee agrees to abide by all commitments and representations previously made to Department by the transferor. These include, but are not limited to: maintaining decommissioning records required by 180 NAC 3-018.07; implementing decontamination activities and decommissioning of the site; and completing corrective actions for open inspection items and enforcement actions.

With regard to contamination of facilities and equipment, the transferee should confirm, in writing, that it accepts full liability for the site, and 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.

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 the Department before license transfer.

14. Documentation that the transferor and transferee agree to the change in ownership or control of the radioactive 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.
15. 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.

Appendix I

Criteria for Acceptable Training Courses for Portable Gauge or XRF Users

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Criteria for Acceptable Training Courses for Portable Gauge or XRF Users

Handling and use of portable gauges or XRF is restricted to a Authorized User (AU) or requires the direct supervision of an Authorized User. Authorized user is required to complete a eight hour course provided by the manufacturer of the device or any Department approved course. (180 NAC 15-027)

Documentation of portable gauge or XRF radiation safety training must be maintained on file for inspection.

Criteria for acceptable training course for portable gauge or XRF users:

Courses must be at least eight hours in length.

- Radiation Safety and Regulatory Requirements emphasizing practical subjects important to safe use of gauges or XRF:**

- Types and Characteristics of Radiation:** Model of the Atom; Alpha, Beta, X-ray and Neutron Radiation; Exposure: Natural versus Man-made Radiation; Irradiation versus Contamination/Internal vs. External; Radioactive Material Used in Portable Gauges or XRF

- Units of Radiation Dose and Quantities of Radioactivity:** Curies, Rad, Rem, Roentgen; Prefixes, SI Units

- Basic Math and Calculations Related to Radioactivity:** Radioactive Decay; Dose Rates; Inverse Square Law; and Half-value Layers

- Biological Effects of Radiation:** Acute, Chronic and Genetic Effects of Exposure; Radiation Protection Standards, The ALARA Philosophy

- Radiation Levels from Radioactive Sealed Sources**

- Methods of Controlling Radiation Dose:** Time, Distance and Shielding

- State and Federal Regulations**

- Licensing and Inspections by regulatory agency**

- Employee protection**

- Need for complete and accurate information**

- Incidents**

- Inventory**

- Record keeping**

- Transfer/disposal requirements**

- Transportation**

- Practical explanation of portable gauge or XRF theory and operation:**

- Radiation Detection Instruments:** Types of Radiation Survey Meters; Operation, Calibration and Limitation; and Monitoring Techniques

- Operating procedures:** Training and supervision, Personnel monitoring, Availability of procedures, Security, ALARA, Inventory, Record Keeping, Posting Requirements, General Rules of Use

- Emergency procedures:** Preventive measures, Emergency response, Notification Requirements, Case Histories

- Maintenance procedures**

- Transportation procedures**

- Radiation detection instruments:** Types of radiation survey meters, Operation, Calibration and limitation, Monitoring techniques

- Practical Training:**

- Field training emphasizing radiation safety, including test runs of: Setting up and making measurements with the gauge or XRF, Controlling and maintaining surveillance of the portable

gauge or XRF, Performing routine cleaning and lubrications, Packaging and transporting the gauge XRF, Storing the gauge or XRF, Following emergency procedures

•**Q&A Session**

•**Written Exam**

•**Exam Review**

Department Approved Course for Authorized Users

The course examination and instructor qualifications listed below will be used by the Department to evaluate the approval of a course, plus the course outline listed above.

Course Examination

- 25-50 question, closed-book written test -- 70 percent grade
 - Emphasis on radiation safety of portable gauge or XRF storage, use, sealed source location, maintenance, and transportation, rather than the theory and art of making portable gauge or XRF measurements
 - Review of correct answers to missed questions with prospective gauge or XRF user immediately following the scoring of the test

Course Instructor Qualifications

Instructor should have either:

- Bachelor's degree in a physical or life science or engineering
- Successful completion of a portable gauge or XRF user course
- Successful completion of an 8 hour radiation safety course AND
- 8 hours hands-on experience with portable gauges or XRF

OR

- Successful completion of portable gauge or XRF user course
- Successful completion of 40 hour radiation safety course; AND
- 30 hours of hands-on experience with portable gauges or XRF.

Appendix J

**Information Needed to Support Applicant's
Request
to Perform Non-Routine Maintenance**

Appendix J

Information Needed to Support Applicant's Request to Perform Non-Routine Maintenance

Non-routine maintenance or repair (beyond routine cleaning and lubrication) involves detaching the source or source rod from the device and any other activities during which personnel could receive radiation doses exceeding Department limits. If this maintenance or repair is not performed properly with attention to good radiation safety principles, the gauge or XRF may not operate as designed and personnel performing these tasks could receive radiation doses exceeding Department limits.

A typical moisture-density gauge contains 0.37 gigabecquerels (10 millicuries) of cesium-137 and 1.5 gigabecquerels (40 millicuries) of americium-241 as a neutron source. In about 9 minutes, an unshielded cesium-137 source of this activity can deliver 0.05 sievert (5 rems) to a worker's hands or fingers (i.e., extremities), assuming the extremities are 1 centimeter from the source. Some gauges contain sources of even higher activities with correspondingly higher dose rates. The threshold for extremity monitoring is 0.05 sievert (5 rems) per year.

Thus, applicants wishing to perform non-routine maintenance must use personnel with special training and follow appropriate procedures consistent with the manufacturer's instructions and recommendations that address radiation safety concerns (e.g., use of radiation survey meter, shielded container for the source, personnel dosimetry). Accordingly, provide the following information:

- Describe the types of work, maintenance, cleaning, repair, etc., to be performed that necessitate detaching the source or source rod from the device or that could cause personnel to receive radiation doses exceeding Department limits. The principal reason for obtaining this information is to assist in the evaluation of the qualifications of individuals who will conduct the work and the radiation safety procedures they will follow.
- Identify who will perform non-routine maintenance, their training and experience, and why they are competent to perform non-routine maintenance.
- Submit procedures for safe handling of the radioactive source while the source or source rod is detached from the gauge. These procedures should ensure the following:
 - doses to personnel and members of the public are within regulatory limits and ALARA (e.g., use of shielded containers or shielding);
 - the source or source rod is secured against unauthorized removal access or under constant surveillance;
 - appropriate labels and signs are used; and
 - manufacturer's instructions and recommendations are followed.
- Confirm that individuals performing non-routine maintenance on gauges or XRF will always wear both whole body and extremity monitoring devices or that an evaluation will be

available to demonstrate that these individuals are not likely to receive, in one year, more than 10 percent of the applicable dose limits.

- Verify possession of at least one survey instrument meeting the following criteria:
 - Be capable of detecting gamma radiation;
 - Be capable of measuring from 0.01 to 0.5 mSv/hr [1 to 50 mrem/hr];
 - Be calibrated at least annually with radionuclide point sources emitting radiation of the type and energy of the sealed sources in the gauge or XRF;
 - Be calibrated at least 2 points located at approximately 1/3 and 2/3 of each scale; readings within $\pm 20\%$ are acceptable;
 - Be calibrated by a person specifically licensed by the Department, an Agreement State or the U.S. Nuclear Regulatory Commission to calibrate radiation detection instruments; and
 - Be checked for functionality prior to use (e.g., with the gauge or XRF or a check source).

Note: Records of instrument calibration must be maintained for 3 years after the record is made. (180 NAC 4-048)

- Describe steps to be taken to ensure that radiation levels in areas where non-routine maintenance will take place do not exceed 180 NAC 4-006 limits. For example, applicants can do the following:
 - commit to performing surveys with a survey instrument (as described above);
 - specify where and when surveys will be conducted during non-routine maintenance; and
 - commit to maintaining, for 3 years from the date of the survey, records of the survey (e.g., who performed the survey, date of the survey, instrument used, measured radiation levels correlated to location of those measurements), as required by 180 NAC 4-048.

Appendix K Dosimetry-related Guidance

Part 1: Guidance for Demonstrating that Unmonitored Individuals are Not Likely to Exceed 10 Percent of the Allowable Limits

Appendix K Dosimetry-related Guidance

Part 1: 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% of the applicable regulatory limits in 180 NAC 4-005. To demonstrate that dosimetry is *not* required, a licensee needs to have available, for inspection, an evaluation to demonstrate that its workers are not likely to exceed 10% of the applicable annual limits.

The most common way that individuals *might* exceed 10% of the applicable limits is by performing frequent routine cleaning and lubrication of gauges or XRF. Thus, a licensee would need to evaluate the doses its workers might receive in performing these tasks to assess whether dosimetry is required.

EXAMPLE

One gauge or XRF manufacturer has estimated the doses to the extremities and whole body of a person performing routine cleaning and lubrication of one of its series of gauges or XRF. Each gauge or XRF in the series 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 based its estimate on observations of individuals performing the recommended procedure according to good radiation safety practices. The manufacturer had the following types of information:

- Time needed to perform the entire procedure (e.g., 10 min)
- Expected dose rate received by the whole body of the individual, associated with the shielded source and determined using measured or manufacturer-determined data (e.g., 0.2 mSv/hr [20 mrem/hr] at contact with the shield)
- Time the hands were exposed to the unshielded source (e.g., 3 min)
- Expected dose rate received by the extremities of the individual, associated with the unshielded source and determined using measured or manufacturer-determined data for the typical distance that the hands would be from the sealed source (e.g., 9 mSv/hr [900 mrem/hr] or 0.15 mSv/hr [15 mrem/min])

From this information, the manufacturer estimated that the individual performing each routine cleaning and lubrication could receive the following:

- Less than 0.04 mSv [4 mrem] TEDE (whole body) and
- 0.45 mSv [45 mrem] to the hands.

The applicable limit TEDE (whole body) is 50 mSv (5 rems) per year and 10% of that value is 5 mSv (500 millirems) per year. If one cleaning/lubrication delivers 0.04 mSv (4 mrem), then an individual could perform 125 of these operations each year and remain within 10% of the applicable limit.

The applicable limit for the extremities is 500 mSv (50 rems) per year and 10% of that value is 50 mSv (5 rems or 5000 millirems) per year. If one cleaning/lubrication delivers 0.45 mSv (45 mrem), then an individual could perform 111 of these operations each year and remain within 10% of the applicable limit.

Based on the above specific situation, no dosimetry is required if an individual performs fewer than 111 procedures per year.

GUIDANCE TO LICENSEES

Licensees who wish to demonstrate that they are *not* required to provide dosimetry to their workers need to prepare a written evaluation similar to that shown in the example above. The expected dose rates, times, and distances used in the above example may *not* be appropriate to individual licensee situations. In their evaluations, licensees need to use information appropriate to the various types of gauges or XRF on which they will perform routine cleaning and lubrication; this information is generally available from gauge or XRF manufacturers or the SSD Registration Sheet maintained by the NRC and Agreement States.

Table G-1 may be helpful in documenting a licensee's evaluation. ¹

Licensees should review evaluations periodically and revised them as needed. They need to check assumptions used in their evaluations to ensure that they continue to be 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 they would receive more than 0.15 mSv (15 mrem) per minute. 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, the purchase of new gauges or XRF containing sources of different activities, different radionuclides, or different cleaning/lubrication procedures would require a new evaluation.

¹For ease of use by most portable gauge 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.

Table G.1, Dosimetry Evaluation

Dosimetry Evaluation for _____ Model _____ Portable Gauge or XRF			
A.	Time needed to perform the entire routine cleaning and lubrication procedure on the gauge or XRF	_____ minutes/60	_____ hour
B.	Expected whole body dose rate which the individual will encounter, determined using measured or manufacturer-provided data.	_____ mrem/hr	
C.	Time the <u>hands</u> were exposed to the unshielded source	_____ minutes/60	_____ hour
D.	Expected extremity dose rate which the individual will encounter, determined using measured or manufacturer-provided data for the unshielded source at the typical distance from the hands to the unshielded source.	_____ mrem/hr	
Formula: (_____ #hours in Row A) x (_____ mrem/hr in Row B) = (_____ estimated mrem) x (_____ # of clean and lubrications conducted each year) = _____ mrem *Whole Body Dose Equivalent			
Formula: (_____ #hours in Row C) x (_____ mrem/hr in Row D) = (_____ estimated mrem) x (_____ # of clean and lubrications conducted each year) = _____ mrem **Extremity Dose Equivalent			
*Whole Body Dose Equivalent <i>less than</i> 500 mrem requires no dosimetry **Extremity Dose Equivalent <i>less than</i> 5000 mrem requires no dosimetry			

Appendix K, Part 2

Guidance for Demonstrating that Individual Members of the Public will not Receive Doses Exceeding the Allowable Limits

Appendix K, Part 2

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 millirem (100 mrem)] in one calendar year resulting from the licensee's possession and/or use of radioactive materials.

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

- The radiation dose in unrestricted areas does not exceed 0.02 mSv (2 mrem) in any one hour.

Typical unrestricted areas may include offices, shops, laboratories, areas outside buildings, property, and nonradioactive equipment storage areas. 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.

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

CALCULATIONAL METHOD¹

The calculational method takes a tiered approach, going through a three-part process starting with a worst case situation and moving toward more realistic situations. It makes the following simplifications: (1) each gauge or XRF is a point source, (2) typical radiation levels encountered when the source is in the shielded position 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 gauges or XRF and the unrestricted areas.

Part 1 of the calculational method is simple but conservative. It assumes that an affected member of the public is present 24 hours a day and uses only the "inverse square law" to determine if the distance between the gauge or XRF and the affected member of the public is sufficient to show compliance with the public dose limits. Part 2 considers not only distance, but also the time that the affected member of the public is actually in the area under consideration. Part 3 considers distance and the portion of time that both the gauge or XRF and the affected

¹For ease of use by most portable gauge 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.

member of the public are present. Using this approach, licensees make only those calculations that are needed to demonstrate compliance. In many cases licensees will need to use the calculational method through Part 1 or Part 2. The results of these calculations typically result in higher radiation levels than would exist at typical facilities, but provide a method for estimating conservative doses which could be received.

Example 1

To better understand the calculational method, we will look at Moisture-Density Measurements, Inc., a portable gauge or XRF licensee. Yesterday, the company's president noted that the new gauge or XRF 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 the Department's regulations.

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

A Bird's Eye View of Office and Gauge Storage Area

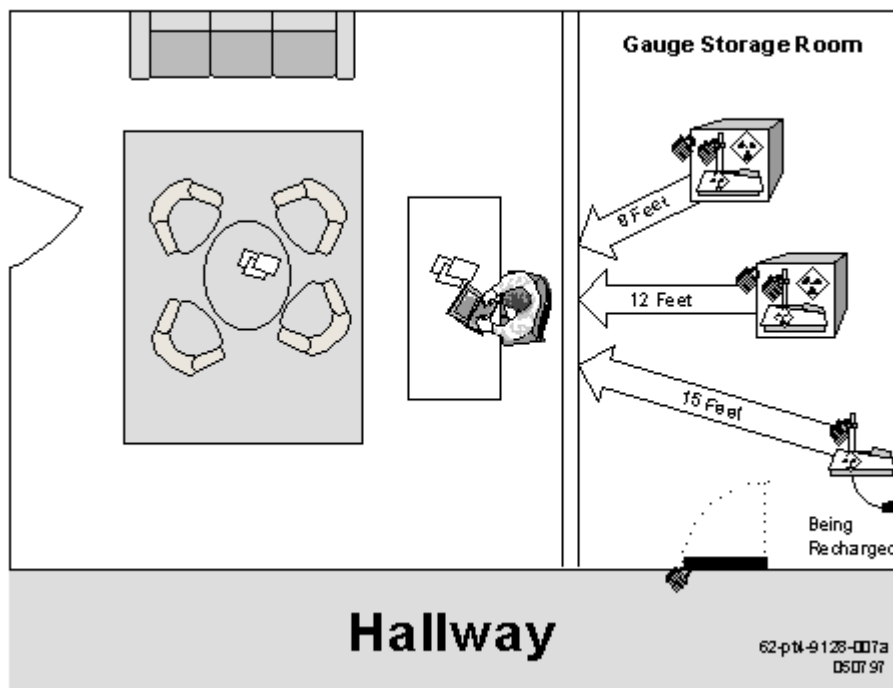


Figure G-1, Diagram of Office and Gauge or XRF Storage Area. This sketch shows the areas described in Examples 1 and 2. Table G.2, Information Known about Each Gauge or XRF

DESCRIPTION OF KNOWN INFORMATION	GAUGE or XRF 1	GAUGE or XRF 2	GAUGE or XRF 3
How gauge is stored	Gauge or XRF in transport container	Gauge or XRF in transport container	Gauge or XRF out of transport container and being recharged
Dose rate in mrem/hr encountered at specified distance from the gauge or XRF (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

Example 1: Part 1

Joe's first thought is that the distance between the gauges or XRFs and the secretary's chair may be sufficient to show compliance with the regulation in 180 NAC 4-013. So, taking a "worst case" approach, he assumes: 1) the gauges or XRFs are constantly present (i.e., 24 hr/d), 2) all three gauges or XRFs remain in storage with no other use, and 3) the secretary is constantly sitting in the desk chair (i.e., 24 hr/d). Joe proceeds to calculate the dose she might receive hourly and yearly from each gauge or XRFs as shown in Tables I-3, I-4, and I-5 below.

Table G.3, Calculational Method, Part 1---Hourly and Annual Dose Received from Gauge or XRF 1

Step No.	Description	GAUGE or XRF 1	
		Input Data	Results
1	Dose received in an hour at known distance from gauge or XRF (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 or XRF 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 or XRF 1 , in mrem in an hour.	2/64 = 0.031	
6	Multiply the result of Step 5 by 24 hr/d x 365 d/yr = MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGE or XRF 1 , in mrem in a year.	0.031 x 24 x 365 = 0.031 x 8760 = 272	

Table G.4, Calculational Method, Part 1---Hourly and Annual Dose Received from Gauge or XRF 2

		GAUGE or XRF 2	
Step No.	Description	Input Data	Results
1	Dose received in an hour at known distance from gauge or XRF (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 or XRF 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 dose received in an hour by an individual at the secretary's desk, HOURLY DOSE RECEIVED FROM GAUGE or XRF 2 , in mrem in an hour	8/144 = .056	
6	Multiply the result of Step 5 by 24 hr/d x 365 d/yr = MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGE or XRF 2 , in mrem in a year	0.056 x 24 x 365 = 0.056 x 8760 = 491	

Table G.5, Calculational Method, Part 1---Hourly and Annual Dose Received from Gauge or XRF 3

		GAUGE or XRF 3	
Step No.	Description	Input Data	Results
1	Dose received in an hour at known distance from gauge or XRF (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 or XRF 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 or XRF 3 , in mrem in an hour	18/225 = 0.08	
6	Multiply the result of Step 5 by 24 hr/d x 365 d/yr = MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGE or XRF 3 , in mrem in a year	0.08 x 24 x 365 = 0.08 x 8760 = 701	

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

Table G.6, Calculational Method, Part 1---Total Hourly and Annual Dose Received from Gauges or XRFs 1, 2, and 3

Step No.	Description	Gauge1	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	$0.031 + 0.056 + 0.08 = \mathbf{0.167}$
8	TOTAL ANNUAL DOSE RECEIVED from Step 6 of Tables I-3, I-4, and I-5, in mrem in a year	272	491	701	$272 + 491 + 701 = \mathbf{1464}$

NOTE: The Sum in Step 7 demonstrates compliance with the 2 mrem in any one hour limit. Reevaluate if assumptions change. If the Sum in Step 8 exceeds 100 mrem/yr, proceed to Part 2 of the calculational method.

At this point, Joe is pleased to see that the total dose that an individual could receive in any one hour is only 0.167 mrem, but notes that an individual could receive a dose of 1,464 mrem in a year, much higher than the 100 mrem limit. **Example 1: Part 2**

Joe reviews his assumptions and recognizes that the secretary is not at the desk 24 hr/d. He decides to make a realistic estimate of the number of hours the secretary sits in the chair at the desk, keeping his other assumptions constant (i.e., the gauges or XRFs are constantly present (i.e., 24 hr/d), all three gauges or XRFs remain in storage with no other use). He then recalculates the annual dose received.

Table G.7, Calculational Method, Part 2---Annual Dose Received from Gauges or XRFs 1, 2, and 3

Step No.	Description	Results
9	A. Average number of hours per day that individual spends in area of concern (e.g., secretary sits at desk 5 hr/day; the remainder of the day the secretary is away from the desk area copying, filing, etc.) B. Average number of days per week in area (e.g., secretary is part time and works 3 days/week) C. Average number of weeks per year in area (e.g., secretary works all year)	5 3 52
10	Multiply the results of Step 9.A. by the results of Step 9.B. by the results of Step 9.C. = AVERAGE NUMBER OF HOURS IN AREA OF CONCERN PER YEAR	$5 \times 3 \times 52 = \mathbf{780}$
11	Multiply the sum in Step 7 by the results of Step 10 = ANNUAL DOSE RECEIVED FROM GAUGES or XRFs CONSIDERING REALISTIC ESTIMATE OF TIME SPENT IN AREA OF CONCERN , in mrem in a year	$0.167 \times 780 = \mathbf{130}$

NOTE: If Step 11 exceeds 100 mrem in a year, proceed to Part 3 of the calculational method.

Although Joe is pleased to note that the calculated annual dose received is significantly lower, he realizes it still exceeds the 100 mrem in a year limit.

Example 1, Part 3

Again Joe reviews his assumptions and recognizes that the gauges or XRFs are not always in storage when the secretary is seated at the desk. As he examines the situation, he realizes he must consider each or XRF individually.

Table G.8, Calculational Method, Part 3---Summary of Information

INFORMATION ON WHEN GAUGES or XRFs ARE PRESENT IN THE STORAGE AREA:				
<ul style="list-style-type: none"> - GAUGE or XRF 1: an old gauge or XRF located in the storage area continuously (24 hr/d) - GAUGE or XRF 2: a new gauge or XRF located in the storage area continuously (24 hr/d) for 8 months of the year; for the remaining 4 months of the year it is at temporary job sites - GAUGE or XRF 3: a new gauge or XRF 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 or XRF is usually present during the secretary’s first and last hours of work each day. 				
INFORMATION FROM EXAMPLE 1, PART 2 ON WHEN THE SECRETARY IS SITTING AT THE DESK				

Table G.9, Calculational Method, Part 3---Annual Dose Received from Gauges or XRFs 1, 2, and 3

Step No.	Description	GAUGE 1	GAUGE 2	GAUGE 3
12	Average number of hours per day gauge or XRF is in storage while secretary is present	5	5	2
13	Average number of days per week gauge or XRF is in storage while secretary is present	3	3	3
14	Average number of weeks per year gauge or XRF is in storage while secretary is present	52	32	52
15	Multiply the results of Step 12 by the results of Step 13 by the results of Step 14 = TOTAL HOURS EACH GAUGE or XRF IS STORED PER YEAR WHILE SECRETARY IS PRESENT	$5 \times 3 \times 52 =$ 780	$5 \times 3 \times 32 =$ 480	$2 \times 3 \times 52 =$ 312
16	Multiply the results of Step 15 by the results of Step 7 = ANNUAL DOSE RECEIVED FROM EACH GAUGE or XRF , in mrem in a year	$780 \times 0.031 =$ 24	$480 \times 0.056 =$ 27	$312 \times 0.08 =$ 25

17	Sum the results of Step 16 for each gauge or XRF = TOTAL ANNUAL DOSE RECEIVED CONSIDERING REALISTIC ESTIMATE OF TIME SPENT IN AREA OF CONCERN AND TIME GAUGE or XRF IS IN STORAGE , in mrem in a year	$24 + 27 + 25 = 76$
----	--	---------------------

NOTE: If the result in Step 17 is greater than 100 mrem/yr, the licensee must take corrective actions.

Joe is pleased that the result in Step 17 shows compliance with the 100 mrem/yr limit. Had the result in Step 17 been higher than 100 mrem/yr, then Joe could have done one or more of the following:

- Consider whether the assumptions used to determine occupancy and the time each gauge or XRF 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 or XRF storage area and the secretarial workstation--such calculation is beyond the scope of this Appendix.
- Take corrective action (e.g., move gauges or XRFs within storage area, move the storage area, move the secretarial workstation) and perform new calculations to demonstrate compliance
- Designate the area outside the storage area as a restricted area and the secretary as an occupationally exposed individual. This would require controlling access to the area for purposes of radiation protection and training the secretary as required by 180 NAC 10-003.

Note that in the example, Joe evaluated the unrestricted area outside only one wall of the gauge or XRF storage area. Licensees also need to make similar evaluations for other unrestricted areas 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 or XRFs closer to the secretarial workstation, adding a gauge or XRF to the storage area, changing the secretary to a full-time worker, or changing the estimate of the portion of time spent at the desk) and to perform additional evaluations, as needed.

RECORD KEEPING: 180 NAC 4-053 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 or XRF 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 or XRF. These

measurements must be made with calibrated survey meters sufficiently sensitive to measure background levels of radiation. However, licensees must exercise caution when making measurements with currently calibrated radiation survey instruments. A maximum dose of 1 mSv (100 mrem) received by an individual over a period of 2080 hours (i.e., a “work” year of 40 hr/wk for 52 wk/yr) is equal to less than 0.5 microsievert (0.05 mrem) per hour.

This rate is well below the minimum sensitivity of most commonly available G-M survey instruments.

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 TLDs¹ in unrestricted areas next to the gauge or XRF 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 or XRF licensee. The company has three gauges or XRFs stored in a designated, locked storage area that adjoins an unrestricted area where a secretarial work station is located. See Figure G-1 and Table G-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 or XRF were in storage, Joe placed an environmental TLD badge in the secretarial work space for 30 days. Joe chose a winter month so he did not have to keep track of the number of hours that each gauge or XRF was in the storage area. The TLD processor sent Joe a report indicating the TLD received 100 mrem.

¹TLDs used for personnel monitoring (e.g., LiF) may not have sufficient sensitivity for this purpose. Generally, the minimum reportable dose received is 0.1 mSv (10 mrem). Suppose a TLD monitors dose received and is changed once a month. If the measurements are at the minimum reportable level, the annual dose received could have been about 1.2 mSv (120 mrem), a value in excess of the 1 mSv/yr (100 mrem/yr) limit. If licensees use TLDs to evaluate compliance with the public dose limits, they should consult with their TLD supplier and choose more sensitive TLDs, such as those containing CaF₂ that are used for environmental monitoring.

Table G.10, Combination Measurement-Calculational Method

Step No.	Description	Input Data and Results
PART 1		
1	Dose received by <i>TLD</i> , in mrem	100
2	Total hours <i>TLD</i> 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 d/yr x 24 hr/d = 8760 hours in one year = MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGES or XRFs , 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 which could be received in any one 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 or XRFs are actually in storage as in Part 3 of Example 1. (Recall that the *TLD* measurement was made while all the gauges or XRFs were in storage--i.e., 24 hr/d for the 30 days that the *TLD* was in place.)

Appendix L

Requests to Perform Leak Testing and Sample Analysis

Appendix L

Request to Perform Leak Testing and Sample Analysis

Information to be Provided Supporting Request

- Identify the individual who will make the analysis and provide his or her qualifications to make quantitative measurements of radioactivity
- Commit to performing leak testing at the frequency specified in the appropriate SSD Registration Certificate.
- Specify how and where test samples will be taken on the gauge or XRF. Describe materials used and methods of handling samples to prevent or minimize exposure to personnel.
- Specify the type of instrument(s) that will be used for measurement, the counting efficiency, and minimum levels of detection for each radionuclide to be measured.

Note: An instrument capable of making quantitative measurements should be used; hand-held survey meters will not normally be considered adequate for measurements.

- Specify the standard sources used to calibrate the instrument; for each, specify the radionuclide, quantity, accuracy, and traceability to primary radiation standards.

Note: Accuracy of standards should be within $\pm 5\%$ of the stated value and traceable to a primary radiation standard such as those maintained by the National Institutes of Standards and Technology (NIST).

- Include a sample calculation for conversion of the measurement data to becquerels (or microcuries).
- Provide instructions on actions to take and persons to be notified if sources are found to be leaking.
- All gauge or XRF licensees are required to retained leak test records for 3 years for inspection purposes.

Model Procedure for Performing Leak Testing and Analysis

- For each source to be tested, list identifying information such as gauge or XRF serial number, radionuclide, activity.
- If available, use a survey meter to monitor exposure.
- Prepare a separate wipe sample (e.g., cotton swab or filter paper) for each source.
- Number each wipe to correlate with identifying information for each source.
- Wipe the most accessible area where contamination would accumulate if the sealed source were leaking.

- Using the instrument identified to, and approved by the Department, count the record background count rate.
- Check the instrument's counting efficiency using standard source of the same radionuclide as the source being tested or one with similar energy characteristics. Calculate efficiency.
- Count each wipe sample; determine net count rate.
- For each sample, calculate and record estimated activity in becquerels (or microcuries).
- Sign and date the list of sources, data and calculations.
- If the wipe test activity is 185 becquerels (0.005 microcurie) or greater, notify the RSO, so that the source can be withdrawn from use and disposed of properly. Also notify the Department.

Leak Test Records

The records will include the following information:

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

Appendix M

Major DOT Regulations; Sample Bill of Lading

Appendix M

Major DOT Regulations and Example of a Bill of Lading

The major areas in the DOT regulations that are most relevant for transportation of typical portable gauges or XRFs that are shipped as Type A quantities are as follows:

- Table of Hazardous Materials and Special Provisions 49 CFR 172.101, and App. A, Table 2: Hazardous Materials Table, List of Hazardous Substances and Reportable Quantities
- Shipping Papers 49 CFR 172.200-204: general entries, description, additional description requirements, shipper's certification
- Package Markings 49 CFR 172.300, 49 CFR 172.301, 49 CFR 172.303, 49 CFR 172.304, 49 CFR 172.310, 49 CFR 172.324: General marking requirements for non-bulk packaging, prohibited marking, marking requirements, radioactive material, hazardous substances in non-bulk packaging
- Package Labeling 49 CFR 172.400, 49 CFR 172.401, 49 CFR 172.403, 49 CFR 172.406, 49 CFR 172.407, 49 CFR 172.436, 49 CFR 172.438, 49 CFR 172.440: General labeling requirements, prohibited labeling, radioactive materials, placement of labels, specifications for radioactive labels
- Placarding of Vehicles 49 CFR 172.500, 49 CFR 172.502, 49 CFR 172.504, 49 CFR 172.506, 49 CFR 172.516, 49 CFR 172.519, 49 CFR 172.556: Applicability, prohibited and permissive placarding, general placarding requirements, providing and affixing placards: highway, visibility and display of placards, RADIOACTIVE placard
- Emergency Response Information, Subpart G, 49 CFR 172.600, 49 CFR 172.602, 49 CFR 172.604: Applicability and general requirements, emergency response information, emergency response telephone number
- Training, Subpart H, 49 CFR 172.702, 49 CFR 172.704: Applicability and responsibility for training and testing, training requirements
- Radiation Protection Program for Shippers and Carriers, Subpart I, 49 CFR 172.800, etc.
- Shippers - General Requirements for Shipments and Packaging, Subpart I, 49 CFR 173.403, 49 CFR 173.410, 49 CFR 173.412, 49 CFR 173.415, 49 CFR 173.433, 49 CFR 173.435, 49 CFR 173.441, 49 CFR 173.475, 49 CFR 173.476: Definitions, general design requirements, additional design requirements for Type A packages, authorized Type A packages, requirement for determining A₁ and A₂, table of A₁ and A₂ values for radionuclides, radiation level limit, quality control requirements prior to each shipment, approval of special form radioactive materials
- Carriage by Public Highway 49 CFR 177.816, 49 CFR 177.817, 49 CFR 177.834(a), 49 CFR 177.842: Driver training, shipping paper, general requirements (secured against movement), Class 7 (radioactive) material

Additional Information Concerning the Transportation of Portable Gauges or XRFs and XRF's

- **Markings and labels**

They will be durable, legible, in English, and printed on or affixed to the package surface (e.g., a label, tag or sign)

- Required **markings** include:

- Shipping name (ex.: radioactive material, Type A Package, special form, class 7)

- RQ (for gauges with an Am-241: Be source ≥ 10 mCi); add to shipping name

- Identification number (ex.: UN3332)

- Package type (ex.: Type A)

- Required **labels** include:

- Two DOT warning labels (ex: RADIOACTIVE YELLOW II) on opposite sides of the package, listing the package's contents and activity in SI and customary units, the package's Transportation Index, the dimensionless number indicating the package's radiation level at 1 meter. The TI is the maximum dose rate in mrem/hr at one meter from the surface of the package. YELLOW II label packages do not require that the vehicle be placarded.

- **Shipping Papers**

- **Bill of lading** listing the below information will be in the vehicle and immediately accessible to the driver during transport

- Name of shipper

- Description of shipment [proper shipping name, RQ (if applicable), identification number, hazard class, type of package, name an activity of each nuclide, category of labeling and Transport Index]

- Emergency response telephone number (manned by knowledgeable personnel or person with immediate access to knowledgeable personnel)

- Shipper's certification

- Signature of shipper

- Note:**

- An example of a Bill of Lading is Exhibit M-1 of this Regulatory Guide.

Exhibit M-2 is a "Bill of Lading" which a licensee can use. Copy it on to the company's letterhead stationery. Then fill in the appropriate information. The Bill of Lading must accompany the driver of a vehicle during the transportation of the gauge. Source type, source activity and TI may differ from gauge to gauge.

The "RQ" requirement applies only to sources containing americium.

- **Emergency response information** will be provided with the bill of lading and will be immediately accessible to the driver during shipment.

- **Operating & emergency procedures** will accompany the shipping papers.

Appendix M-1 Example of a Bill of Lading

STRAIGHT BILL OF LADING ORIGINAL—NOT NEGOTIABLE

Shipper No. _____
Carrier No. _____

Page 1 of 1 (Name of carrier) (BOAC) Date

TO: Builders, Inc. ** <small>Consignee</small> <small>On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec. 1.</small>	FROM: Moisture Density Measurements, Inc. ** <small>Shipper</small>
Street 5678 Jefferson Davis Highway **	Street 1234 A Street, NW **
Destination Arlington, VA** Zip Code 22222**	Origin Washington, DC 20000**

Route	No. of Units & Container Type	HM	BASIC DESCRIPTION <small>Proper Shipping Name, Hazard Class Identification Number (UN or NA) per 172.101, 172.202, 172.203</small>	TOTAL QUANTITY <small>(Weight, Volume, Gallons, etc.)</small>	WEIGHT <small>(Subject to Correction)</small>	RATE	CHARGES <small>(For Carrier Use Only)</small>
	1	RQ	Radioactive material, Type A Package Special Form, 7, UN3332 0.41GBq (11 mCi) Cs-137 and 1.9GBq (50 mCi) Am-241:Be RADIOACTIVE - YELLOW II TI = 0.4 ** USDOT 7A TYPE A Emergency Response Telephone No.: 1-800-000-0000 (24 hr/d)**	2.31 GBq (61 mCi)			
			** SUBSTITUTE APPROPRIATE INFORMATION FOR YOUR GAUGE AND YOUR SHIPMENT				

PLACARDS TENDERED: YES NO

<small>Note — Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding \$ _____ per _____</small>	<small>I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packaged, marked and labeled, and are in all respects in proper condition for transport by air in accordance with the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (TI) or by land in accordance with the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Road (RID) or by rail in accordance with the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Rail (RID) or by inland waterway in accordance with the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Inland Waterway (TIW) or by sea in accordance with the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Sea (TSCG) or by air, land, inland waterway or sea in accordance with applicable international and national governmental regulations.</small> <i>John Jones</i> Signature	REMIT C.O.D. TO: ADDRESS COD Amt: \$ _____ <small>Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.</small>	C.O.D. FEE: PREPAID <input type="checkbox"/> COLLECT <input type="checkbox"/> \$ _____ TOTAL CHARGES: \$ _____ FREIGHT CHARGES <small>Freight PREPAID when bill is right is checked <input type="checkbox"/> Check box if charges are to be added</small>
---	---	---	--

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (comments and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout the contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER	CARRIER
PER	PER
	DATE

Permanent post-office address of shipper: _____ STYLE F85 LABELMASTER, Div. of American Labelmark Co., Chicago, IL 60646 312/478-0900

BILL OF LADING

Shipper: _____

RQ, Radioactive material, Type "A" package, Special Form, 7, UN 3332

_____ Package(s) containing:

Cs-137, _____ GBq (_____ mCi)
Am-241: Be, _____ GBq (_____ mCi)

RADIOACTIVE YELLOW II Label, TI = _____

EMERGENCY CONTACT: (_____) _____ - _____

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

Shipper: _____
(Signature)

Sample XRF UN 2911 Marking



Appendix N

Guide to SI Unit for Radiation Protection

Guide to SI Unit for Radiation Protection

Introduction to SI Units

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

Common Radiological Unit Prefixes

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

Length

1 centimeter (cm)	=	0.3937 in	=	.03287 ft
1 meter (m)	=	100 cm	=	39.37 in = 3.281 ft
1 inch (in)	=	2.54 cm	=	0.254 m
1 foot (ft)	=	30.48 cm	=	0.3048 m

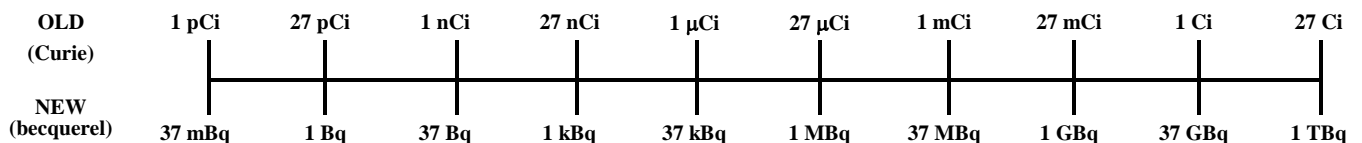
Activity

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

$1 \text{ Ci} = 3.7 \times 10^{10} \text{ Bq} = 37 \text{ GBq}$ $1 \text{ Bq} = 1 \text{ disintegration per second} = 2.7027 \times 10^{-11} \text{ Ci}$ or $\cong 27 \text{ pCi}$

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

To convert Ci to Bq, multiply the Ci figure by 37×10^9



Examples: $9 \text{ mCi} = 333 \text{ MBq} = 0.333 \text{ GBq}$ $10 \text{ mCi} = 370 \text{ MBq} = 0.37 \text{ GBq}$
 $44 \text{ mCi} = 1628 \text{ MBq} = 1.63 \text{ GBq}$ $50 \text{ mCi} = 1850 \text{ MBq} = 1.85 \text{ GBq}$

Activity (continued)

Table A

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

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

Table B

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

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

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

Radiation Dose Equivalent

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

1 rem = 0.01 sievert (Sv) = 10 mSv

100 rem = 1 Sv = 0.01 Sv

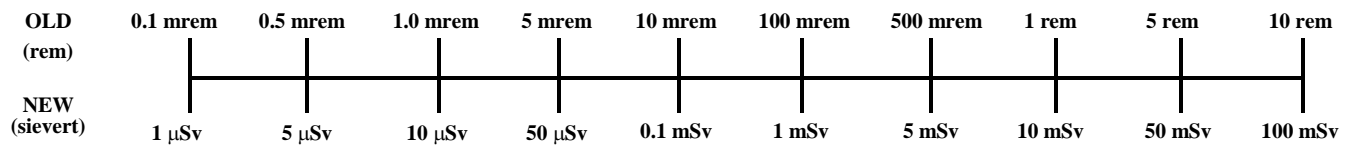
500 rem = 5 Sv = 0.5 mSv

1 rad = 0.01 gray (Gy) = 10 mGy

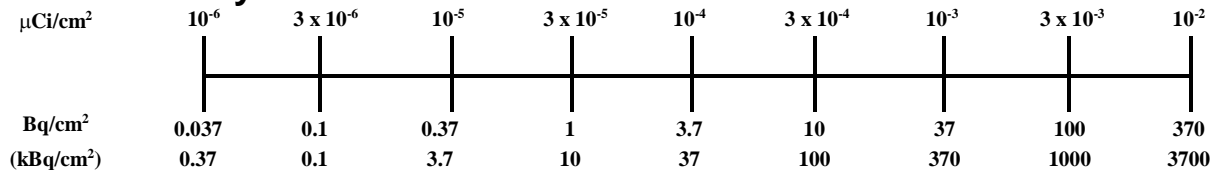
100 rads = 1 Gy = 0.01 Gy

500 rads = 5 Gy = 0.5 mGy

The working SI unit is the sievert (Sv)



Surface Activity



Appendix O

Portable Gauge or XRF Audit Checklist

- B. If ownership changed or bankruptcy filed, was the Department's prior consent obtained or was the Department notified?
No N/A Yes
- C. If the RSO was changed, was license amended? N/A Yes No
- D. Does new RSO meet the Department training requirements?
No N/A Yes
- E. If the designated contact person for the Department changed, was the Department notified?
No N/A Yes
- F. Does the license authorize all of the Department-regulated radionuclides contained in gauges or XRF possessed?
No N/A Yes
- G. Are the gauges or XRFs as described in the Sealed Source and Device (SSD) Registration Certificate or Sheet? Yes No
Have copies of (or access to) SSD Certificates? Yes No
Have manufacturers' manuals for operation and maintenance? Yes No
- H. Are the actual uses of gauges or XRFs consistent with the authorized uses listed on the license? N/A Yes No
- I. Is the RSO fulfilling his/her duties? N/A Yes No
- J. Is company management appropriately involved with the radiation protection program and oversight of the RSO's activities? Yes No
- K. Does RSO have sufficient time to perform all duties/responsibilities? Yes No

3. Training and Instructions to Workers

- A. Were all workers who are likely to exceed 100 mrem/yr provided radiation awareness training per 180 NAC 10-003? Yes No
- B. Did each authorized user complete a 8 hour course provided by the manufacturer of the device or any Department approved course? Yes No
- C. Are training records maintained for each gauge or XRF operator? Yes No
- D. Did interviews with operators reveal that they know the emergency procedures? Yes No
- D. Did this audit include observations of operators:
using the gauge or XRF in a field situation? Yes No

Operating the gauge or XRF?			
Yes	No	Performing routine cleaning and lubrication?	Yes No
		Transporting the gauge or XRF?	Yes No
		Storing the gauge or XRF?	Yes No

E. HAZMAT training provided as required? [49 CFR 172.700, 49 CFR 172.701, CFR 172.702, 49 CFR 172.703, 49 CFR 172.704] N/A Yes No

4. Radiation Survey Instruments

A. If the licensee possesses its own survey meter, does it meet the Department's criteria?	N/A	Yes	No
B. If the licensee does not possess a survey meter, are specific plans made to have one available?	N/A	Yes	No
C. Is the survey meter needed for non-routine maintenance calibrated as required (180 NAC 4-021)?	N/A	Yes	No
D. Are calibration records maintained (180 NAC 4-048)?	N/A	Yes	No

5. Gauge or XRF Inventory

A. Is a record kept showing the receipt & transfer/disposal of each gauge or XRF? (180 NAC 1-004)		Yes	No
B. Are all gauges or XRF received physically inventoried every six months?	N/A	Yes	No
C. Are records of inventory results with appropriate information maintained?		Yes	No

6. Personnel Radiation Protection

A. Are ALARA considerations incorporated into the radiation protection program? (180 NAC 4-004.02)	Yes	No
B. Is documentation kept showing that unmonitored users receive $\leq 10\%$ of limit? (180 NAC 4-022.01)	Yes	No
C. Did unmonitored users' activities change during the year which could put them over 10% of limit?	Yes	No
D. If yes to c. above, was a new evaluation performed?		Yes
		No
E. Is external dosimetry required (user receiving $>10\%$ of limit)?	Yes	No
And is dosimetry provided to users?	Yes	No

- | | | |
|---|-----|----|
| 1) Is the dosimetry supplier NVLAP approved? (180 NAC 4-021.03) | Yes | No |
| 2) Are the dosimeters exchanged monthly for film badges and at industry recommended frequency for TLDs? | Yes | No |
| 3) Are dosimetry reports reviewed by the RSO when they are received? | Yes | No |
| 4) Are the records Department Forms or equivalent?
(180 NAC 4-009.04, 180 NAC 4-052.03) | Yes | No |
| • NRH-1 "Cumulative Occupational Exposure History" completed? | Yes | No |
| • NRH-2 "Occupational Exposure Record for a Monitoring Period" completed? | Yes | No |
| 5) If a worker declared her pregnancy, did licensee comply with (180 NAC 4-012)? | Yes | No |
| • Were records kept of embryo/fetus dose per 180 NAC 4-052.04? | Yes | No |
| F. Are records of exposures, surveys, monitoring, and evaluations maintained (180 NAC 4-047, 180 NAC 4-48, 180 NAC 4-052) | Yes | No |

7. Public Dose

- | | | |
|---|-----|----|
| A. Are gauges or XRFs stored in a manner to keep doses below 100 mrem in a year? (180 NAC 4-013.01, Item 1) | Yes | No |
| B. Has a survey or evaluation been performed per 180 NAC 4-021.01? | Yes | No |
| Have there been any additions or changes to the storage, security, or use of surrounding areas that would necessitate a new survey or evaluation? | Yes | No |
| C. Do unrestricted area radiation levels exceed 2 mrem in any one hour? (180 NAC 4-013.01, Item 2) | Yes | No |
| D. Are gauges or XRFs being stored in a manner that would prevent unauthorized use or removal? (180 NAC 4-031) | Yes | No |
| E. Records maintained? (180 NAC 4-048, 180 NAC 4-053] | Yes | No |

8. Operating and Emergency Procedures

- | | | |
|--|-----|----|
| A. Have operating and emergency procedures been developed? | Yes | No |
| B. Do they contain the required elements? | Yes | No |

- C. Does a current copy of the operating and emergency procedures accompany the portable gauge or XRF at all time? Yes
 No
- D. Does the operating and emergency procedures list the correct phone number for the RSO and the Department? Yes No
- E. Did any emergencies occur? Yes No
- If so, and were they handled properly by operator? Yes No
- Were appropriate corrective actions taken? Yes No

9. Leak Tests

- A. Was each sealed source leak tested every 6 months or at other prescribed intervals? Yes No
- B. Was the leak test performed as described in correspondence with the Department and according to the license? Yes
 No
- C. Are records of results retained with the appropriate information included? Yes No
- D. Were any sources found leaking? Yes No
 And if yes, was the Department notified? Yes No

10. Maintenance of Gauges or XRFs

- A. Are manufacturer's procedures followed for routine cleaning and lubrication of gauge or XRF? Yes No
- B. Does the source or source rod remain attached to the gauge or XRF during cleaning? Yes No
- C. Is non-routine maintenance performed in-house? Yes No
- D. Is yes to C., is non-routine gauge or XRF maintenance conducted by authorized personnel following procedures approved by the Department? Yes No

11. Transportation

PORTABLE GAUGES

- A. Only DOT-7A or other authorized packages is used to transport gauges? [49 CFR 173.415, 49 CFR 173.416(b)] Yes No
- B. Package performance test records are on file? Yes No

- C. Special form sources documentation? [49 CFR 173.476(a)] Yes No
- D. Package has 2 labels (ex. Yellow-II) with TI, Nuclide, Activity, and Hazard Class? [49 CFR 172.403, 49 CFR 173.441] Yes No
- E. Packages used to ship gauges properly marked and labeled per 49 CFR 172.301, 49 CFR 172.304, 49 CFR 172.310 49 CFR 172.324? Yes No
- F. Shipping containers properly locked, blocked & braced prior to transport? [49 CFR 173.475(f)] Yes No
- G. Shipping papers prepared and used? [49 CFR 172.200(a)] Yes No
- H. 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 172.201, 49 CFR 172.202, 49 CFR 172.203, 49 CFR 172.204, 49 CFR 172.604] Yes No
- I. Shipping papers within drivers reach and readily accessible during transport? [49 CFR 177. 817(e)] Yes No
- J. Secured against movement? [49 CFR 177. 834] Yes No
- K. Placarded on vehicle, if needed? [49 CFR 172.504] Yes No
- L. Proper overpacks, if used? [49 CFR 173.25] Yes No
- M. Any incidents reported to DOT? [49 CFR 171.15, 16] Yes No

XRF

- A. If shipping papers are not required (49 CFR 173.422(a) is the package marked with UN 2911 when the XRF is transported?

12. Auditor's Independent Survey Measurements (If Made)

- A. Describe the type, location, and results of measurements. Do any radiation level exceed regulatory limits? _____

13. Notification and Reports

- | | |
|---|--------|
| A. Was any radioactive material lost or stolen? (180 NAC 4-057,
180 NAC 3-026) | Yes No |
| If yes, were reports made? | Yes No |
| B. Did any reportable incidents occur? (180 NAC 4-058,
180 NAC 3-026) | Yes No |
| If yes were reports made? | Yes No |
| C. Did any overexposures and high radiation levels occur? (180 NAC 4-059,
180 NAC 3-026) | Yes No |
| Were they reported? | Yes No |

If any events (as described in items a through c above) did occur, what was root cause?

- | | |
|---|--------|
| D. Were corrective actions appropriate? | Yes No |
| E. Is the licensee aware of telephone number for the Department Emergency
Operations Center? | Yes No |

14. Posting and Labeling

- | | |
|--|-----------|
| A. Following documents are posted at permanent facility:
NRH-3 "Notice to Employees" posted (180 NAC 10-002) | Yes No |
| B. Below documents are posted or a notice indicating the location of the
following documents.? | |
| . Title 180 NAC | Yes No |
| Operating & Emergency Procedures | Yes No |
| The license, conditions or documents incorporated into the
license by reference and amendments | Yes No |
| Any notice of violation involving radiological working conditions,
proposed imposition of civil penalties, or order issued to 180 NAC 1
and any response from the licensee. | NA Yes No |
| C. Radiation signs: (180 NAC 4-034, 180 NAC 4-035) | |
| 1) "Caution (or Danger), Radioactive Material" signs: posted at
permanent facility & job sites where gauges or XRFs are stored (unless
documentation kept describing eligibility for exception described
180 NAC 4-033? | Yes No |
| 2) "Caution (or Danger), Radiation Area" signs: Is manufacturers'
information kept on file to demonstrate that gauge or XRF radiation levels | |

are to low to require posting of radiation area signs around gauge or XRF storage area? NA Yes
No

D. Gauges or XRFs bear durable, clearly visible labels w/ radiation symbol, “Caution (or Danger), Radioactive Material” warning, & sufficient information to permit individuals to avoid/minimize exposures? Yes No

15. Record Keeping for Decommissioning

A. Records kept of information important to decommissioning? (180 NAC 3-018.07) Yes No

B. Records include all information outlined in (180 NAC 3-018.07)? Yes No

16. Bulletins and Information Notices

a. Department Bulletins, Department Information Notices, Department Newsletters, received? Yes No

B. Appropriate training and action taken in response? Yes No

17. Special License Conditions or Issues

A. Did auditor review special license conditions or other issues (e.g., non-routine maintenance)? Yes No

18. Deficiencies Identified in Audit; Corrective Actions

A. Summarize problems/deficiencies identified during audit.

B. If problems/deficiencies identified in this audit, describe corrective actions planned or taken. Are corrective actions planned or taken at ALL licensed locations (not just location audited)?

c. Provide any other recommendations for improvement.

19. Evaluation of Other Factors

- A. Senior licensee management is appropriately involved with the radiation protection program and/or Radiation Safety Officer (RSO) oversight? Yes No
- B. RSO has sufficient time to perform his/her radiation safety duties? Yes No
- C. Licensee has sufficient staff to support the radiation protection program? Yes No

Appendix P

Portable Gauge or XRF Utilization Log

Appendix Q

Inventory Procedure

Appendix Q

Inventory Procedure

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

Physical Inspection

Every 6 months the general condition of each gauge or XRF will be evaluated to determine if any damage to the source housing or shielding has occurred. The inspection will also verify that all of the identification and warning labels remain attached.

If the inspection reveals missing labels or apparent damage, the device will be immediately returned to its transportation case and removed from service until the problem can be corrected. Any apparent damage to the gauge or XRF will be reported to the Radiation Safety Officer immediately. If excessive radiation levels are discovered, notify the Nebraska Health and Human Services Regulation and Licensure, Radioactive Materials Program.

Inventory Records

A semiannual inventory record will be retained for 3 years from the date of the inventory. The attached inventory form (or equivalent) will be used. Relevant inventory information includes:

- Device Manufacturer, Model Number and Serial Number
- Source Manufacturer, Model Number and Serial Number
- Source Activity
- Location
- Condition
- Date of Inventory
- Signature of the Radiation Safety Officer (or designee)

Appendix R

Inventory of Radioactive

Material Sources and Devices

Appendix S

Records Retention

RECORD RETENTION

Records pertaining to portable gauging operations will be maintained in accordance with the requirements specified in Title 180

DOCUMENT	RETENTION INTERVAL
Title 180, Nebraska Administrative	Until termination of license
Radioactive materials license (with all active amendments and supporting documents)	Until termination of license
Provisions of radiation protection program	Until termination of license
Rad. protection program Audits	3 years after records are made
Training and testing records	Until worker's termination or 5 years, whichever is greater
Leak test records	3 years after records are made
Inventory records	3 years after records are made
Copies of "IAEA Certificate of Competent Authority" for each gauges or XRFs source (Special Form Source Certificate)	1 year beyond last gauge or XRF shipment
Records of Type A package test results for each authorized portable gauge or XRF model	1 year beyond last gauge or XRF shipment
Copies of manufacturer's operation/safety manual for each authorized gauge or XRF model	As long as each gauge or XRF model is Authorized by the license
Receipt records	Until disposal is authorized
Transfer & disposal records	Until termination of license
Prior occupational dose histories	3 years after records are made
Personnel monitoring (PM) results	Until termination of license
Annual PM exposure notification reports	3 years after reports are made
Individual PM reports following employee termination	3 years after reports are made
Records demonstrating compliance with individual members of the public dose limits	Until termination of license
Records of surveys/measurements used to determine external/internal doses	3 years beyond the calibration date
Records of surveys performed to evaluate radiation levels or radiation hazards	Until termination of license
Survey instrument calibration records	3 years beyond the calibration date

Appendix T

Transfer/Disposal

Appendix T

Transfer/Disposal

180 NAC 3-025, address transfer and disposal of radioactive material. Portable gauges or XRF will be transferred only to companies or individuals specifically licensed to possess them, in accordance with the below procedure.

Verification

If a gauge or XRF or other device containing radioactive material is bought, sold or transferred for disposal, verification of the transferor's and transferee's authorization to possess the radioactive material will be documented. Either a copy of each other's radioactive materials license will be exchanged, and the transferor's license will be retained on file as evidence of an authorized transfer, or one of the other verification methods listed in 180 NAC 3-025, will be used.

Documentation

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

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

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

Appendix U

NRH-60

Certification of Disposition Of Materials



NEBRASKA DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH
RADIOACTIVE MATERIALS PROGRAM

CERTIFICATION OF DISPOSITION OF MATERIALS

INSTRUCTIONS - (Use additional sheets where necessary.)

Type or Print except where indicated.

Retain one copy for your files and submit original application to: Department of Health and Human Services, Division of Public Health, Radiological Health, 301 Centennial Mall South, P.O. Box 95026, Lincoln, NE 68509-5026.

Upon approval of this Certification of Disposition of Materials the licensee will receive a termination notice of this radioactive material license.

<p>1. Licensee Information</p> <p>Licensee Number: _____</p> <p>License Expiration Date: _____</p> <p>Licensee Name and Street Address:</p> <p style="padding-left: 40px;">Applicant Name: _____</p> <p style="padding-left: 40px;">Address: _____</p> <p style="padding-left: 40px;">City, State Zip+4 _____</p> <p style="padding-left: 40px;">Telephone #: _____</p> <p style="padding-left: 40px;">FAX#: _____</p> <p style="padding-left: 40px;">E-mail Address: _____</p>	<p>2. Person to Contact Regarding this Application</p> <p>_____</p> <p>Telephone #: _____</p>
<p>3. Materials Data</p> <p><input type="checkbox"/> No Materials have ever been procured or possessed by the Licensee under this License.</p> <p><input type="checkbox"/> All Materials procured and/or possessed by the Licensee under the License Number cited above have been disposed of in the following manner:</p> <p style="padding-left: 20px;"><input type="checkbox"/> <u>Transfer</u> Specify the date of the transfer, the name of the licensed recipient and the recipient's Department, NRC or Agreement State license number. Describe specific materials transfer actions and if there were radioactive wastes generated in terminating this license, the disposal actions, including the disposition of low-level radioactive waste, mixed waste, Greater-than-Class-C waste, and sealed sources, if applicable.</p> <p style="padding-left: 20px;"><input type="checkbox"/> <u>Disposed of directly by Licensee</u> Describe specific disposal procedures (e.g. decay in storage).</p>	
<p>4. Other Data</p> <p><input type="checkbox"/> Our License has not yet expired, please terminate it. A Radiation Survey was conducted to confirm the absence of licensed radioactive materials and to determine whether any contamination remains on the premises covered by the license:</p> <p style="padding-left: 20px;"><input type="checkbox"/> NO (Attach Explanation)</p> <p style="padding-left: 20px;"><input type="checkbox"/> YES, the results:</p> <p style="padding-left: 40px;"><input type="checkbox"/> Are attached</p> <p style="padding-left: 40px;"><input type="checkbox"/> Were forwarded to the Agency on (Date) _____</p>	

4. Other Data (Continued)

Address all future correspondence regarding this license to:

Name: _____

Address: _____

City, State Zip+4: _____

Telephone #: _____

FAX#: _____

E-mail Address: _____

5. CERTIFICATION
(This item must be completed by applicant.)

The applicant and any official executing this document on behalf of the applicant named in Item 1., certify that this application is prepared in conformity with the Nebraska Department of Health and Human Services, Title 180, Regulations for Control of Radiation and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

Applicant Name From Item 1.

By: _____
Signature

Date: _____

Print Name and Title of certifying official authorized to act on behalf of the applicant

Appendix V

Security Guidance

Security Guidance

DHHS regulations require a portable gauge licensee 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. “Control and maintain constant surveillance” of portable gauges means being immediately present or remaining in close proximity to the portable gauge to prevent unauthorized removal of the portable gauge. The objective of the security guidance is to reduce the opportunity for unauthorized removal and/or theft by providing a delay and deterrent mechanism.

The following security requirements apply to portable gauge licensees regardless of the location, situation, and activities involving the portable gauge. Licensees are required to either maintain control and constant surveillance of the portable gauge when in use or use two independent physical controls to secure the portable gauge from unauthorized removal while in storage. 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. Using two chains is not the preferred method; licensees are encouraged to use other combinations.

As long as the licensee maintains constant control and surveillance while transporting the portable gauges, the licensee need only to comply with the DOT requirements for transportation (e.g., placarding, labeling, shipping papers, blocking and bracing). However, if the licensee leaves the vehicle and portable gauge unattended (e.g., while visiting a gas station, restaurant, store), the licensee needs to ensure that the portable gauge is secured by two independent controls in order to comply with the requirements of 180 NAC 3-017.06.

While transporting a portable gauge, a licensee should not modify the transportation case if it is being used as the Type A container for transporting the device. This includes, but is not limited to, drilling holes to mount the case to the vehicle or to mount brackets or other devices used for securing the case to the vehicle. In order to maintain its approval as a Type A shipping container, the modified package must be re-evaluated by any of the methods described in 49 CFR Part 173.350 or 173.461(a). The re-evaluation must be documented and maintained on file in accordance with DOT regulations.

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, inside a locked vehicle, a locked shelter, a secured fenced-in area, a locked garage, a locked non-portable cabinet, a locked room, or a secured building. To assist licensees, some common scenarios are illustrated and examples of two independent physical controls are provided below.

Securing a Portable Gauge at a Licensed Facility

When a portable gauge is stored at a licensed facility, the licensee is required to use two independent physical controls to secure the gauge. Examples of two independent physical controls used 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.

Securing a Portable Gauge in a Vehicle

180 NAC 13 requires that licensees who transport licensed 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 170 through 189.

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 is taken. If a 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. Similarly, 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, is not sufficient because both the case and the gauge are portable.

A vehicle may be used for storage, however, it is recommended by DHS and DOT that this practice only be used for short periods of time or when a portable gauge is in transit. Storage in a hotel room is not authorized. When a portable gauge is being stored in a vehicle, the licensee is specifically required to use a minimum of two independent physical controls to secure the portable gauge.

Examples of two such independent physical controls approved by DHS to secure portable gauges in this situation 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 cannot be opened unless the chain or cable is removed;
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 transportation case 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.

Securing a Portable Gauge at a Temporary Jobsite or at Locations Other Than a Licensed Facility

When a job requires storage of a portable gauge at a temporary jobsite or at a location other than a licensed facility, the licensee should use a permanent structure for storage, if practicable.

When storing a portable gauge at a temporary jobsite, the licensee should limit access by storing the gauge as far away from members of the public as possible. The licensee must also meet the radiation exposure limits specified in 180 NAC 4-013. When a portable gauge is stored at a temporary jobsite or at a location other than an authorized facility, the licensee is required to use two independent physical controls to secure the portable gauge. Examples of two independent physical controls to secure portable gauges at these locations are --

- 1 At a temporary job site, the portable gauge or transportation case containing the portable gauge is stored inside a locked building or in a locked non-portable structure (e.g., construction trailer, sea container, etc.), and is physically secured by a chain or steel cable to a non-portable structure in such a manner that an individual would not be able to open the transportation case or remove the portable gauge without removing the chain or cable. 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 portable gauge are portable;
- 2 The portable gauge or transportation case containing the portable gauge is stored in a locked garage, and is within a locked vehicle or is physically secured by a chain or steel cable to the vehicle in such a manner that an individual would not be able to open the transportation case or remove the portable gauge without removing the chain or cable; or
3. The portable gauge or transportation case containing the portable gauge is stored in a locked garage, and is within a locked enclosure or is physically secured by a chain or steel cable to a permanent or non-portable structure in such a manner that an individual would not be able to open the transportation case or remove the portable gauge without removing the chain or cable.

Appendix W

Delegation of Authority to Make Legally Binding Statements Form

Appendix W

Delegation of Authority To Make Legally Binding Statements

Below is a sample copy of a delegation of authority to make legally binding statement.

Memo to: All Employees and Nebraska Office of Radiological Health

From: Chief Executive Officer

Subject: Delegation of Authority to Make Legally Binding Statements

_____ has been delegated the authority to make legally binding statements with regard to the radioactive materials license application, inspections, renewal, amendments and termination.

License Certifying Official (signature)

Name (type or printed)

Title

Date