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Consolidated Guidance About Materials Licenses

Program-Specific Guidance About Portable Gauge Licenses

Final Report

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ABSTRACT

As part of its redesign of the materials licensing process, NRC consolidated and updated numerous guidance documents into a single comprehensive repository as described in NUREG-1539, “Methodology and Findings of the NRC’s Materials Licensing Process Redesign,” dated April 1996 and draft NUREG-1541, “Process and Design for Consolidating and Updating Materials Licensing Guidance,” dated April 1996. NUREG-1556, Vol. 1, was the first program-specific guidance developed for the new process and served as a template for subsequent program-specific guidance. This is the first planned revision to NUREG-1556, Vol. 1, “Program-Specific Guidance About Portable Gauge Licenses” dated May 1997. This document is intended for use by applicants, licensees, and NRC staff, and will also be available to Agreement States. This final report, as did the previous version, takes a more risk-informed, performance-based approach to licensing portable gauges, and reduces the information (amount and level of detail) needed to support an application to use these devices. This final report should be used in preparing portable gauge license applications. NRC staff will use this final report in reviewing these applications.

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FOREWORD

The United States Nuclear Regulatory Commission (NRC) has been in the process of redesigning its materials licensing process. This effort is described in NUREG-1539, "Methodology and Findings of NRC's Materials Licensing Process Redesign," dated April 1996. A critical element of the new process is consolidating and updating numerous guidance documents into a NUREG series of reports. Below is a list of volumes currently included in the NUREG-1556 series:

Vol. No.	Volume Title	Status
1, Rev. 1	Program-Specific Guidance About Portable Gauge Licenses	Final Report
2	Program-Specific Guidance About Radiography Licenses	Final Report
3	Applications for Sealed Source and Device Evaluation and Registration	Final Report
4	Program-Specific Guidance About Fixed Gauge Licenses	Final Report
5	Program-Specific Guidance about Self-Shielded Irradiators	Final Report
6	Program-Specific Guidance about 10 CFR Part 36 Irradiators	Final Report
7	Program-Specific Guidance about Academic, Research and Development, and Other Licenses of Limited Scope	Final Report
8	Program-Specific Guidance about Exempt Distribution Licenses	Final Report
9	Program-Specific Guidance about Medical Use Licenses	Draft
10	Program-Specific Guidance about Master Material Licenses	Final Report
11	Program-Specific Guidance about Licenses of Broad Scope	Final Report
12	Program-Specific Guidance about Possession Licenses for Manufacturing and Distribution	Final Report
13	Program-Specific Guidance about Commercial Radiopharmacy Licenses	Final Report
14	Program-Specific Guidance about Well Logging, Tracer, and Field Flood Study Licenses	Final Report
15	Guidance About Changes of Control and About Bankruptcy Involving Byproduct, Source, or Special Nuclear Materials Licenses	Final Report
16	Program-Specific Guidance About Licenses Authorizing Distribution To General Licensees	Final Report

Vol. No.	Volume Title	Status
17	Program-Specific Guidance About Licenses for Special Nuclear Material of Less Than Critical Mass	Final Report
18	Program-Specific Guidance About Service Provider Licenses	Final Report
19	Guidance For Agreement State Licensees Proposing to Work in NRC Jurisdiction (Non-Agreement States, Areas of Exclusive Federal Jurisdiction, or Offshore Waters) and Guidance For NRC Licensees Proposing to Work in Agreement State Jurisdiction (Reciprocity)	Final Report
20	Guidance About Administrative Licensing Procedures	Final Report

The current document, NUREG-1556, Vol. 1, Rev. 1, "Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Portable Gauge Licenses," dated September 2001, is the first revision to guidance originally published in May 1997. It is intended for use by applicants, licensees, NRC license reviewers, and other NRC personnel.

The risk-informed, performance-based approach to licensing portable gauges taken by this report minimizes the amount of information needed from an applicant seeking to possess and use portable gauges. The risk-informed data as discussed in NUREG/CR 6642, "Risk Analysis and Evaluation of Regulatory Options for Nuclear Byproduct Material Systems," was considered in the preparation of this document. Based on these considerations, no specific changes to this document were deemed necessary.

A team composed of NRC staff from Headquarters and Regional Offices drafted this document, drawing on their collective experience in radiation safety in general, and as specifically applied to the use of portable gauges. A representative of NRC's Office of the General Counsel provided a legal perspective.

NUREG-1556, Vol. 1, Rev. 1, "Consolidated Guidance about Materials Licenses: Program-Specific Guidance About Portable Gauges Licenses," dated September 2001, represents a step in the transition from the current paper-based process to the new electronic process. This draft document is available on the Internet at the following address:

<http://www.nrc.gov/NRC/NUREGS/SR1556/V1_REV1/index.html>

NUREG-1556, Vol. 1, Rev. 1, "Consolidated Guidance about Materials Licenses: Program-Specific Guidance About Portable Gauge Licenses," dated September 2001, is not a substitute for NRC regulations, and compliance is not required. The approaches and methods

described in this report are provided for information only. Methods and solutions different from those described in this report will be acceptable if they provide a basis for the staff to make the determinations needed to issue or continue a license.

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ABBREVIATIONS

AIT	Augmented Inspection Team
ALARA	As low as reasonably achievable
Bq	Becquerel
CFR	Code of Federal Regulations
DOE	United States Department of Energy
DOT	United States Department of Transportation
GPO	Government Printing Office
IN	Information Notice
MC	Manual Chapter
mrem	Millirem
mSv	Millisievert
NIST	National Institute of Standards and Technology
NMSS	Office of Nuclear Materials Safety and Safeguards
NRC	United States Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OCFO	Office of the Chief Financial Officer
OCR	Optical character reader
OMB	Office of Management and Budget
RQ	Reportable Quantities
RSO	Radiation Safety Officer
SSD	Sealed Source and Device
STP	Office of State and Tribal Programs
Sv	Sievert
TEDE	Total effective dose equivalent
TI	Transportation Index
TLD	Thermoluminescent dosimeters
USC	United States Code

1 PURPOSE OF REPORT

This report provides guidance to an applicant in preparing a portable gauge license application, as well as NRC criteria for evaluating a portable gauge license application. It is not intended to address the research and development of gauging devices or the commercial aspects of manufacturing, distribution, and service of such devices. Within this document, the phrases "portable gauge" or "gauging devices," and the term "gauge" may be used interchangeably.

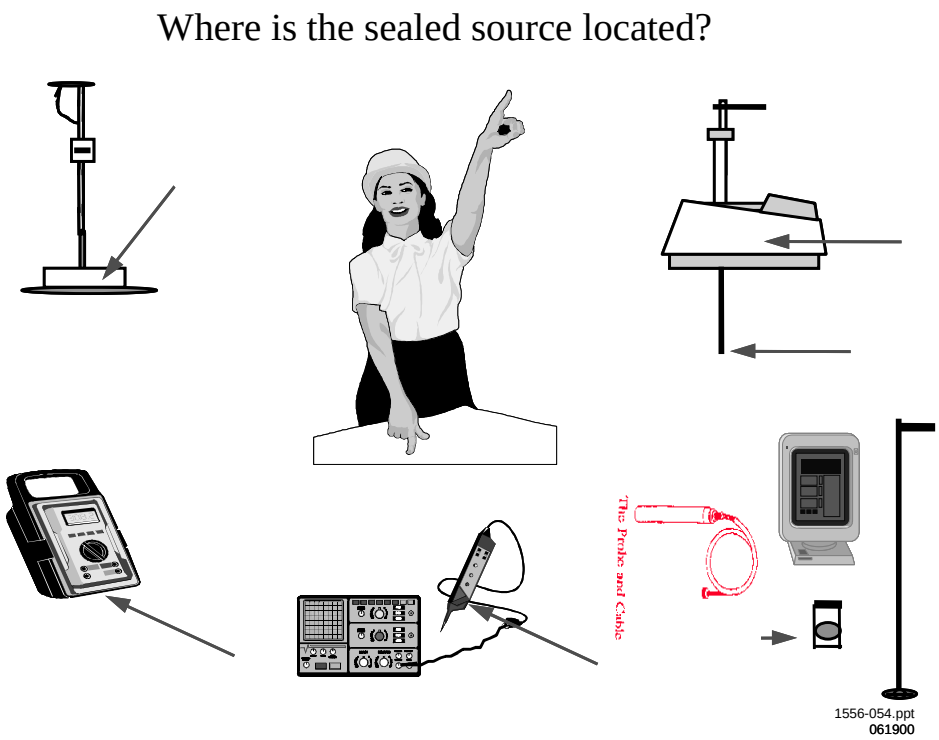

Figure 1.1 **Where is the Radioactive Source?** *The wide variety of portable gauge designs include placing the sealed source in different locations, resulting in different radiation safety problems.*

This report addresses the variety of radiation safety issues associated with portable gauges of many designs. As shown in Figure 1.1, portable gauges 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 of varying designs, the sealed sources may be oriented in different locations within the devices, resulting in different radiation safety problems.

This report identifies the information needed to complete NRC Form 313 (Appendix A), "Application for Material License," for the use of sealed sources in portable gauging devices.

The format within this document for each item of technical information is as follows:

- Regulations – references the regulations applicable to the item;
- Criteria – outlines the criteria used to judge the adequacy of the applicant's response;
- Discussion – provides additional information on the topic sufficient to meet the needs of most readers; and
- Response from Applicant – provides suggested response(s), offers the option of an alternative reply, or indicates that no response is needed on that topic during the licensing process.
- Notes and References are self-explanatory and may not be found for each item on NRC Form 313.

NRC Form 313 does not have sufficient space for applicants to provide full responses to Items 5 through 11; as indicated on the form, the answers to those items are to be provided on separate sheets of paper and submitted with the completed NRC Form 313. For the convenience of applicants and for streamlined handling of portable gauge applications in the new materials licensing process, use Appendix B to provide supporting information, attach it to NRC Form 313, and submit them to NRC.

Appendixes C through K contain additional information on various radiation safety topics. Appendix L is a sample portable gauge license; it contains the conditions most often found on these licenses, although not all licenses will have all conditions. Appendix M is a checklist that NRC staff can use to review applications and applicants can use to check for completeness.

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in this NUREG are covered by the requirements of 10 CFR Parts 20, 30, and 71, and NRC Forms 313 & 314, which were approved by the Office of Management and Budget, approval numbers 3150-0008, 0014, 0017, 0028, and 0120.

PUBLIC PROTECTION NOTIFICATION

If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

2 AGREEMENT STATES

Certain states, called Agreement States (see Figure 2.1), have entered into agreements with NRC that give them the authority to license and inspect byproduct, source, or special nuclear materials used or possessed within their borders. Any applicant, other than a Federal Agency, who wishes to possess or use licensed material in one of these Agreement States, needs to contact the responsible officials in that State for guidance on preparing an application. These applications should be filed with State officials, not with NRC.

NRC's materials licensees who wish to conduct operations under reciprocity at temporary job sites in an Agreement State, and who are specifically authorized on the license to conduct such activities, should contact that State's Radiation Control Program Office for information about State regulations and questions of jurisdiction on Federal lands or facilities within that Agreement State's boundaries. To ensure compliance with Agreement State reciprocity requirements, licensees should request authorization well in advance of scheduled use.

In the special situation of work at Federally-controlled sites in Agreement States, it is necessary to know the jurisdictional status of the land in order to determine whether NRC or the Agreement State has regulatory authority. NRC has regulatory authority over land determined to be "exclusive Federal jurisdiction," while the Agreement State has jurisdiction over non-exclusive Federal jurisdiction land. Licensees are responsible for finding out, in advance, the jurisdictional status of the specific areas where they plan to conduct licensed operations. NRC recommends that licensees ask their local contact for the Federal Agency controlling the site (e.g., contract officer, base environmental health officer, district office staff) to help determine the jurisdictional status of the land and to provide the information in writing, so that licensees can comply with NRC or Agreement State regulatory requirements, as appropriate. Additional guidance on determining jurisdictional status is found in All Agreement States Letter, SP-96-022, dated February 16, 1996.

Table 2.1 provides a quick way to check on which agency has regulatory authority.

Table 2.1 Who Regulates the Activity?

Applicant and Proposed Location of Work	Regulatory Agency
Federal agency regardless of location (except that Department of Energy [DOE] and, under most circumstances, its prime contractors are exempt from licensing [10 CFR 70.11])	NRC
Non-Federal entity in non-Agreement State, US territory, or possession	NRC
Non-Federal entity in Agreement State at non-Federally controlled site	Agreement State

Applicant and Proposed Location of Work	Regulatory Agency
Non-Federal entity in Agreement State at Federally-controlled site not subject to exclusive Federal jurisdiction	Agreement State
Non-Federal entity in Agreement State at Federally-controlled site subject to exclusive Federal jurisdiction	NRC

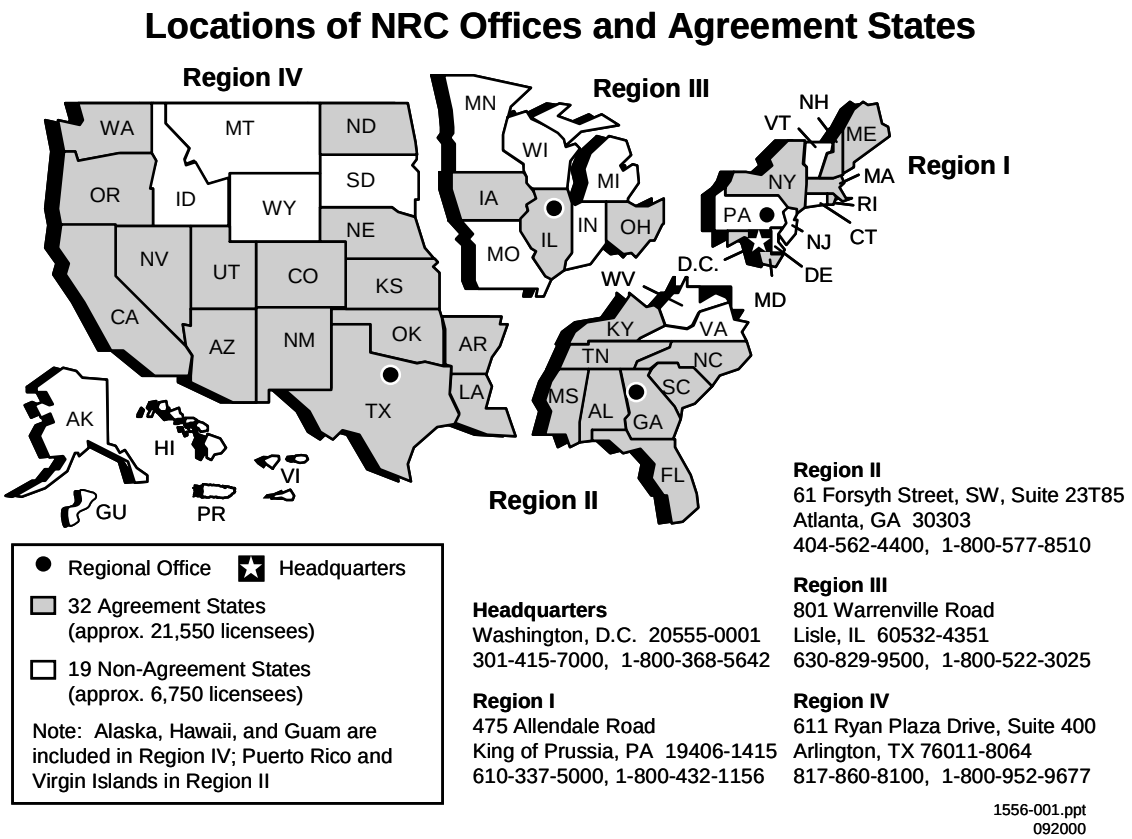

Figure 2.1 U.S. Map. *Location of NRC Offices and Agreement States.*

Reference: A current list of Agreement States (including names, addresses, and telephone numbers of responsible officials) may be obtained upon request from NRC's Regional Offices. You can also visit NRC's Office of State and Tribal Programs' (STP's) home page <http://www.hsrd.ornl.gov/nrc> and choose "Directories," then "State Program Directors."

All Agreement States Letter, SP-96-022, dated February 16, 1996, is available on NRC's Office of State and Tribal Programs' (STP's) home page <http://www.hsrd.ornl.gov/nrc> (choose "NRC-State Communications," then choose "Other"; scroll down to find "1996," then "SP-96-022") or by calling STP at NRC's toll free number (800) 368-5642, extension 415-3340.

3 MANAGEMENT RESPONSIBILITY

NRC recognizes that effective radiation safety program management is vital to achieving safe and compliant operations. NRC also believes that consistent compliance with its regulations provides reasonable assurance that licensed activities will be conducted safely. NRC frequently finds ineffective management is the underlying cause of safety and compliance problems. Management refers to a senior-level manager who has responsibility for overseeing licensed activities.

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 all information provided to NRC (10 CFR 30.9);
- Knowledge about the contents of the license and application;
- Meticulous compliance with current NRC and Department of Transportation (DOT) regulations and the licensee's operating and emergency procedures;
- Commitment to provide adequate resources (including space, equipment, personnel, time, and, if needed, contractors) to the radiation protection program to ensure that public and workers are protected from radiation hazards and meticulous compliance with regulations is maintained;
- Selection and assignment of a qualified individual to serve as the Radiation Safety Officer (RSO) for licensed activities;
- Obtaining NRC's prior written consent before transferring control of the license; and
- Notifying appropriate NRC Regional Administrator in writing, immediately following filing of petition for voluntary or involuntary bankruptcy.

For information on NRC inspection and enforcement, see the current version of "General Statement of Policy and Procedures for NRC Enforcement Actions," NUREG-1600, and Manual Chapter (MC) 87114, "Fixed and Portable Gauge Programs." NUREG-1600 is available electronically at <http://www.nrc.gov/OE>. For hard copies of NUREG-1600 and MC 87114, see the Notice of Availability (on the inside front cover of this draft report).

4 APPLICABLE REGULATIONS

It is the applicant's or licensee's responsibility to have up-to-date copies of applicable regulations, read them, and abide by each applicable regulation.

The following Parts of 10 CFR Chapter I contain regulations applicable to portable gauging devices:

- 10 CFR Part 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders";
- 10 CFR Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations";
- 10 CFR Part 20, "Standards for Protection Against Radiation";
- 10 CFR Part 21, "Reporting of Defects and Noncompliance";
- 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material";
- 10 CFR Part 71, "Packaging and Transportation of Radioactive Material";

Part 71 requires that licensees or applicants 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.

- 10 CFR Part 150, "Exemptions and Continued Regulatory Authority in Agreement States and in Offshore Waters under Section 274";
- 10 CFR Part 170, "Fees for Facilities, Materials, Import and Export Licenses, and Other Regulatory Services Under the Atomic Energy Act of 1954, as Amended";
- 10 CFR Part 171, "Annual Fees for Reactor Operating Licenses, and Fuel Cycle Licenses and Materials Licenses, Including Holders of Certificates of Compliance, Registrations, and Quality Assurance Program Approvals and Government Agencies Licensed by NRC."

To request copies of the above documents, call GPO's order desk in Washington, DC at (202) 512-1800. You may also contact GPO electronically at <http://www.gpo.gov>. Electronic copies of all documents are available at this site. Single copies of the above NRC regulations may be requested from NRC's Regional Offices (see Figure 2.1 for addresses and telephone numbers). Note that NRC publishes amendments to its regulations in the *Federal Register*. NRC regulations and amendments can also be accessed on NRC's web page at <http://www.nrc.gov>.

5 HOW TO FILE

5.1 PAPER APPLICATION

Applicants for a materials license should do the following:

- Be sure to use the most recent guidance in preparing an application;
- Complete NRC Form 313 (Appendix A) Items 1 through 4, 12, and 13 on the form itself;
- Complete NRC Form 313 Items 5 through 11 on supplementary pages or use Appendix B;
- For each separate sheet, other than Appendix B, that is submitted with the application, identify and key it to the item number on the application or the topic to which it refers;
- 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;
- Retain one copy of the license application for future reference.

As required by 10 CFR 30.32(c), applications must be signed by a duly authorized representative; see section on Certification.

Using the suggested wording of responses and committing to using the model procedures in this report will expedite NRC's review.

All license applications will be available for review by the general public in NRC's Public Document Rooms. If it is necessary to submit proprietary information, follow the procedure in 10 CFR 2.790. Failure to follow this procedure could result in disclosure of the proprietary information to the public or substantial delays in processing the application. Employee personal information, i.e., home address, home telephone number, social security number, date of birth, and radiation dose information, should not be submitted unless specifically requested by NRC.

As explained in the Foreword to this document, NRC's new licensing process will be faster and more efficient, in part, through acceptance and processing of electronic applications. NRC will continue to accept paper applications; however, these will be scanned and put through an optical character reader (OCR) to convert them to electronic format. To ensure a smooth transition, applicants are requested to follow these suggestions:

- Submit printed or typewritten, not handwritten, text on smooth, crisp paper that will feed easily into the scanner;
- Choose typeface designs that are sans serif, such as Arial, Helvetica, Futura, or Univers; the text of this document is in a serif font called Times New Roman;

- Choose 12-point or larger font size;
- Avoid stylized characters such as script, italic, etc.;
- Be sure the print is clear and sharp;
- Be sure there is high contrast between the ink and paper (black ink on white paper is best).

5.2 ELECTRONIC APPLICATION

As the electronic licensing process develops, it is anticipated that NRC will provide additional mechanisms for filing applications that could include filing via fax, on diskettes or CD-ROM, and through the Internet. Additional filing instructions will be provided as these new mechanisms become available.

6 WHERE TO FILE

Applicants wishing to possess or use licensed material in any State or U. S. territory or possession subject to NRC jurisdiction must file an application with NRC's Regional Office for the locale in which the material will be possessed and/or used. Figure 2.1 shows NRC's four Regional Offices and their respective areas for licensing purposes and identifies Agreement States.

In general, applicants wishing to possess or use licensed material in Agreements States must file an application with the Agreement State, not NRC; however, if work will be conducted at Federally controlled sites in Agreement States, applicants must first determine the jurisdictional status of the land in order to determine whether NRC or the Agreement State has regulatory authority. See the section on "Agreement States" for additional information.

7 LICENSE FEES

Each application for which a fee is specified must be accompanied by the appropriate fee. Refer to 10 CFR 170.31 to determine the amount of the fee. NRC will not issue the license before it receives the required fee. Consult 10 CFR 170.11 for information on exemptions from these fees. Once technical review has begun, no fees will be refunded; application fees will be charged regardless of NRC's disposition of an application or the withdrawal of an application.

Most NRC licensees are also subject to annual fees; refer to 10 CFR 171.16. Consult 10 CFR 171.11 for information on exemptions from annual fees and 10 CFR 171.16(c) on reduced annual fees for licensees that qualify as "small entities."

Direct all questions about NRC's fees or completion of Item 12 of NRC Form 313 (Appendix B) to the Office of the Chief Financial Officer (OCFO) at NRC Headquarters in Rockville, Maryland, (301) 415-7554. Information about fees may also be obtained by calling NRC's toll free number (800) 368-5642, extension 415-7554. The e-mail address is fees@nrc.gov.

8 CONTENTS OF AN APPLICATION

The following comments apply to the indicated items on NRC Form 313 (Appendix A).

8.1 ITEM 1: LICENSE ACTION TYPE

THIS IS AN APPLICATION FOR (Check appropriate item):

Type of Action	License No.
❒ A. New License	Not Applicable
❒ B. Amendment	XX-XXXXX-XX
❒ C. Renewal	XX-XXXXX-XX

Check box A if the application is for a new license.

Check box B if the application is for an amendment to an existing license, and provide license number.

Check box C if the application is for the renewal of an existing license, and provide the license number.

Licensees are required to request and obtain an amendment to the license before making changes in their radiation safety program. Examples of changes that require amendment are: change of Radiation Safety Officer (RSO), changes in approved radiation safety procedures, addition of authorized user(s), changes in areas of use, and changes in licensed material, including increases in possession limit of byproduct material. See "Amendments and Renewals to a License" later in this document.

8.2 ITEM 2: APPLICANT'S NAME AND MAILING ADDRESS

List the legal name of the applicant's corporation or other legal entity with direct control over use of the radioactive material; a division or department within a legal entity may not be a licensee. An individual may be designated as the applicant only if the individual is acting in a private capacity and the use of the radioactive material is not connected with employment in a corporation or other legal entity. Provide the mailing address where correspondence should be sent. A Post Office box number is an acceptable mailing address.

Notify NRC of changes in mailing address; these changes do not require a fee.

Note: NRC must be notified before control of the license is transferred and the licensee must receive written consent from NRC prior to the transfer. NRC must also be notified when bankruptcy proceedings have been initiated. See below for more details. NUREG-1556,

Volume 15, "Consolidated Guidance About Materials Licenses: Guidance About Changes of Control and Bankruptcy Involving Byproduct, Source, or Special Nuclear Materials Licenses," provides additional information about NRC requirements related to bankruptcy considerations.

Timely Notification of Transfer of Control

Regulations: 10 CFR 30.34(b).

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

Discussion: Transfer of control may be the result of mergers, buyouts, or majority stock transfers. Although it is not NRC's intent to interfere with the business decisions of licensees, it is necessary for licensees to obtain NRC's written consent before the transaction is finalized. This is to ensure the following:

- Radioactive materials are possessed, used, or controlled only by persons who have valid NRC 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 disposition of records and licensed material;
- 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 C identifies the information to be provided about transferring control.

Notification of Bankruptcy Proceedings

Regulation: 10 CFR 30.34(h).

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

Discussion: Even though a licensee may have filed for bankruptcy, the licensee remains responsible for all regulatory requirements. NRC 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). NRC shares the results of its determinations 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. Generally, licensees should notify NRC within 24 hours of filing a bankruptcy petition.

Reference: See the Notice of Availability on the inside front cover of this report to obtain copies of Inspection Procedure 87103, "Inspection of Material Licensees Involved in an Incident or Bankruptcy Filing," available on NRC's web site at <http://www.nrc.gov>.

Additional References: NUREG-1556, Volume 15, "Consolidated Guidance About Materials Licenses: Guidance About Changes of Control and Bankruptcy Involving Byproduct, Source, or Special Nuclear Materials Licenses."

8.3 ITEM 3: ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

Most applicants need to provide two types of information in response to Item 3:

- Description of storage, use, and dispatch locations; and
- Specification of whether they intend to use the portable gauge at temporary job sites.

Specify the street address, city, and state or other descriptive address (such as on Highway 10, 5 miles east of the intersection of Highway 10 and State Route 234, Anytown, State) for each permanent facility used as a location of storage or use, and each facility from which the applicant will dispatch gauge users to job sites for more than one customer. If gauges will NOT be stored at a dispatch site, so indicate. The descriptive address should be sufficient to allow an NRC inspector to find the storage location. A Post Office Box address is not acceptable.

NRC does not consider long-term storage in vehicles or personal residences not listed on the license an acceptable practice. As discussed in the above paragraph, in responding to Item 3, license applicants should also include a description of those locations, such as personal residences where portable gauges may be stored by licensee staff for dispatch to customer job sites.

An NRC-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 an NRC license does not relieve a licensee from complying with other applicable Federal, State, or local regulations (e.g., local zoning requirements for storage locations).

To conduct operations at temporary job sites (i.e., locations where work is conducted for limited periods of time and from which gauge users are NOT dispatched to job sites for other customers), specify "temporary job sites anywhere in the United States where NRC maintains jurisdiction." See Figure 2.1.

Note: As discussed later under "Financial Assurance and Recordkeeping for Decommissioning," licensees must maintain permanent records describing 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 licensees, acceptable records are sketches or written descriptions of storage or use locations specifically listed on the license. Licensees only need to maintain this information for temporary job sites where sources have leaked.

8.4 ITEM 4: PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Identify the individual(s) who can answer questions about the application and include telephone number(s). This is typically the proposed RSO, unless the applicant has named a different person as the contact. NRC will contact this individual if there are questions about the application.

Notify NRC if the contact person or his or her telephone number changes so that NRC 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.

8.5 ITEM 5: RADIOACTIVE MATERIAL

As indicated on NRC Form 313 (Appendix B), Items 5 through 11 should be submitted on separate sheets of paper. Applicants may use Appendix B for this purpose and should note that using the suggested wording of responses and committing to using the model procedures in this report will expedite NRC's review.

8.5.1 SEALED SOURCES AND DEVICES

Regulations: 10 CFR 30.32(g), 10 CFR 30.33(a)(2), 10 CFR 32.210.

Criteria: Applicants must provide the manufacturer's or distributor's name and model number for each requested sealed source and device. Licensees will be authorized to possess and use only those sealed sources and devices specifically approved or registered by NRC or an Agreement State.

Discussion: NRC or an Agreement State performs a safety evaluation of gauges before authorizing a manufacturer or distributor to distribute the gauges to specific licensees. The safety evaluation is documented in a Sealed Source and Device (SSD) Registration Certificate. Before the SSD registration process was formalized, some older gauges may not have been evaluated in a separate document, but they were specifically approved on a license. Licensees can continue to use these gauges that are specifically listed on their licenses.

Consult with the proposed manufacturer or distributor to ensure that requested sources and devices are compatible and conform to the sealed source and device designations registered with NRC or an Agreement State. Licensees may not make any changes to the sealed source, device, or source/device combination that would alter the description or specifications from those indicated in the respective registration certificates, without obtaining NRC's prior permission in a license amendment. Such changes may necessitate a custom registration review, increasing the time needed to process a licensing action.

SSD Registration Certificates contain sections on "Conditions of Normal Use" and "Limitation and Other Considerations of Use." These sections may include limitations derived from conditions imposed by the manufacturer or distributor, by particular conditions of use that would reduce radiation safety of the device, or by circumstances unique to the sealed source or device. For example, working life of the device or appropriate temperature and other environmental conditions may be specified. Except as specifically approved by NRC, licensees are required to use gauges according to their respective SSD Registration Certificates. Accordingly, applicants may want to obtain a copy of the certificate and review it with the manufacturer or distributor or with NRC or the issuing Agreement State to ensure that it correctly reflects the radiation safety properties of the source or device.

Response from Applicant:

- Identify each radionuclide that will be used in each source in the gauging device(s);
- Identify the manufacturer or distributor and model number of each type of sealed source and device requested;
- 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;

- Confirm that the activity per source and maximum activity per device will not exceed the maximum activity listed on the approved certificate of registration issued by NRC or by an Agreement State.

Note: Information on SSD registration certificates may be found at the Office of State and Tribal Programs home page at URL <http://www.hsrd.ornl.gov/nrc/home.html>. You may also contact the Registration Assistant by calling NRC toll free at (800) 368-5642, extension 415-7217.

For more information about the SSD registration process, see the current version of NUREG-1556, Vol. 3, "Consolidated Guidance About Materials Licenses: Applications for Sealed Source and Device Evaluation and Registration." It is available electronically in the "Reference Library" at <http://www.nrc.gov>; for a paper copy, see the Notice of Availability on the inside front cover of this report.

8.5.2 FINANCIAL ASSURANCE AND RECORDKEEPING FOR DECOMMISSIONING

Regulations: 10 CFR 30.34(b), 10 CFR 30.35.

Criteria: Portable gauge licensees possessing sealed sources containing radioactive material in excess of the limits specified in 10 CFR 30.35 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 are used or stored and to leaking sources. Licensees must transfer these records important to decommissioning either to the new licensee before licensed activities are transferred or assigned in accordance with 10 CFR 30.34(b), or to the appropriate NRC Regional Office before the license is terminated.

Discussion: The requirements for financial assurance are specific to the types and quantities of byproduct material authorized on a license. Most portable gauge applicants and licensees do not need to comply with the financial assurance requirements because the thresholds for sealed sources are 3.7 x 106 gigabecquerels (100,000 curies) of cesium-137 or 3.7 x 103 gigabecquerels (100 curies) of americium-241 or californium-252. Thus, a licensee would need to possess hundreds of gauges (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 license does not specify the maximum number of gauges that the licensee may possess (allowing the licensee flexibility in obtaining gauges as needed without amending its license), it contains a condition requiring the licensee to limit its possession of gauges to quantities not requiring financial assurance for decommissioning. Applicants and licensees desiring to possess gauges exceeding the threshold amounts must submit evidence of financial assurance.

The same regulation also requires that licensees maintain records important to decommissioning in an identified location. All portable gauge licensees need to maintain records of structures and equipment where gauges are used or stored at locations specifically listed on the license. As-built drawings with modifications of structures and equipment shown, as appropriate, fulfill this requirement. If drawings are not available, licensees may substitute appropriate records concerning the areas and locations. In addition, if portable gauge licensees have experienced unusual occurrences (e.g., leaking sources, other incidents that involve spread of contamination), they also need to maintain records about contamination that remains after cleanup or that may have spread to inaccessible areas.

For portable gauge licensees whose sources have never leaked, acceptable records important to decommissioning are sketches or written descriptions of portable gauge storage or use locations specifically listed on the license. Similar information need not be maintained for temporary job sites unless a source leaked at a particular site.

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

Reference: See the Notice of Availability on the inside front cover of this report to obtain copies of Regulatory Guide 3.66, "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70, and 72."

8.6 ITEM 6: PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED

Regulations: 10 CFR 30.33(a)(1).

Criteria: Proposed activity is authorized by the Atomic Energy Act of 1954, as amended, and devices will be used only for the purposes for which they were designed and according to the manufacturer's recommendations for use as specified in an approved SSD Registration Sheet.

Response from Applicant: If the gauging device(s) will be used for the purposes listed on the SSD Registration Sheet, state the following: "Gauges will be used for the purposes described in their respective SSD Registration Sheets." If the gauging device(s) will be used for purposes other than those listed on the SSD Registration Sheet, specify these other purposes.

Notes:

- The typical portable gauge license authorizes use "to measure physical properties of materials."
- Unusual uses will be evaluated on a case-by-case basis and the authorized use condition will reflect approved uses.

8.7 ITEM 7: INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE

Regulations: 10 CFR 30.33(a)(3).

Criteria: RSOs must have adequate training and experience. In the past, NRC has found successful completion of one of the following as evidence of adequate training and experience:

- Portable gauge manufacturer's course for users or for RSOs; or
- Equivalent course that meets Appendix D criteria.

Discussion: The person responsible for the radiation protection program is called the RSO. 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 illustrated in Figure 8.1 and described in Appendix E. NRC requires the name of the RSO on the license to ensure that licensee management always has a responsible, qualified person identified and that the named individual knows of his or her designation as RSO.

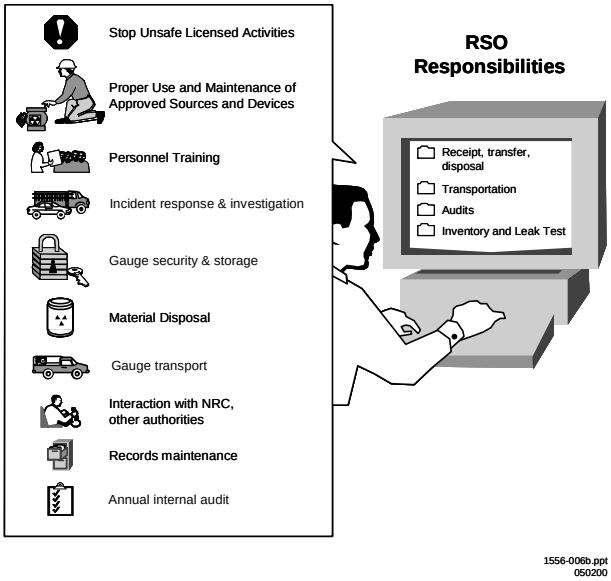

Figure 8.1 RSO Responsibilities. *Typical duties and responsibilities of RSOs.*

Response from Applicant: Provide either of the following:

- Name of the proposed RSO;

AND EITHER

- Statement that: "Before obtaining licensed materials, the proposed RSO will have successfully completed one of the training courses described in Criteria in the section entitled 'Individual(s) Responsible for Radiation Safety Program and Their Training and Experience – Radiation Safety Officer' in NUREG-1556, Vol. 1, Rev. 1, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Portable Gauge Licenses,' dated September 2001";

OR

- Alternative information demonstrating that the proposed RSO is qualified by training and experience.

Note: It is important to notify NRC, as soon as possible, of changes in the designation of the RSO.

Alternative responses will be reviewed against the criteria listed above.

8.8 ITEM 8: TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS (INSTRUCTIONS TO OCCUPATIONALLY EXPOSED WORKERS AND ANCILLARY PERSONNEL)

Regulations: 10 CFR 19.11, 10 CFR 19.12, 10 CFR 30.7, 10 CFR 30.9, 10 CFR 30.10, 10 CFR 30.33.

Criteria: Authorized users must have adequate training and experience. In the past, NRC has found successful completion of one of the following as evidence of adequate training and experience:

- Portable gauge manufacturer's course for users; or
- Equivalent course that meets Appendix D criteria.

Discussion: The individuals using the gauges are usually referred to as authorized users. Authorized users have the responsibility to ensure the surveillance, proper use, security, and routine maintenance of portable gauges containing licensed material.

Response from Applicant: Provide either of the following:

- The statement: "Before using licensed materials, authorized users will have successfully completed one of the training courses described in Criteria in the section entitled 'Training for Individuals Working In or Frequenting Restricted Areas' in NUREG-1556, Vol. 1, Rev. 1, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Portable Gauge Licenses,' dated September 2001";

OR

- A description of the training and experience for proposed gauge users.

Notes:

- Records of training should be maintained.
- Alternative responses will be evaluated against the criteria listed above.

8.9 ITEM 9: FACILITIES AND EQUIPMENT

No information need be submitted in response to this item. The key elements for portable gauge applicants are ensuring compliance with public dose limits and maintaining adequate security and control over the gauges. These issues are covered under "Radiation Safety Program – Public Dose" and "Radiation Safety Program – Operating and Emergency Procedures."

8.10 ITEM 10: RADIATION SAFETY PROGRAM

8.10.1 AUDIT PROGRAM

Regulations: 10 CFR 20.1101, 10 CFR 20.2102.

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

- Compliance with NRC 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) (10 CFR 20.1101); and
- Records of audits and other reviews of program content are maintained for 3 years.

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

Currently, NRC's emphasis in inspections is to perform actual observations of work in progress. As part of their audit programs, applicants should consider performing unannounced audits of gauge users in the field to determine if, for example, Operating and Emergency Procedures are available, are being followed, etc.

It is essential that, once identified, problems be corrected comprehensively and in a timely manner. Information Notice (IN) 96-28, "Suggested Guidance Relating to Development and Implementation of Corrective Action," provides guidance on this subject. NRC will review the licensee's audit results and determine if corrective actions are thorough, timely, and sufficient to prevent recurrence. If the licensee identifies violations and takes these corrective steps, NRC can exercise discretion and may elect not to cite a violation. NRC's goal is to encourage prompt identification and prompt, comprehensive correction of violations and deficiencies. For additional information on NRC's use of discretion on issuing violations, refer to "General Statement of Policy and Procedures for NRC Enforcement Actions," (NUREG-1600).

With regard to audit records, 10 CFR 20.2102(a) requires licensees to maintain records of "... audits and other reviews of program content and implementation." NRC 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: The applicant is not required to, and should not, submit its audit program to NRC for review during the licensing phase.

References: The following documents are available from NRC on request: Inspection Procedure 87114, "Fixed and Portable Gauge Programs"; NUREG-1600, "General Statement of Policy and Procedures on NRC Enforcement Actions"; and IN 96-28, "Suggested Guidance Relating to Development and Implementation of Corrective Action."

8.10.2 TERMINATION OF ACTIVITIES

Regulations: 10 CFR 30.34(b), 10 CFR 30.35(g), 10 CFR 30.36(d) and (j), 10 CFR 30.51(f).

Criteria: The licensee must do the following:

- Notify NRC, in writing, within 60 days, when principal activities have not been conducted for a period of 24 months or a decision is made to permanently cease licensed activities;
- Certify the disposition of licensed materials by submitting NRC Form 314, "Certificate of Disposition of Materials," available from NRC upon request;

- Before a license is terminated, send the records important to decommissioning (as required by 10 CFR 30.35(g)) to the appropriate NRC Regional Office. If licensed activities are transferred or assigned in accordance with 10 CFR 30.34(b), transfer records important to decommissioning to the new licensee.

Discussion: For guidance on the disposition of licensed material, see the section on Waste Management – Gauge Disposal or Transfer. For guidance on decommissioning records, see the section on Radioactive Materials – Financial Assurance and Recordkeeping for Decommissioning.

Response from Applicant: The applicant is not required to submit a response to NRC during the initial application. However, when the license expires or when the licensee ceases operations, then NRC Form 314 must be submitted.

8.10.3 INSTRUMENTS

Regulations: 10 CFR 30.33(a)(2).

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 a check source).

Discussion: Each year there are a number of incidents involving gauges at construction sites (e.g., construction equipment running over the gauge). It is important to determine as soon as possible after an incident, by the use of a radiation survey meter, whether the shielding and source are intact. Applicants should preplan how they will obtain an instrument (e.g., use an instrument located on site or obtain one from the applicant's home office or a local emergency response organization).

Response from Applicant: Provide either of the following:

- A statement that: "We will either possess and use, or have access to and use, a radiation survey meter that meets the criteria in the section entitled 'Radiation Safety Program – Instruments' in NUREG-1556, Vol. 1 Rev. 1, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Portable Gauge Licenses,' dated September 2001, in the event of an incident";

OR

- A description of an alternative procedure for determining source integrity after an incident involving the gauge.

***Notes*:**

- Alternative responses will be reviewed against the criteria listed above.
- 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 Safety Program – Maintenance and Appendix G for more information.

8.10.4 MATERIAL RECEIPT AND ACCOUNTABILITY

Regulations: 10 CFR 30.34(e), 10 CFR 30.41, 10 CFR 30.51.

Criteria: Licensees must do the following:

- Maintain records of receipt, transfer, and disposal of gauges; and
- Conduct physical inventories at intervals not to exceed 6 months (or some other interval justified by the applicant) to account for all sealed sources.

Discussion: As Figure 8.2 illustrates, licensed materials must be tracked "from cradle to grave" in order to ensure gauge accountability, identify when gauges could be lost, stolen, or misplaced, and ensure that, if the licensee possesses gauges exceeding threshold amounts, the licensee complies with financial assurance requirements in 10 CFR 30.35. Many licensees record daily use of gauges in a log book as part of their accountability program; see the suggested Operating Procedures in Appendix H.

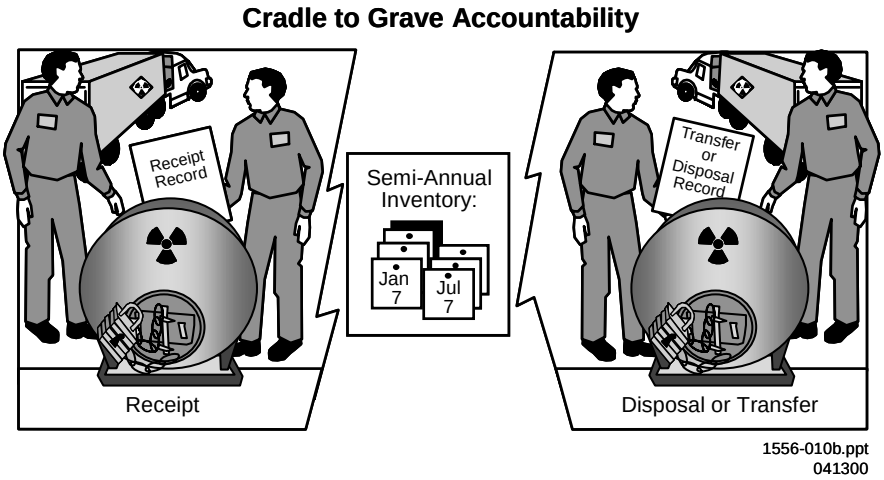

Figure 8.2 Material Receipt and Accountability. *Licensees must maintain records of receipt and disposal and conduct semiannual inventories.*

Response from Applicant: Provide either of the following:

- A statement that: "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."

OR

- A description of the frequency and procedures for ensuring that no gauge has been lost, stolen, or misplaced and that, if the licensee possesses gauges exceeding threshold amounts, the licensee complies with financial assurance requirements in 10 CFR 30.35.

Notes:

- Alternative responses will be evaluated against the criteria listed above.
- Inventory records should be maintained and should 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.

8.10.5 OCCUPATIONAL DOSIMETRY

Regulations: 10 CFR 20.1502, 10 CFR 20.1201, 10 CFR 20.1207, 10 CFR 20.1208.

Criteria: Applicants must do either of the following:

- Maintain, for inspection by NRC, documentation demonstrating that unmonitored individuals are not likely to receive, in one year, a radiation dose[1] in excess of 10 percent of the allowable limits as shown in Figure 8.3;

OR

- 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.

[1] In this document, dose or radiation dose is used as defined in 10 CFR 20.1003, 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. These latter terms are also defined in 10 CFR Part 20.

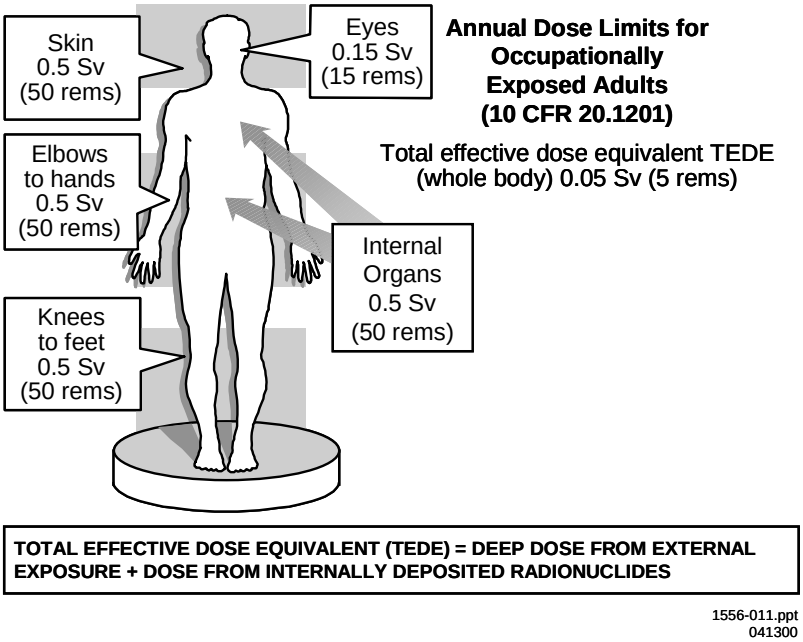

Figure 8.3 Annual Dose Limits for Radiation Workers.

Discussion: Under conditions of routine use (including weekly cleaning and lubrication of the gauge according to the manufacturer's instructions), the typical portable gauge user does not require a personnel monitoring device (dosimetry). In most accidents where a gauge has been run over and has been damaged, the shielding of the source remains intact. A gauge user also does not require dosimetry when proper emergency procedures are used. Part 1 of Appendix I provides guidance on preparing a written evaluation demonstrating that gauge users are not likely to exceed 10 percent of the applicable limits and thus, are not required to have personnel dosimetry.

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

Response from Applicant: Provide either of the following:

- A statement that: "Either we will maintain, for inspection by NRC, 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 in 10 CFR Part 20, or we will provide dosimetry processed and evaluated by an NVLAP-approved processor that is exchanged at a frequency recommended by the processor."

OR

- A description of an alternative method for demonstrating compliance with the referenced regulations.

Notes:

- Alternative responses will be evaluated against the criteria listed above.
- Many licensees choose to provide personnel dosimetry to their workers for reasons other than compliance with NRC requirements (e.g., to respond to worker requests).

Reference: National Institute of Standards and Technology (NIST) Publication 810, "National Voluntary Laboratory Accreditation Program Directory," is published annually and is available for purchase from GPO and on the Internet at the following address: <http://ts.nist.gov/ts/htdocs/210/214/214.htm>.

8.10.6 PUBLIC DOSE

Regulations: 10 CFR 20.1301, 10 CFR 20.1302, 10 CFR 20.1003, 10 CFR 20.1801, 10 CFR 20.1802, 10 CFR 20.2107.

Criteria: Licensees must do the following:

- Ensure that licensed gauges 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 that are not in storage and secure stored gauges from unauthorized removal or use.

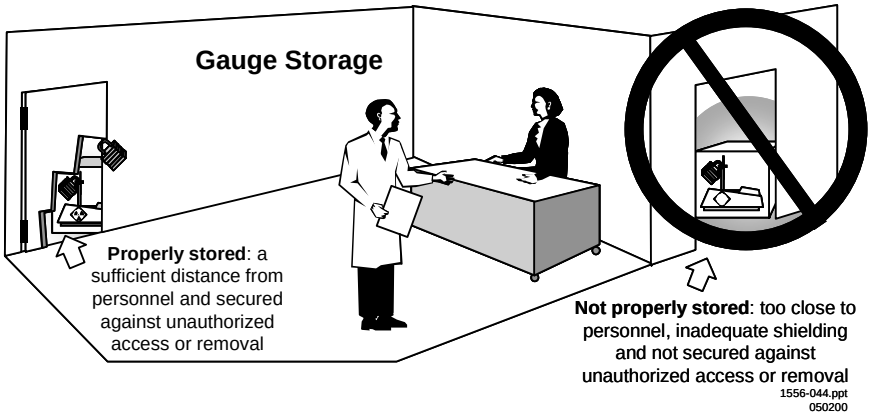

Figure 8.4 Storing Gauges. *Gauges should be stored away from occupied areas and secured against unauthorized removal.*

Discussion: Members of the public include persons who live, work, or may be near locations where portable gauges are used or stored and employees whose assigned duties do not include the use of licensed materials and who work in the vicinity where gauges 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 not in use are stored securely (e.g., stored in a locked area) to prevent unauthorized access or use (see Figure 8.4). If gauges 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 use them, and thus receive unneeded radiation exposure.

Public dose is also affected by the choice of storage location and conditions. Because a gauge presents a radiation field during storage, it must be stored so that the radiation level in an unrestricted area (e.g., an office, the exterior surface of an outside wall, or occupied areas of a personal residence) does not exceed 1 mSv (100 mrem) in a year or 0.02 mSv (2 mrem) in any one hour. Licensees should take time, distance, and shielding into consideration when choosing a permanent or temporary storage location. Decreasing the time spent near a gauge, increasing the distance from the gauge, and using shielding (i.e., brick, concrete, lead, or other solid walls) will reduce radiation exposure. As a rule of thumb, gauges should be stored as far away as possible from areas that are occupied by other employees and 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). See Part 2 of Appendix I for examples.

If, after making an initial evaluation, a licensee makes changes affecting the storage area (e.g., changing the location of gauges within the storage area, removing shielding, adding gauges, changing the occupancy of adjacent areas, moving the storage area to a new location), then the licensee must ensure that gauges 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: No response is required from the applicant in a license application, but this matter will be examined during an inspection.

8.10.7 OPERATING AND EMERGENCY PROCEDURES

Regulations: 10 CFR 30.34(e), 10 CFR 20.1101, 10 CFR 20.1801, 10 CFR 20.1802, 10 CFR 20.2201-2203, 10 CFR 30.50.

Criteria: Each applicant must do the following:

- Develop, implement, and maintain operating and emergency procedures containing the following elements:
  - — Instructions for using the portable gauge and performing routine maintenance, according to the manufacturer's recommendations and instructions;
  - — Instructions for maintaining security during storage and transportation;
  - — Instructions to keep the gauge 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; and
  - — Steps to take, and whom to contact, when a gauge has been damaged.
- 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 hole;

— Provide instructions for procedures to follow to retrieve a stuck source; and

— Require reporting to NRC, pursuant to 10 CFR 30.50(b)(2), when a stuck source cannot be retrieved.

- Provide copies of operating and emergency procedures to all gauge users and at each job site.

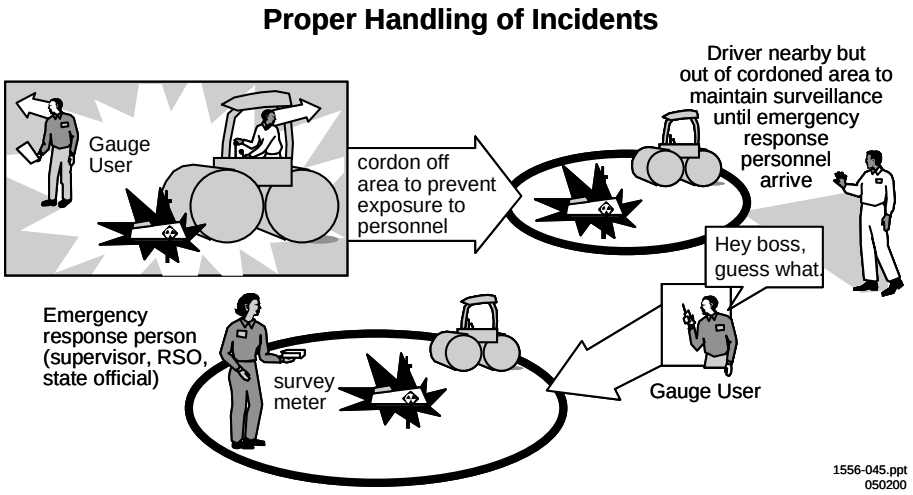

Figure 8.5 Proper Handling. *Gauges are often damaged by heavy equipment at job sites and emergency procedures need to minimize radiation safety risk.*

Discussion: Lost or stolen gauges and, as illustrated in Figure 8.5, gauges damaged by heavy equipment during use at job sites are the most common occurrences that present a potentially significant radiation safety risk. Figure 8.6 illustrates steps that should be taken to prevent loss, theft, or unauthorized use. Operating and emergency procedures should be developed to minimize these risks. NRC considers security of gauges extremely important, and lack of security is a significant violation for which gauge licensees are fined. See Appendix H for sample procedures.

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 1) the hole is free of debris; 2) it is not likely that debris will re-enter the cased hole; and 3) the source will be able to move freely, NRC will normally require the use of 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.

Notify NRC when gauges are lost, stolen, or certain other conditions are met. Refer to the regulations for a description of when and where notifications are required.

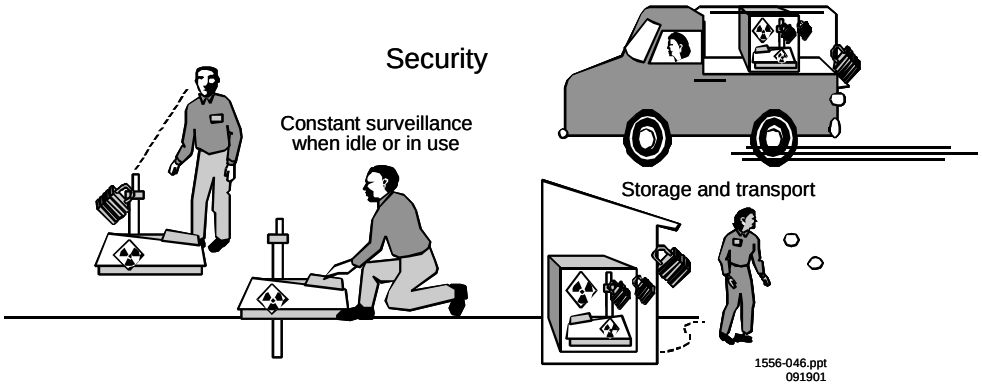

Figure 8.6 **Security.** *To avoid lost or stolen gauges, licensees must keep the gauges under constant surveillance, or secured against unauthorized use or removal.*

Response from Applicant: Do one of the following:

- State: "We will implement and maintain the operating and emergency procedures in Appendix H of NUREG-1556, Vol. 1, Rev. 1, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Portable Gauge Licenses,' dated September 2001, and provide copies of these procedures to all gauge users and at each job site."

OR

- State: "Operating and emergency procedures will be developed, implemented, and maintained, and will meet the criteria in the section entitled 'Radiation Safety Program – Operating and Emergency Procedures' in NUREG-1556, Vol. 1, Rev. 1, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Portable Gauge Licenses,' dated September 2001."

OR

- Submit alternative procedures.

Note: Alternative procedures will be reviewed against the criteria listed above.

References: NRC IN 93-18, "Portable Moisture-Density Gauge User Responsibilities During Field Operations"; NRC IN 98-01, "Thefts of Portable Gauges"; and NUREG/BR-0133, "Working Safely with Nuclear Gauges"; are available from NRC upon request.

8.10.8 LEAK TESTS

Regulations: 10 CFR 30.53.

Criteria: NRC requires testing to determine whether there is any radioactive leakage from the source in the device. NRC finds testing to be acceptable if it is conducted by an organization approved by NRC or an Agreement State or according to procedures approved by NRC or an Agreement State. Records of test results must be maintained.

Discussion: When issued, a license will require performance of leak tests at intervals approved by NRC or an Agreement State and specified in the SSD Registration 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 Bqs (0.005 microcurie) of radioactivity.

Manufacturers, consultants, and other organizations may be authorized by NRC or an Agreement State to either perform the entire leak test sequence for other licensees or provide leak test kits to licensees. In the latter case, the licensee is expected to take the leak test sample according to the gauge manufacturer's and the kit supplier's instructions and return it to the kit supplier for evaluation and reporting results. Leak test samples should be collected at the most accessible area where contamination would accumulate if the sealed source were leaking. Licensees may also be authorized to conduct the entire leak test sequence themselves.

Response from Applicant: Do either of the following:

- State: "Leak tests will be performed at intervals approved by NRC or an Agreement State and specified in the Sealed Source and Device Registration Sheet. Leak tests will be performed by an organization authorized by NRC or an Agreement State to provide leak testing services to other licensees or using a leak test kit supplied by an organization authorized by NRC or an Agreement State to provide leak test kits to other licensees and according to the kit supplier's instructions."

OR

- Provide the information in Appendix J supporting a request to perform leak testing and sample analysis.

Note: Requests for authorization to perform leak testing and sample analysis will be reviewed on a case-by-case basis and, if approved, NRC staff will authorize via a license condition.

References: See the Notice of Availability (on the inside front cover of this report) to obtain a copy of Draft Regulatory Guide FC 412-4, "Guide for the Preparation of Applications for the Use of Radioactive Materials in Leak-Testing Services," dated June 1985.

8.10.9 MAINTENANCE

Regulations: 10 CFR 20.1101, 10 CFR 30.34(e).

Criteria: Licensees must routinely clean and maintain gauges 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 the possibility of receiving exposures to the whole body, as well as to the hands, from handling the source rod. Licensees should keep such exposures 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 NRC limits, must be performed by the gauge manufacturer or a person specifically authorized by NRC or an Agreement State. Requests for specific authorization to perform non-routine maintenance or repair (see Appendix G) must demonstrate that personnel performing the work:

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

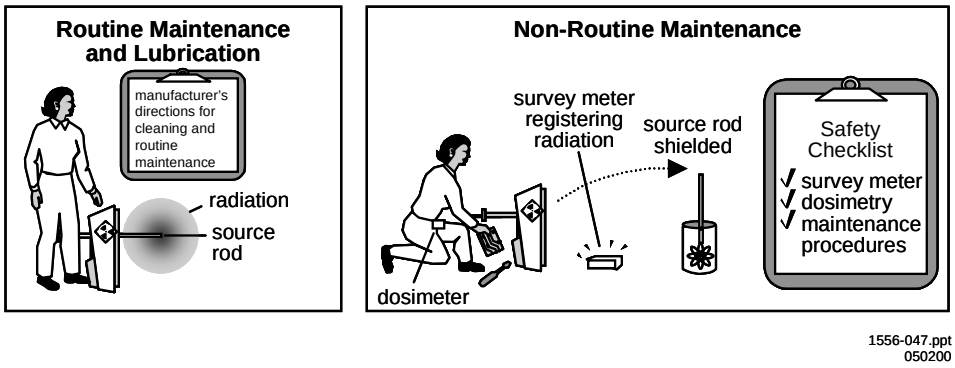

Figure 8.7 Maintenance. *All licensees need to perform routine cleaning and lubrication to ensure proper operation of the gauge. For non-routine maintenance, most licensees rely on the gauge manufacturer or other service companies.*

Discussion: Figure 8.7 illustrates routine cleaning and lubrication and non-routine maintenance. Generally, NRC permits portable gauge licensees to perform routine maintenance of the gauges, provided that they follow the gauge 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 NRC 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 NRC or an 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. Applicants seeking authorization to detach the source or source rod from the device must submit specific procedures for review. See Appendix G for more information.

Response from Applicant:

Routine cleaning and lubrication: Submit either of the following:

- A statement that: "We will implement and maintain procedures for routine maintenance of our gauges according to each manufacturer's recommendations and instructions."

OR

- Alternative procedures for NRC review.

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

- A statement that: "We will send the gauge to the manufacturer or other person authorized by NRC or an Agreement State to perform non-routine maintenance or repair operations that require detaching the source or source rod from the gauge."

OR

- The information listed in Appendix G supporting a request to perform this work in-house.

Notes:

- Alternative procedures for performing routine cleaning and lubrication will be reviewed according to the criteria listed above.
- Information requested in Appendix G will be reviewed on a case-by-case basis; if the request is approved, the license will contain a condition authorizing the licensee to perform non-routine maintenance.

8.10.10 TRANSPORTATION

Regulations: 10 CFR 71.5, 49 CFR Parts 171-178, 10 CFR 20.1101**.**

Criteria: Applicants must develop, implement, and maintain safety programs for public transport of radioactive material to ensure compliance with DOT regulations.

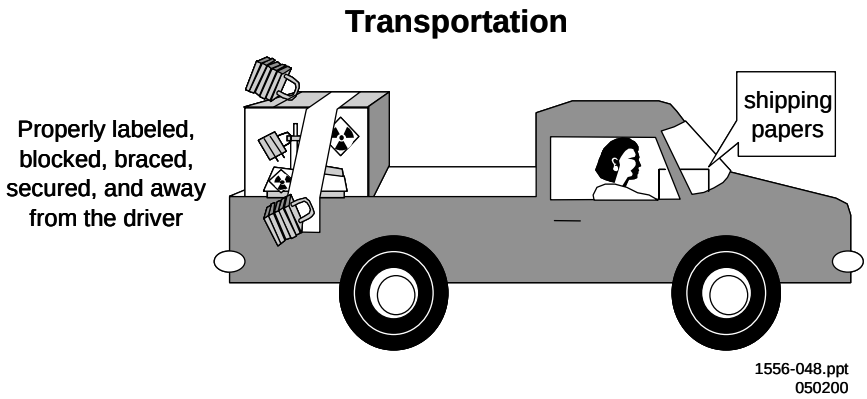

Figure 8.8 Transportation. *Licensees often transport their gauges to and from job sites and must ensure compliance with Department of Transportation regulations.*

Discussion: Figure 8.8 illustrates some DOT requirements often overlooked by portable gauge licensees. For example, the labeling of the transport container must be maintained in a legible condition. With regard to blocking and bracing, the licensee must assure that the transport container does not shift during transport. During an inspection, NRC uses the provisions of 10 CFR 71.5 to examine and enforce transportation requirements applicable to portable gauge licensees. Appendix K lists major DOT regulations and provides a sample shipping paper.

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

References: "Radioactive Material Regulations Review," RAMREG-001-98 (1998 revision) can be obtained by calling DOT's Office of Hazardous Material Initiatives and Training at (202) 366-4900.

8.11 ITEM 11: WASTE MANAGEMENT – GAUGE DISPOSAL AND TRANSFER

Regulations: 10 CFR 20.2001, 10 CFR 30.41, 10 CFR 30.51.

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

Discussion: Significant problems can arise from improper gauge transfer or failure to dispose of gauges in a proper and timely manner. Such problems include the possession of radioactive materials by unauthorized individuals which could result in exposures to members of the general public. When disposing of portable gauges, licensees must transfer them to an authorized recipient. Authorized recipients are the original manufacturer of the device, a commercial firm licensed by NRC or an Agreement State 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 10 CFR 30.41. In addition, all packages containing radioactive sources must be prepared and shipped in accordance with NRC and DOT regulations. Records of the transfer must be maintained as required by 10 CFR 30.51.

Response from Applicant: The applicant does not need to provide a response to this item during the licensing process. However, the licensee should establish and include waste disposal procedures in its radiation safety program.

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.

8.12 ITEM 12: FEES

Items 12 and 13 on NRC Form 313 should be completed on the form itself.

Each application must be accompanied by the appropriate fee. Refer to 10 CFR 170.31 to determine the amount of the fee. NRC will not issue the new license before it receives the fee. Once technical review has begun, no fees will be refunded; application fees will be charged regardless of NRC's disposition of an application or the withdrawal of an application.

Most NRC licensees are also subject to annual fees; refer to 10 CFR 171.16. Consult 10 CFR 171.11 for additional information on exemptions from annual fees, and 10 CFR 171.16(c) on reduced annual fees for licensees that qualify as "small entities."

Direct all questions about NRC's fees or completion of Item 12 on NRC Form 313 Item 12 (Appendix A) to the Office of the Chief Financial Officer (OCFO) at NRC Headquarters in Rockville, Maryland, at (301) 415-7554, or toll-free at (800) 368-5642, extension 415-7554.

8.13 ITEM 13: CERTIFICATION

Individuals acting in a private capacity are required to date and sign NRC Form 313. Otherwise, a representative of the corporation or legal entity filing the application must sign and date NRC Form 313. The representative signing the application must be authorized to make binding commitments and to sign official documents on behalf of the applicant. As discussed previously in "Management Responsibility," signing the application acknowledges management's commitment to and responsibility for the radiation protection program. NRC will return all unsigned applications for proper signature.

Notes:

- It is a criminal offense to make a willful false statement or representation on applications or correspondence (18 U.S.C. 1001).
- When the application references commitments, those items become binding and are part of the license conditions and regulatory requirements.

9 APPLICATIONS FOR EXEMPTIONS

Regulations: 10 CFR 19.31; 10 CFR 20.2301, 10 CFR 30.11.

Licensees may request exemptions to regulations. Various sections of NRC's regulations address requests for exemptions (e.g., 10 CFR 19.31, 10 CFR 20.2301, 10 CFR 30.11(a)). These regulations state that NRC may grant an exemption, acting on its own initiative or on an application from an interested person.

Exemptions are not intended to revise regulations, are not intended for large classes of licensees, and are generally limited to unique situations. NRC will prepare an environmental assessment as appropriate as part of its evaluation of an exemption request. Exemption requests must be accompanied by descriptions of the following:

- The exemption requested and a justification of why it is needed;
- Proposed compensatory safety measures intended to provide a level of health and safety equivalent to the regulation for which the exemption is being requested;
- Alternative methods for complying with the regulation and why compliance with the existing regulation is not feasible.

Until NRC grants an exemption in writing, NRC expects strict compliance with all applicable regulations.

10 AMENDMENTS AND RENEWALS TO A LICENSE

It is the licensee's obligation to keep the license current. If any information in the original application is to be modified or changed, the licensee must submit an application for a license amendment before the change takes place. Also, to continue the license after its expiration date, the licensee must submit an application for a license renewal at least 30 days before the expiration date (10 CFR 2.109, 10 CFR 30.36(a)).

Applications for license amendment, in addition to the following, must provide the appropriate fee. For renewal and amendment requests, applicants must do the following:

- Be sure to use the most recent guidance in preparing an amendment or renewal request;
- Submit either an NRC Form 313 or a letter requesting amendment or renewal;
- Provide the license number;
- For renewals, provide a complete and up-to-date application if many outdated documents are referenced or if there have been significant changes in regulatory requirements, NRC's guidance, the licensee's organization, or radiation protection program. Alternatively, describe clearly the exact nature of the changes, additions, and deletions.

Using the suggested wording of responses and committing to using the model procedures in this report will expedite NRC's review.

Appendix A

NRC Form 313

NRC FORM 313 U. S. NUCLEAR REGULATORY COMMISSION

(8-1999)
10 CFR 30, 32, 33
34, 35, 36, 39 and 40

APPROVED BY OMB: NO. 3150-0120 EXPIRES:08/31/2002

Estimated burden per response to comply with this mandatory information collection request: 7.4 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

APPLICATION FOR MATERIAL LICENSE

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

LICENSING ASSISTANT SECTION
NUCLEAR MATERIALS SAFETY BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

SAM NUNN ATLANTA FEDERAL CENTER
U. S. NUCLEAR REGULATORY COMMISSION, REGION II
61 FORSYTH STREET, S.W., SUITE 23T85
ATLANTA, GEORGIA 30303-8931

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
801 WARRENVILLE RD.
LISLE, IL 60532-4351

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-8064

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S.NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*
   - ☐ A. NEW LICENSE
   - ☐ B. AMENDMENT TO LICENSE NUMBER _____
   - ☐ C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip code)*

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

TELEPHONE NUMBER

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
   a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*

FEE CATEGORY | AMOUNT ENCLOSED $

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39 AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OFJUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER -- TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED $	CHECK NUMBER	COMMENTS
APPROVED BY				DATE	

Appendix B

Suggested Format for Providing Information Requested in Items 5 through 11

ITEMS 5 AND 6: MATERIALS TO BE POSSESSED AND PROPOSED USES

Yes	No	Radioisotope	Manufacturer or Distributor Model No.	Quantity	Use As Listed on SSD Certificate	Specify Other Uses Not Listed on SSD Certificate
		Cesium-137	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes ❒ Specific description of the gauge use: _____ _____ _____ _____ _____ _____ _____	❒ Not applicable _____ ❒ Uses are: _____ (Submit safety analysis supporting safe use)
		Americium-241	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes ❒ Specific description of the gauge use: _____ _____ _____ _____ _____ _____ _____	❒ Not applicable _____ ❒ Uses are: _____ (Submit safety analysis supporting safe use)

Yes	No	Radioisotope	Manufacturer or Distributor Model No.	Quantity	Use As Listed on SSD Certificate	Specify Other Uses Not Listed on SSD Certificate
		Californium-252	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes ❒ Specific description of the gauge use: _____ _____ _____ _____ _____ _____ _____	❒ Not applicable _____ ❒ Uses are: _____ (Submit safety analysis supporting safe use)
		Other Isotope (Specify):	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration Certificate	Yes ❒ Specific description of the gauge use: _____	❒ Not applicable _____ ❒ Uses are: _____ (Submit safety analysis supporting safe use)
		Financial Assurance Required and Evidence of Financial Assurance Provided				

ITEMS 7 THROUGH 11: TRAINING AND EXPERIENCE, FACILITIES AND EQUIPMENT, RADIATION SAFETY PROGRAM, AND WASTE DISPOSAL

Item No. And Title	Suggested Response	Yes	Alternative Procedures Attached
7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE – RADIATION SAFETY OFFICER Name:_____	Before obtaining licensed materials, the proposed RSO will have successfully completed one of the training courses described in Criteria in the section entitled "Individual(s) Responsible for Radiation Safety Program and Their Training and Experience – Radiation Safety Officer" in NUREG-1556, Vol. 1, Rev. 1, dated September 2001.	❒	❒
8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS	Before using licensed materials, authorized users will have successfully completed one of the training course described in Criteria in the section entitled "Training for Individuals Working In or Frequenting Restricted Areas" in NUREG-1556, Vol. 1, Rev 1, dated September 2001.	❒	❒
9. FACILITIES AND EQUIPMENT	No information needs to be submitted in response to this item; key issues are addressed under "Radiation Safety Program – Public Dose" and "Radiation Safety Program – Operating and Emergency Procedures."	**Separate Item 9 Response** **Need Not Be Submitted With Application**	
10. RADIATION SAFETY PROGRAM – AUDIT PROGRAM	The applicant is *not* required to, and should not, submit its audit program to NRC for review during the licensing phase.	**Need Not Be Submitted With Application**	
10. RADIATION SAFETY PROGRAM – TERMINATION OF ACTIVITIES	The applicant is *not* required to submit a response to the termination of activities section during the initial application. However, when the license expires when the licensee ceases operation, NRC Form 314 must be submitted.	**Need Not Be Submitted With Application**	
10. RADIATION SAFETY PROGRAM – SURVEY INSTRUMENTS	We will either possess and use, or have access to and use, a radiation survey meter that meets the Criteria in the section entitled "Radiation Safety Program – Instruments" in NUREG-1556, Vol. 1, Rev. 1, dated September 2001.	❒	❒

Item No. And Title	Suggested Response	Yes	Alternative Procedures Attached
10. RADIATION SAFETY PROGRAM – 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.	❒	❒
10. RADIATION SAFETY PROGRAM – OCCUPATIONAL DOSIMETRY	Either we will maintain, for inspection by NRC, documentation demonstrating that unmonitored individuals are not likely to receive a radiation dose in excess of 10 percent of the allowable limits in 10 CFR Part 20, or we will provide dosimetry processed and evaluated by an NVLAP-approved processor that is exchanged at a frequency recommended by the processor.	❒	❒
10. RADIATION SAFETY PROGRAM – 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**	
10. RADIATION SAFETY PROGRAM – OPERATING AND EMERGENCY PROCEDURES	We will implement and maintain the operating and emergency procedures in Appendix H of NUREG-1556, Vol. 1, Rev. 1, dated September 2001, and provide copies of these procedures to all gauge users and at each job site. **OR** Operating and emergency procedures will be developed, implemented, and maintained and will meet the criteria in the section entitled "Radiation Safety Program – Operating and Emergency Procedures" in NUREG-1556, Vol. 1, Rev. 1, dated September 2001.	❒ ❒	❒
10. RADIATION SAFETY PROGRAM – LEAK TEST	Leak tests will be performed at intervals approved by NRC or an Agreement Sate and specified in the Sealed Source and Device Registration Sheet. Leak tests will be performed by an organization authorized by NRC or an Agreement State to provide leak testing services for other licensees or using a leak test kit supplied by an organization authorized by NRC or an Agreement State to provide leak test kits to other licensees and according to the kit supplier's instructions.	❒	❒ **The information in Appendix J supporting a request to perform leak testing and sample analysis is attached.**

Item No. And Title	Suggested Response	Yes	Alternative Procedures Attached
10. RADIATION SAFETY PROGRAM – MAINTENANCE	*Routine Cleaning and Lubrication* We will implement and maintain procedures for routine maintenance of our gauges according to each manufacturer's recommendations and instructions.	❒	❒
	Non-Routine Maintenance We will send the gauge to the manufacturer or other person authorized by 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.	❒	❒ **The information listed in Appendix G supporting a request to perform non-routine maintenance in-house is attached.**
10.RADIATION SAFETY PROGRAM – TRANSPORTATION	The applicant is *not* required to submit its response to transportation during the licensing process. However, this issue will be reviewed during inspection.	**Need Not Be Submitted With Application**	
11. WASTE MANAGEMENT – GAUGE DISPOSAL AND TRANSFER	The applicant is *not* required to submit a response to waste management during the licensing process. However, the licensee should develop, implement, and maintain gauge transfer and disposal procedures in its radiation protection program.	**Need Not Be Submitted With Application**	

Appendix C

Information Needed for Change of Ownership or Control Application

Licensees must provide full information and obtain NRC's prior written consent before transferring ownership or control of the license; some licensees refer to this as "transferring the license." Licensees must provide the following information concerning changes of ownership or control by the applicant (transferor and/or transferee, as appropriate). If any items are not applicable, licensees must so state.

1. The new name of the licensed organization. If there is no change, the licensee should so state.
2. The new licensee contact and telephone number(s) to facilitate communications.
3. Any change in personnel having control over licensed activities (e.g., officers of a corporation) and any change in personnel named in the license such as RSO, authorized users, or any other persons identified in previous license applications as responsible for radiation safety or use of licensed material. The licensee should include information concerning the qualifications, training, and responsibilities of new individuals.
4. An indication of whether the transferor will remain in non-licensed business without the license.
5. A complete, clear description of the transaction, including any transfer of stocks or assets, mergers, etc., so that legal counsel is able, when necessary, to differentiate between name changes 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 licensed 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 10 CFR 30.35(g), 40.36(f), 70.25(g), and 72.30(d); 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 NRC 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 10 CFR 30.35, 40.36, and 70.25. 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 NRC by the transferor. These include, but are not limited to: maintaining decommissioning records required by 10 CFR 30.35(g), 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 it should provide evidence of adequate resources to fund decommissioning; or the transferor should provide a commitment to decontaminate the facility before change of control or ownership.

    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 NRC before license transfer.

14. Documentation that the transferor and transferee agree to the change in ownership or control of the licensed material and activity, and the conditions of transfer; and the transferee is made aware of all open inspection items and its responsibility for possible resulting enforcement actions.

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.

References: The information above is contained in IN-89-25, Revision 1, "Unauthorized Transfer of Ownership or Control of Licensed Activities." See the Notice of Availability (on the inside front cover of this draft report) to obtain copies.

Appendix D

Criteria for Acceptable Training Courses for Portable Gauge Users

COURSE CONTENT

- 1.5 to 2 hours of radiation safety and regulatory requirements, emphasizing practical subjects important to safe use of the gauge; radiation vs. contamination; internal vs. external exposure; concept of time, distance, and shielding to minimize exposure; control and surveillance of gauges; location of sealed source within the portable gauge; inventory; recordkeeping; incidents; licensing and inspection by regulatory agency; need for complete and accurate information; employee protection; deliberate misconduct.
- 1.5 to 2 hours of practical explanation of portable gauge theory and operation; operating, emergency, maintenance, and transportation procedures; and field training emphasizing radiation safety and including test runs of setting up and making measurements with the gauge, controlling and maintaining surveillance over the portable gauge, performing routine cleaning and lubrication, packaging and transporting the gauge, storing the gauge, and following emergency procedures.

COURSE EXAMINATION

- At least a 70-percent score on a 25-to-50-question, closed-book written test
  - Emphasis on radiation safety of portable gauge storage, use, sealed source location, maintenance, and transportation, rather than the theory and art of making portable gauge measurements;
  - Review of correct answers to missed questions with prospective gauge 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 user course;
- Successful completion of an 8-hour radiation safety course; and
- 8 hours hands-on experience with portable gauges.

OR

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

Note: Licensees should maintain records of training.

Appendix E

Typical Duties and Responsibilities of the Radiation Safety Officer

The RSO's duties and responsibilities are illustrated in Figure 8.1 and typically include ensuring the following:

- Licensed activities that the RSO considers unsafe are stopped;
- Possession, use, storage, and maintenance of sources and gauges are consistent with the limitations in the license, the Sealed Source and Device Registration sheet(s), and the manufacturer's recommendations and instructions;
- Individuals who use gauges 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;
- Gauges are properly secured;
- Proper authorities are notified in case of accident, damage to gauges, fire, or theft;
- Unusual occurrences involving the gauge (e.g., accident, damage) are investigated, cause(s) and appropriate corrective action are identified, and corrective action is taken;
- Audits are performed at least annually and documented, and corrective actions are taken;
- Licensed material is transported in accordance with all applicable DOT requirements;
- Licensed material is disposed of properly;
- Appropriate records are maintained;
- An up-to-date license is maintained and amendment and renewal requests are submitted in a timely manner;
- Up-to-date operating and emergency procedures are developed, maintained, distributed, and implemented;
- Non-routine operations are performed by the manufacturer, distributor, or person specifically authorized by NRC or an Agreement State;
- Documentation is maintained to demonstrate, by measurement or calculation, that the TEDE to the individual member of the public likely to receive the highest dose from the licensed operation does not exceed the annual limit in 10 CFR 20.1301;
- When the licensee identifies violations of regulations or license conditions or program weaknesses, corrective actions are developed, implemented, and documented;
- Posting of documents required by 10 CFR 19.11 (Parts 19 and 20, license documents, operating procedures, NRC Form 3, "Notice to Employees"), and 10 CFR 21.6 (Part 21, Section 206 of Energy Reorganization Act of 1974, procedures adopted pursuant to Part 21) or posting a notice indicating where these documents can be examined.

Appendix F

Portable Gauge Audit Checklist

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

Licensee's name:_____ License No._____

Auditor: _____Date of Audit _____Telephone No._____

_____

(Signature)

1. AUDIT HISTORY

a. Last audit of this location conducted on (date) _____.

b. Were previous audits conducted yearly? [10 CFR 20.1101]

c. Were records of previous audits maintained? [10 CFR 20.2102]

d. Were any deficiencies identified during the last two audits or two years, whichever is longer?

e. Were corrective actions taken? (Look for repeated deficiencies).

2. ORGANIZATION AND SCOPE OF PROGRAM

a. If the mailing address or places of use changed, was the license amended?

b. If ownership changed or bankruptcy was filed, was prior NRC consent obtained or was NRC notified?

c. If the RSO was changed, was the license amended? Does the new RSO meet NRC training requirements?

d. If the designated contact person for NRC changed, was NRC notified?

e. Does the license authorize all of the NRC-regulated radionuclides contained in the gauges possessed?

f. Are the gauges as they are described in the Sealed Source and Device (SSD) Registration Certificate or Sheet? Are copies of (or access to) SSD Certificates available? Does the licensee have the manufacturers' manuals for operation and maintenance? [10 CFR 32.210]

g. Are the actual uses of gauges consistent with the authorized uses listed on the license?

h. Is the RSO fulfilling his/her duties?

3. TRAINING AND INSTRUCTIONS TO WORKERS

a. Were all workers who are likely to exceed 100 mrem/yr instructed per 10 CFR 19.12? Was refresher training provided, as needed?

b. Did each gauge operator attend an approved course before using the gauges?

c. Are training records maintained for each gauge operator?

d. Did interviews with operators reveal that they know the emergency procedures?

e. Did this audit include observation of operators using the gauge in a field situation? Operating gauge? Performing routine cleaning and lubrication? Transporting gauge? Storing gauge?

f. Did the operator demonstrate safe handling and security during transportation, use, and storage?

g. Was HAZMAT training (required at least once every three years) provided as required? [49 CFR 172.700, 49 CFR 172.701, CFR 172.702, 49 CFR 172.703, 49 CFR 172.704]

4. RADIATION SURVEY INSTRUMENTS

a. If the licensee possesses its own survey meter, does the survey meter meet NRC's criteria?

b. If the licensee does not possess a survey meter, are specific plans made to have one available?

c. Is the survey meter needed for non-routine maintenance calibrated as required? [10 CFR 20.1501]

d. Are calibration records maintained? [10 CFR 20.2103(a)]

5. GAUGE INVENTORY

a. Is a record kept showing the receipt of each gauge? [10 CFR 30.51(a)(1)]

b. Are all gauges received physically inventoried every 6 months?

c. Are records of inventory results with appropriate information maintained?

6. PERSONNEL RADIATION PROTECTION

a. Are ALARA considerations incorporated into the radiation protection program? [10 CFR 20.1101(b)]

b. Is documentation kept showing that unmonitored users receive less than 10 percent of limit?

c. Did unmonitored users' activities change during the year which could put them over 10 percent of limit?

d. If yes to c. above, was a new evaluation performed?

e. Is external dosimetry required (user receiving greater than 10 percent of limit)? Is dosimetry provided to users?

   i. Is the dosimetry supplier NVLAP-approved? [10 CFR 20.1501(c)]

   ii. Are the dosimeters exchanged monthly for film badges and at the industry-recommended frequency for TLDs?

   iii. Are dosimetry reports reviewed by the RSO when they are received?

   iv. Are the records NRC forms or equivalent? [10 CFR 20.2104(d), 10 CFR 20.2106(c)]

      • NRC-4 "Cumulative Occupational Exposure History" completed?

      • NRC-5 "Occupational Exposure Record for a Monitoring Period" completed?

   v. If a worker declared her pregnancy, did licensee comply with 10 CFR 20.1208? Were records kept of embryo/fetus dose per 10 CFR 20.2106(e)?

f. Are records of exposures, surveys, monitoring, and evaluations maintained? [10 CFR 102, 10 CFR 20.2103, 10 CFR 20.2106]

7. PUBLIC DOSE

a. Are gauges stored in a manner to keep doses below 100 mrem in a year? [10 CFR 1301(a)(1)]

b. Has a survey or evaluation been performed per 10 CFR 20.1501(a)? Have there been any additions or changes to the storage, security, or use of surrounding areas that would necessitate a new survey or evaluation?

c. Do unrestricted area radiation levels exceed 2 mrem in any one hour? [10 CFR 0.1301(a)(2)]

d. Are gauges being stored in a manner that would prevent unauthorized use or removal? [10 CFR 20.1801]

e. Are records maintained? [10 CFR 20.2103, 10 CFR 20.2107]

8. OPERATING AND EMERGENCY PROCEDURES

a. Have operating and emergency procedures been developed?

b. Do they contain the required elements?

c. Does each operator have a current copy of the operating and emergency procedures, including current telephone numbers?

9. LEAK TESTS

a. Was each sealed source leak tested every 6 months or at other prescribed intervals?

b. Was the leak test performed as described in correspondence with NRC and according to the license?

c. Are records of results retained with the appropriate information included?

d. Were any sources found leaking and if yes, was NRC notified?

10. MAINTENANCE OF GAUGES

a. Are manufacturer's procedures followed for routine cleaning and lubrication of the gauge?

b. Does the source or source rod remain attached to the gauge during cleaning?

c. Is non-routine maintenance performed where the source or source rod is detached from the gauge? If yes, was it performed according to license requirements (e.g., extent of work, individuals performing the work, procedures, dosimetry, survey instrument, compliance with 10 CFR 20.1301 limits)?

11. TRANSPORTATION

a. Were DOT-7A or other authorized packages used? [49 CFR 173.415, 49 CFR 173.416(b)]

b. Are package performance test records on file?

c. Are special form sources documented? [49 CFR 173.476(a)]

d. Did the package have 2 labels (ex. Yellow-II) with TI, Nuclide, Activity, and Hazard Class? [49 CFR 172.403, 49 CFR 173.441]

e. Was the package properly marked? [49 CFR 172.301, 49 CFR 172.304, 49 CFR 172.310, 49 CFR 172.324]

f. Was the package closed and sealed during transport? [49 CFR 173.475(f)]

g. Were shipping papers prepared and used? [49 CFR 172.200(a)]

h. Did the shipping papers contain proper entries (Shipping name, Hazard Class, Identification Number (UN Number), Total Quantity, Package Type, Nuclide, RQ, Radioactive Material, Physical and Chemical Form, Activity, category of label, TI, Shipper's Name, Certification and Signature, Emergency Response Phone Number, Cargo Aircraft Only [if applicable])? [49 CFR 172.200, 49 CFR 72.201, 49 CFR 172.202, 49 CFR 172.203, 49 CFR 172.204, 49 CFR 172.604]

i. Were the shipping papers within the driver's reach and readily accessible during transport? [49 CFR 177. 817(e)]

j. Was the package secured against movement? [49 CFR 177. 834]

k. Was the vehicle placarded, if needed? [49 CFR 172.504]

l. Were overpacks, if needed, used properly? [49 CFR 173.25]

m. Were any incidents reported to DOT? [49 CFR 171.15, 16]

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

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

13. NOTIFICATION AND REPORTS

a. Was any radioactive material lost or stolen? Were reports made? [10 CFR 20.2201, 10 CFR 30.50]

b. Did any reportable incidents occur? Were reports made? [10 CFR 20.2202, 10 CFR 30.50]

c. Did any overexposures and high radiation levels occur? Were they reported? [10 CFR 20.2203, 10 CFR 30.50]

d. If any events (as described in items a through c above) did occur, what was the root cause? Were the corrective actions appropriate?

e. Is the licensee aware of the telephone number for the NRC Emergency Operations Center? [(301) 816-5100]

14. POSTING AND LABELING

a. Is NRC-3 "Notice to Workers" posted? [10 CFR 19.11]

b. Are NRC regulations and license documents posted or is a notice posted stating where these documents are located? [10 CFR 19.11, 10 CFR 21.6]

c. Is there any other posting and labeling? [10 CFR 20.1902, 10 CFR 20.1904]

15. RECORDKEEPING FOR DECOMMISSIONING

a. Are records kept of information important to decommissioning? [10 CFR 30.35(g)]

b. Do records include all information outlined? [10 CFR 30.35(g)]

16. BULLETINS AND INFORMATION NOTICES

a. Are NRC bulletins, NRC Information Notices, and NMSS Newsletters, received?

b. Is appropriate training and action taken in response?

17. SPECIAL LICENSE CONDITIONS OR ISSUES

a. Did the auditor review special license conditions or other issues (e.g., non-routine maintenance)?

18. DEFICIENCIES IDENTIFIED IN AUDIT; CORRECTIVE ACTIONS

a. Summarize problems and/or deficiencies identified during the audit.

b. If problems and/or deficiencies were identified in this audit, describe the corrective actions planned 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. Is senior licensee management appropriately involved with the radiation protection program and/or RSO oversight?

b. Does RSO have sufficient time to perform his/her radiation safety duties?

c. Does licensee have sufficient staff to support the radiation protection program?

Appendix G

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 NRC limits (see Figure 8.7). If this maintenance or repair is not performed properly, with attention to good radiation safety principles, the gauge may not operate as designed and personnel performing these tasks could receive radiation doses exceeding NRC 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, applicants must 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 NRC 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 is 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 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. The dose limits are illustrated in Figure 8.3.

- 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;
  - Be calibrated at at least 2 points, each located at approximately one-third and two-thirds of each scale; readings within ±20 percent are acceptable;
  - Be calibrated by a person specifically licensed by NRC or an Agreement State to calibrate radiation detection instruments; and
  - Be checked for functionality prior to use (e.g., with the gauge or a check source).

Note: Records of instrument calibration must be maintained for 3 years after the record is made. [10 CFR 20.2103]

- Describe steps to be taken to ensure that radiation levels in areas where non-routine maintenance will take place do not exceed 10 CFR 20.1301 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 10 CFR 20.2103.

Appendix H

Operating and Emergency Procedures

Operating Procedures

- If personnel dosimetry is provided:
  - — Always wear your assigned thermoluminescent dosimeter (TLD) or film badge when using the gauge;
  - — Never wear another person's TLD or film badge;
  - — Never store your TLD or film badge near the gauge.
- Before removing the gauge from its place of storage, ensure that, where applicable, each gauge 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 in the transport case and lock the case.
- Sign out the gauge 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, and the temporary job site(s) where the gauge will be used.
- Block and brace the gauge to prevent movement during transport and lock the gauge in or to the vehicle. Follow all applicable Department of Transportation (DOT) requirements when transporting the gauge.
- Use the gauge 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.
- Always maintain constant surveillance and immediate control of the gauge when it is not in storage. At job sites, do not walk away from the gauge when it is left on the ground. Take action necessary to protect the gauge and yourself from danger of moving heavy equipment.
- Always keep unauthorized persons away from the gauge.
- Perform routine cleaning and maintenance according to the manufacturer's instructions and recommendations.
- When the gauge is not in use at a temporary job site, place the gauge in a secured storage location (e.g., locked in the trunk of a car or locked in a storage shed).

- Before transporting the gauge, ensure that, where applicable, each gauge 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 in the transport case and lock the case. Block and brace the case to prevent movement during transportation. Lock the case in or to the vehicle, preferably in a closed compartment.
- Return the gauge to its proper locked storage location at the end of the work shift.
- Log the gauge into the daily use log when it is returned to storage.
- 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 storage area (e.g., changing the location of gauges 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.

Emergency Procedures

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 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 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 users and other potentially contaminated individuals should not leave the scene until emergency assistance arrives.
- Notify the following persons, in the order listed below, of the situation:

NAME[2]	WORK PHONE NUMBER[2]	HOME PHONE NUMBER[2]
_____	_____	_____
_____	_____	_____
_____	_____	_____

Follow the directions provided by the person contacted above.

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 job site 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 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 to NRC as required. (Even if it is not required, you may report *any* incident to NRC by calling NRC's Emergency Operations Center at (301) 816-5100, which is staffed 24 hours a day and accepts collect calls.) NRC notification is required when gauges containing licensed material are lost or stolen, when gauges are damaged or involved in incidents that result in doses in excess of 10 CFR 20.2203 limits, and when it becomes apparent that attempts to recover a source stuck below the surface will be unsuccessful.
- Reports to NRC must be made within the reporting time frames specified by the regulations.
- Reporting requirements are found in 10 CFR 20.2201-2203 and 10 CFR 30.50.

[2] Fill in with (and update, as needed) the names and telephone numbers of appropriate personnel (e.g., the RSO or other knowledgeable licensee staff, licensee's consultant, gauge manufacturer) to be contacted in case of emergency.

Appendix I

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 percent of the applicable regulatory limits in 10 CFR 20.1201. Thus, a licensee needs to evaluate the doses its workers receive in performing these tasks to assess whether dosimetry is required.

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

EXAMPLE

One gauge 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. Each gauge 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 leaning 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 percent 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 percent of the applicable limit.

The applicable limit for the extremities is 500 mSv (50 rems) per year and 10 percent of that value is 50 mSv (5 rems or 5000 millirems) per year. 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 percent 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 must 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 must use information appropriate to the various types of gauges on which they will perform routine cleaning and lubrication; this information is generally available from gauge manufacturers or the SSD Registration Sheet maintained by NRC and Agreement States.

Table I.1 may be helpful in documenting a licensee's evaluation.[3]

Licensees should review evaluations periodically and revised them as needed. They should check assumptions used in their evaluations to ensure that the assumptions are up-to-date and accurate. For example, if workers became lax in following good radiation safety practices in the example used above, the extremities could be closer to the unshielded source, and the workers would receive 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, using new gauges containing sources of different activities, different radionuclides, or different cleaning/lubrication procedures requires a new evaluation.

[3] For 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 I.1 Dosimetry Evaluation

Dosimetry Evaluation for _____ Model _____ Portable Gauge			
A.	Time needed to perform the entire routine cleaning and lubrication procedure on the gauge.	_____ minutes/60	_____ hour
B.	Expected whole body dose rate that the individual will encounter, determined using measured or manufacturer-provided data.	_____ mrem/hr	
C.	Time the *hands* were exposed to the unshielded source.	_____ minutes/60	_____ hour
D.	Expected extremity dose rate that 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	
F 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			

* Expected Whole Body Dose Equivalent *less than* 500 mrem requires no dosimetry

** Expected Extremity Dose Equivalent *less than* 5000 mrem requires no dosimetry.

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

Members of the public include persons who live, work, or may be near locations where portable gauges are used or stored. (For storage of gauges in personal residences, occupants are considered members of the public.) Employees whose assigned duties do not include the use of licensed materials but who work in the vicinity where gauges are used or stored are also considered members of the public.

- 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, nonradioactive equipment storage areas, and occupied areas of personal residences. The licensee does not control access to these areas for purposes of controlling exposure to radiation or radioactive materials. However, the licensee may control access to these areas for other reasons such as security.

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 METHOD[4]

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 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 and the unrestricted areas.

[4] For 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.

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 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 amount of time that both the gauge and the affected 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 that could be received.

Example 1

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

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

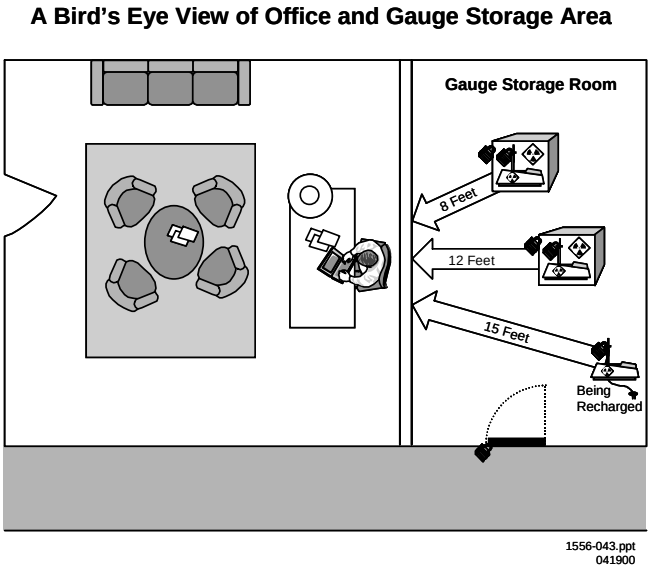

Figure I.1 Diagram of Office and Gauge Storage Area. *This sketch shows the areas described in Examples 1 and 2.*

Table I.2 Information Known About Each Gauge

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

Example 1, Part 1

Joe's first thought is that the distance between the gauges and the secretary's chair may be sufficient to show compliance with the regulation in 10 CFR 20.1301. So, taking a "worst-case" approach, he assumes: 1) the gauges are constantly present (i.e., 24 hours per day); 2) all three gauges remain in storage with no other use; and 3) the secretary is constantly sitting in the desk chair (i.e., 24 hours per day). Joe proceeds to calculate the dose she might receive hourly and yearly from each gauge, as shown in Tables I.3, I.4, and I.5 below.

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

		GAUGE 1	
Step No.	**Description**	**Input Data**	**Results**
1	Dose received in an hour at known distance from gauge (e.g., from manufacturer's data), in mrem/hr.	2	2
2	Square of the distance (ft) at which the Step 1 rate was measured, in ft^2.	$(1)^2$	1
3	Square of the distance (ft) from the gauge to the secretary's desk in an unrestricted area, in ft^2.	$(8)^2$	64
4	Multiply the results of Step 1 by the results of Step 2 (this is an intermediate result).	2 x 1 =2	
5	Divide the result of Step 4 by the result of Step 3 to calculate the dose received by an individual at the secretary's desk = HOURLY DOSE RECEIVED FROM GAUGE 1, in mrem in an hour.	2/64 = 0.031	
6	Multiply the result of Step 5 by 24 hours per day x 365 days per year = MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGE 1, in mrem in a year.	0.031 x 24 x 365 = 0.031 x 8760 = 272	

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

		GAUGE 2	
Step No.	**Description**	**Input Data**	**Results**
1	Dose received in an hour at known distance from gauge (e.g., from manufacturer's data), in mrem/hr.	8	8
2	Square of the distance (ft) at which the Step 1 rate was measured, in ft^2.	$(1)^2$	1
3	Square of the distance (ft) from the gauge to the secretary's desk in an unrestricted area, in ft^2.	$(12)^2$	144
4	Multiply the results of Step 1 by the results of Step 2 (this is an intermediate result).	8 x 1 = 8	

		GAUGE 2	
Step No.	**Description**	**Input Data**	**Results**
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 2, in mrem in an hour.	8/144 = .056	
6	Multiply the result of Step 5 by 24 hours per day x 365 days per year = MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGE 2, in mrem in a year	0.056 x 24 x 365 =0.056 x 8760 = 491	

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

		GAUGE 3	
Step No.	**Description**	**Input Data**	**Results**
1	Dose received in an hour at known distance from gauge (e.g., from manufacturer's data), in mrem/hr.	2	2
2	Square of the distance (ft) at which the Step 1 rate was measured, in ft^2.	$(3)^2$	9
3	Square of the distance (ft) from the gauge to the secretary's desk in an unrestricted area, in ft^2.	$(15)^2$	225
4	Multiply the results of Step 1 by the results of Step 2 (this is an intermediate result).	2 x 9 =18	
5	Divide the result of Step 4 by the result of Step 3 to calculate dose received by an individual at the secretary's desk = HOURLY DOSE RECEIVED FROM GAUGE 3, in mrem in an hour.	18/225 = 0.08	
6	Multiply the result of Step 5 by 24 hours per day x 365 days per year = MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGE 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 I.6. Calculational Method, Part 1 – Total Hourly and Annual Dose Received from Gauges 1, 2, and 3

Step No.	Description	Gauge 1	Gauge 2	Gauge 3	Sum
7	TOTAL HOURLY DOSE RECEIVED from Step 5 of Tables I.3, I.4, and I.5, in mrem in an hour.	0.031	0.056	0.08	0.031 + 0.056 + 0.08 = 0.167
8	TOTAL ANNUAL DOSE RECEIVED from Step 6 of Tables I.3, I.4, and I.5, in mrem in a year.	272	491	701	272 + 491 + 701 = 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 hours per day. 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 are constantly present (i.e., 24 hours per day), all three gauges remain in storage with no other use). He then recalculates the annual dose received.

Table I.7. Calculational Method, Part 2 – Annual Dose Received from Gauges 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 hours per day; the rest of the day the secretary is away from the desk area copying, filing, etc.).	5
	B. Average number of days per week in area (e.g., secretary is part-time and works 3 days a week).	3
	C. Average number of weeks per year in area (e.g., secretary works all year).	52
10	Multiply the results of Step 9A by the results of Step 9B by the results of Step 9C = AVERAGE NUMBER OF HOURS IN AREA OF CONCERN PER YEAR.	5 x 3 x 52 = 780

Step No.	Description	Results
11	Multiply the sum in Step 7 by the results of Step 10 = ANNUAL DOSE RECEIVED FROM GAUGES CONSIDERING REALISTIC ESTIMATE OF TIME SPENT IN AREA OF CONCERN, in mrem in a year.	0.167 x 780 = 130

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 are not always in storage when the secretary is seated at the desk. As he examines the situation, he realizes he must consider each gauge individually.

Table I.8. Calculational Method, Part 3 – Summary of Information

INFORMATION ON WHEN GAUGES ARE PRESENT IN THE STORAGE AREA:

- GAUGE 1: an old gauge located in the storage area continuously (24 hours per day)
- GAUGE 2: a new gauge located in the storage area continuously (24 hours per day) for 8 months of the year; for the remaining 4 months of the year it is at temporary job sites;
- GAUGE 3: a new gauge located in the storage area overnight; it is used every day at temporary job sites all year and returned to the storage location at the end of each day. The gauge is usually present during the secretary's first and last hours of work each day.

INFORMATION FROM EXAMPLE 1, PART 2 ON WHEN THE SECRETARY IS SITTING AT THE DESK:

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

Table I.9. Calculational Method, Part 3 – Annual Dose Received from Gauges 1, 2, and 3

Step No.	Description	GAUGE 1	GAUGE 2	GAUGE 3
12	Average number of *hours per day* gauge is in storage while secretary is present.	5	5	2
13	Average number of *days per week* gauge is in storage while secretary is present.	3	3	3
14	Average number of *weeks per year* gauge 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 IS STORED PER YEAR WHILE SECRETARY IS PRESENT.	5 x 3 x 52 = 780	5 x 3 x 32 = 480	2 x 3 x 52 = 312
16	Multiply the results of Step 15 by the results of Step 7 = ANNUAL DOSE RECEIVED FROM EACH GAUGE, in mrem in a year.	780 x 0.031 = 24	480 x 0.056 = 27	312 x 0.08 = 25
17	Sum the results of Step 16 for each gauge = TOTAL ANNUAL DOSE RECEIVED CONSIDERING REALISTIC ESTIMATE OF TIME SPENT IN AREA OF CONCERN AND TIME GAUGE 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 action.

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 is in storage are accurate, revise the assumptions as needed, and recalculate using the new assumptions;
- Calculate the effect of any shielding located between the gauge storage area and the secretarial workstation – such calculation is beyond the scope of this appendix;
- Take corrective action (e.g., move gauges 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 10 CFR 19.12.

Note that in the example, Joe evaluated the unrestricted area outside only one wall of the gauge 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 closer to the secretarial workstation, adding a gauge 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.

RECORDKEEPING: 10 CFR 20.2107 requires licensees to maintain records demonstrating compliance with the dose limits for individual members of the public.

COMBINATION MEASUREMENT – CALCULATIONAL METHOD

This method, which allows the licensee to take credit for shielding between the gauge and the area in question, begins by measuring radiation levels in the areas, as opposed to using manufacturer-supplied rates at a specified distance from each gauge. These measurements must be made with calibrated survey meters sufficiently sensitive to measure background levels of radiation. 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 (40 hours per week for 52 weeks per year 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 TLDs[5] in unrestricted areas next to the gauge storage area for monitoring. This direct measurement method would provide a definitive measurement of actual radiation levels in unrestricted areas without any restrictive assumptions. Records of these measurements can then be evaluated to ensure that rates in unrestricted areas do not exceed the 1 mSv/yr (100 mrem/yr) limit.

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[5] TLDs 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 CaF_2, that are used for environmental monitoring.

Example 2

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

During the winter, while all the gauges were in storage, Joe placed an environmental TLD badge in the secretarial 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 was in the storage area. The TLD processor sent Joe a report indicating the TLD received 100 mrem.

Table I.10. Combination Measurement – Calculational Method

Step No.	Description	Input Data and Results
	PART 1	
1	Dose received by TLD, in mrem.	100
2	Total hours TLD exposed.	24 hr/d x 30 d/mo = 720
3	Divide the results of Step 1 by the results of Step 2 to determine HOURLY DOSE RECEIVED, in mrem in an hour.	0.14
4	Multiply the results of Step 3 by 365 days per year x 24 hours per day = 8760 hours in one year = MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGES, in mrem in a year.	365 x 24 x 0.14 = 8760 x 0.14 = 1226
NOTE: For the conditions described above, Step 3 indicates that the dose received in any one hour is less than the 2 mrem in any one hour limit. However, if there are any changes, then the licensee would need to reevaluate the potential doses that could be received in any 1 hour. Step 4 indicates that the annual dose received would be much greater than the 100 mrem in a year allowed by the regulations.		
	PART 2	
At this point Joe can adjust for a realistic estimate of the time the secretary spends in the area as he did in Part 2 of Example 1.		

Step No.	Description	Input Data and Results
PART 3		
If the results of Joe's evaluation in Part 2 show that the annual dose received in a year exceeds 100 mrem, then he can make adjustments for realistic estimates of the time spent in the area of concern while the gauges are actually in storage as in Part 3 of Example 1. (Recall that the TLD measurement was made while all the gauges were in storage, i.e., 24 hours per day for the 30 days that the TLD was in place.)		

Appendix J

Requests to Perform Leak Testing and Sample Analysis

Model Leak Test Program

Training

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

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

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

Appropriate on-the-job-training consists of:

- Observing authorized personnel collecting and analyzing leak test samples;
- Collecting and analyzing leak test samples under the supervision and in the physical presence of an individual authorized to perform leak tests.

Facilities and Equipment

- To ensure achieving the required sensitivity of measurements, leak tests will be analyzed in a low-background area.
- Individuals conducting leak tests will use a calibrated and operable survey instrument to check leak test samples for gross contamination before they are analyzed.
- An NaI(Tl) well counter system with a single or multichannel analyzer will be used to count samples from gauges containing gamma-emitters (e.g., Cs-137, Co-60).
- A liquid scintillation or gas-flow proportional counting system will be used to count samples from gauges containing beta-emitters (e.g., Sr-90) or alpha emitters (e.g., Am-241).

Frequency for Conducting Leak Tests of Sealed Sources

- Leak tests will be conducted at the frequency specified in the respective SSD Registration Certificate.

Procedure for Performing Leak Testing and Analysis

- For each source to be tested, list identifying information such as gauge 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.
- Select an instrument that is sensitive enough to detect 185 Bq (0.005 microcurie) of the radionuclide contained in the gauge.
- Using the selected instrument, count and record background count rate.
- Check the instrument's counting efficiency using standard source of the same radionuclide as the source being tested or one with similar energy characteristics. Accuracy of standards should be within +/-5 percent of the stated value and traceable to a primary radiation standard such as those maintained by the National Institutes of Standards and Technology (NIST).
- Calculate efficiency.

For example:

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

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

- Count each wipe sample; determine net count rate.
- For each sample, calculate and record estimated activity in Bq (or microcuries).

For example:

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

- Sign and date the list of sources, data, and calculations. Retain records for 3 years.
- If the wipe test activity is 185 Bq (0.005 microcurie) or greater, notify the RSO so that the source can be withdrawn from use and disposed of properly. Also notify NRC.

Reference: See the Notice of Availability (on the inside front cover of this report) to obtain a copy of Draft RG FC 412-4, "Guide for the Preparation of Applications for Licenses for the Use of Radioactive Materials in Leak-Testing Services," dated June 1985.

Appendix K

Major DOT Regulations; Sample Bill of Lading

The major areas in the DOT regulations that are most relevant for transportation of typical portable gauges 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 packagings, 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.

Minimum Required Packaging For Class 7 (Radioactive) Materials

This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

Quantity:	< 70 Bq/g (< 0.002 µCi/g)	Limited Quantity (§173.421)	A_1/A_2 value (§173.435)	1 rem/hr at 3 m, un-shielded (§173.427)
Non-LSA/SCO:	**Excepted**	**Type A**	**Type B [3]**	
Domestic or International LSA/SCO: • LSA-I solid, (liquid)[1] • SCO-I	**Excepted**	**IP-I**		**Type B [3]**
• LSA-I Liquid • LSA-II Solid, (liquid or gas)[1] • (LSA-III)[1] • SCO-II		**IP-II**		**Type B [3]**
• LSA-II Liquid or Gas • LSA-III		**IP-III**		**Type B [3]**
Domestic (only) LSA/SCO: • LSA-I, II, III; SCO-I, II	**Excepted**	**Strong-tight [2]**	**DOT Spec. 7A Type A**	**Type B [3]** **NRC Type A LSA [3,4]**

1. For entries in parentheses, exclusive use is required for shipment in an IP (e.g., shipment of LSA-I liquid in an IP-I packaging would require exclusive-use consignment)
2. Exclusive use required for strong-tight container shipments made pursuant to §173.427(b)(2)
3. Subject to conditions in Certificate, if NRC package
4. Exclusive use required, see §173.427(b)(4). Use of these packages expires on 4/1/99 (10 CFR 71.52)

Package and Vehicle Radiation Level Limits (49 CFR 173.441) [A]

This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

Transport Vehicle Use:	**Non-Exclusive**	**Exclusive**		
Transport Vehicle Type:	Open or Closed	Open (flat-bed)	Open w/Enclosure [B]	Closed
Package (or freight container) **Limits:**				
External Surface	2 mSv/hr **(200 mrem/hr)**	2 mSv/hr **(200 mrem/hr)**	10 mSv/hr **(1000 mrem/hr)**	10 mSv/hr **(1000 mrem/hr)**
Transport Index (TI) [C]	10	no limit		
Roadway or Railway Vehicle (or freight container) **Limits:**				
Any point on the outer surface	N/A	N/A	N/A	2 mSv/hr **(200 mrem/hr)**
Vertical planes projected from outer edges		2 mSv/hr **(200 mrem/hr)**	2 mSv/hr **(200 mrem/hr)**	N/A
Top of . . .		load: **(200 mrem/hr)**	enclosure: 2 mSv/hr **(200 mrem/hr)**	vehicle: 2 mSv/hr **(200 mrem/hr)**
2 meters from. . .		vertical planes: 0.1 mSv/hr **(10 mrem/hr)**	vertical planes: 0.1 mSv/hr **(10 mrem/hr)**	outer lateral surfaces: 0.1 mSv/hr **(10 mrem/hr)**
Underside		2 mSv/hr **(200 mrem/hr)**		
Occupied position	N/A [D]	0.02 mSv/hr **(2 mrem/hr)** [E]		
Sum of package TI's	50	no limit [F]		

A. The limits in this table do not apply to excepted packages - see 49 CFR 173.421-426.
B. Securely attached (to vehicle), access-limiting enclosure; package personnel barriers are considered as enclosures.
C. For nonfissile radioactive materials packages, the dimensionless number equivalent to maximum radiation level at 1 m (3.3 feet) from the exterior package surface, in millirem/hour.
D. No dose limit is specified, but separation distances apply to Radioactive Yellow-II or Radioactive Yellow-III labeled packages.
E. This does not apply to private carrier wearing dosimetry if under radiation protection program satisfying 10 CFR 20 or 49 CFR 172 Subpart I.
F. Some fissile shipments may have combined conveyance TI limit of 100 - see 10 CFR 71.59 and 49 CFR 173.457.

Hazard Communications for Class 7 (Radioactive) Materials

DOT Shipping Papers (49 CFR 172.200-205)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

Entries Always Required Unless Excepted	Additional Entries Sometimes Required	Optional Entries
• The basic description, In sequence: **Proper Shipping Name**, **Hazard Class (7),** **U.N. Identification Number** • 24 hour **emergency response telephone number** • Name of **shipper** • Proper page numbering (Page 1 of 4) • Except for empty and bulk packages, the **total quantity** (mass, or volume for liquid), in appropriate units (lbs, mL....) • If not special form, **chemical and physical form** • The **name of each radionuclide** (95 percent rule) and total package activity. The activity must be in SI units (e.g., Bq, TBq), or both SI units and customary units (e.g., Ci, mCi). However, for domestic shipments, the activity *may* be expressed in terms of customary units only, until 4/1/97. • For each labeled package: - The **category of label** used; - The **transport index** of each package with a Yellow-II or Yellow-III label - Shipper's **certification** (not required of private carriers)	Materials-Based Requirements • If hazardous substance, "RQ" as part of the basic description • The LSA or SCO group (e.g., LSA-II) • "Highway Route Controlled Quantity" as part of the basic description , if HRCQ • Fissile material information (e.g., "Fissile Exempt," controlled shipment statement [see §172.203(d)(7)]) • If the material is considered hazardous waste and the word waste does not appear in the shipping name, then "waste" must precede the shipping name (e.g., Waste Radioactive Material, nos, UN2982) • "Radioactive Material" if not in proper shipping name **Package-Based Requirements** • Package identification for DOT Type B or NRC certified packages • IAEA CoC ID number for export shipments or shipments using foreign-made packaging (see §173.473) **Administrative-Based Requirements** • "Exclusive Use-Shipment" • Instructions for maintenance of exclusive use-shipment controls for LSA/SCO strong-tight or NRC certified LSA (§ 173.427) • If a DOT exemption is being used, "DOT-E" followed by the exemption number	• The type of packaging (e.g., Type A, Type B, IP-1, ...) • The technical/chemical name may be in included (if listed in §172.203(k), in parentheses between the proper shipping name and hazard class; otherwise inserted in parenthesis after the basic description) • Other information is permitted (e.g., functional description of the product), provided it does not confuse or detract from the proper shipping name or other required information • For fissile radionuclides, except Pu-238, Pu-239, and Pu-241, the weight in grams or kilograms may be used *in place of* activity units. For Pu-238, Pu-239, and Pu-241, the weight in grams or kilograms may optionally be entered *in addition to* activity units [see §172.203(d)(4)] • Emergency response hazards and guidance information (§§172.600-604) may be entered on the shipping papers, or may be carried with the shipping papers [§172.602(b)]

Some Special Considerations/Exceptions for Shipping Paper Requirements

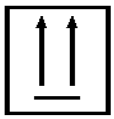
- Shipments of Radioactive Material, excepted packages, under UN2910 (e.g., Limited Quantity, Empty packages, and Radioactive Instrument and Article), are excepted from shipping papers. For limited quantities (§173.421), this is only true if the limited quantity is not a hazardous substance (RQ) or hazardous waste (40 CFR 262).
- Shipping papers must be in the pocket on the left door, or readily visible to a person entering the driver's compartment and within arm's reach of the driver.
- For shipments of multiple cargo types, any HAZMAT entries must appear as the first entries on the shipping papers, be designated by an "X" (or "RQ") in the hazardous material column, ***or*** be highlighted in a contrasting color.

NRC Contacts: John Cook, (301) 415-8521 Earl Easton, (301) 415-8520

Hazard Communications for Class 7 (Radioactive) Materials

Marking Packages (49 CFR 172.300-338)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

Markings Always Required Unless Excepted	Additional Markings Sometimes Required	Optional Markings
Non-Bulk Packages • Proper shipping name • U.N. identification number • Name and address of consignor or consignee, *unless*: highway only and no motor carrier transfers; *or* part of carload or truckload lot or freight container load, and entire contents of railcar, truck, or freight container are shipped from one consignor to one consignee [see §172.301(d)]	**Materials-Based Requirements** • If in excess of 110 lbs (50 kg), Gross Weight • If non-bulk *liquid* package, underlined double arrows indicating upright orientation (two opposite sides) [ISO Std 780-1985 marking]  • If a Hazardous substance in non-bulk package, the letters "RQ" in association with the proper shipping name **Package-Based Requirements** • The package type if Type A or Type B (½" or greater letters) • The specification-required markings [e.g., for Spec. 7A packages: "DOT 7A Type A" and "Radioactive Material" (see §178.350-353)] • For approved packages, the certificate ID number (e.g., USA/9166/B(U), USA/9150/B(U)-85, ...) • If Type B, the trefoil (radiation) symbol per Part 172 App. B [*size*: outer radius ≥ 20 mm (0.8 in)] • For NRC certified packages, the model number, gross weight, and package ID number (10 CFR 71.85) **Administrative-Based Requirements** • If a DOT exemption is being used, "DOT-E" followed by the exemption number • If an export shipment, "USA" in conjunction with the specification markings or certificate markings	• "IP-1," "IP-2," or "IP-3" on industrial packaging is recommended • Both the name and address of consignor and consignee are recommended • Other markings (e.g., advertising) are permitted, but must be sufficiently away from required markings and labeling
Bulk Packages (i.e., net capacity greater than 119 gallons as a receptacle for liquid, or 119 gallons and 882 pounds as a receptacle for solid, or water capacity greater than 1000 lbs, with no consideration of intermediate forms of containment) • U.N. identification number, on orange, rectangular panel (see §172.332) - some exceptions exist		

Some Special Considerations/Exceptions for Marking Requirements

- Marking is required to be: (1) durable, (2) printed on a package, label, tag, or sign, (3) unobscured by labels or attachments, (4) isolated from other marks, and (5) be representative of the hazmat contents of the package.
- Limited Quantity (§173.421) packages and Articles Containing Natural Uranium and Thorium (§173.426) must bear the marking "radioactive" on the outside of the inner package or the outer package itself, and are excepted from other marking. The excepted packages shipped under UN 2910 must also have the accompanying statement that is required by §173.422.
- Empty (§173.428) and Radioactive Instrument and Article (§173.424) packages are excepted from marking.
- Shipment of LSA or SCO required by §173.427 to be consigned as exclusive use are excepted from marking except that the exterior of each nonbulk package must be marked "**Radioactive-LSA**" or "**Radioactive-SCO**," as appropriate. Examples of this category are domestic, strong-tight containers with less than an A_2 quantity, and domestic NRC certified LSA/SCO packages using 10 CFR 71.52.
- For bulk packages, marking may be required on more than one side of the package (see 49 CFR 172.302(a)).

Hazard Communications for Class 7 (Radioactive) Materials

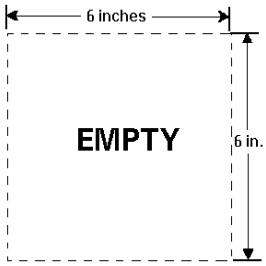
Labeling Packages (49 CFR 172.400-450)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

Placement of Radioactive Labels

- Labeling is required to be: (1) placed near the required marking of the proper shipping name, (2) printed or affixed to the package surface (not the bottom), (3) in contrast with its background, (4) unobscured by markings or attachments, (5) within color, design, and size tolerance, and (6) representative of the HAZMAT contents of the package.
- For labeling of radioactive materials packages, two labels are required on opposite sides excluding the bottom.

Determination of Required Label

Size: *Sides:* ≥ 100 mm (3.9 in.) *Border:* 5-6.3 mm (0.2-0.25 in.)	 49 CFR 172.436	 49 CFR 172.438	 49 CFR 172.440	 49 CFR 172.450
Label	**WHITE-I**	**YELLOW-II**	**YELLOW-III**	**EMPTY LABEL**
Required when:	Surface radiation level < 0.005 mSv/hr (0.5 mrem/hr)	0.005 mSv/hr (0.5 mrem/hr) < surface radiation level ≤ 0.5 mSv/hr (50 mrem/hr)	0.5 mSv/hr (50 mrem/hr) < surface radiation level ≤ 2 mSv/hr (200 mrem/h) [Note: 10 mSv/hr (1000 mrem/hr) for exclusive-use closed vehicle (§173.441(b)]	The EMPTY label is required for shipments of empty Class 7 (radioactive) packages made pursuant to **§173.428**. It must cover any previous labels, or they must be removed or obliterated.
Or:	TI = 0 [1 meter dose rate < 0.0005 mSv/hr (0.05 mrem/hr)]	TI ≤ 1 [1 meter dose rate < 0.01 mSv/hr (1 mrem/hr)]	TI ≤ 10 [1 meter dose rate < 0.1 mSv/hr (10 mrem/hr)] [Note: There is no *package* TI limit for exclusive-use]	
Notes:	• Any package containing a Highway Route Controlled Quantity (HRCQ) **must bear YELLOW-III label** • Although radiation level transport indices (TIs) are shown above, for fissile material, the TI is typically determined on the basis of criticality control			

Content on Radioactive Labels

RADIOACTIVE Label must contain (entered using a durable, weather-resistant means):

(1) The radionuclides in the package (with consideration of available space). Symbols (e.g., Co-60) are acceptable.
(2) The activity in SI units (e.g., Bq, TBq), or both SI units with customary units (e.g., Ci, mCi) in parenthesis. However, for domestic shipments, the activity *may* be expressed in terms of customary units only, until 4/1/97.
(3) The Transport Index (TI) in the supplied box. The TI is entered *only* on YELLOW-II and YELLOW-III labels.

Some Special Considerations/Exceptions for Labeling Requirements
• For materials meeting the definition of another hazard class, labels for each secondary hazard class need to be affixed to the package. The subsidiary label *may* not be required on opposite sides, and must not display the hazard class number. • Radioactive Material, excepted packages, under UN2910 (e.g., Limited Quantity, Empty packages, and Radioactive Instrument and Article), are excepted from labeling. However, if the excepted quantity meets the definition for another hazard class, it is re-classed for that hazard. Hazard communication requirements for the other class are required. • Labeling exceptions exist for shipment of LSA or SCO required by § 173.427 to be consigned as exclusive use. • The “Cargo Aircraft Only” label is typically required for radioactive materials packages shipped by air [§ 172.402(c)].

Hazard Communications for Class 7 (Radioactive) Materials

Placarding Vehicles (49 CFR 172.500-560)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials.

Visibility and Display of Radioactive Placard

- Placards are required to be displayed:
  - On four sides of the vehicle;
  - Visible from the direction they face, (for the front side of trucks, tractor-front, trailer, or both are authorized);
  - Clear of appurtenances and devices (e.g., ladders, pipes, tarpaulins);
  - At least 3 inches from any markings (such as advertisements) which may reduce placard's effectiveness;
  - Upright and on-point such that the words read horizontally;
  - In contrast with the background, or have a lined-border which contrasts with the background;
  - Such that dirt or water from the transport vehicle's wheels will not strike them;
  - Securely attached or affixed to the vehicle, or in a holder.
- Placard must be maintained by carrier to keep color, legibility, and visibility.

Conditions Requiring Placarding

- Placards are required for any vehicle containing a package with a RADIOACTIVE Yellow-III label.
- Placards are required for shipment of LSA or SCO required by §173.427 to be consigned as exclusive use. Examples of this category are domestic, strong-tight containers with less than an A_2 quantity, and domestic NRC certified LSA/SCO packages using 10 CFR 71.52. Also, for bulk packages of these materials, the orange panel marking with the UN Identification number is not required.
- Placards are required for any vehicle containing a package with a Highway Route Controlled Quantity (HRCQ). In this case, the placard must be placed in a square background as shown below (see §173.507(a)).

Radioactive Placard

Size Specs: *Sides:* ≥ 273 mm (10.8 in.) *Solid line Inner border:* About 12.7 mm (0.5 in.) from edges *Lettering:* ≥ 41 mm (1.6 in.) *Square for HRCQ:* 387mm (15.25 in.) outside length by 25.4 mm (1 in.) thick			
	49 CFR 172.556	IAEA SS 6 (1985) paras. 443-444	See 49 CFR 172.527 AND 556
	RADIOACTIVE PLACARD (Domestic) *Base of yellow solid area:* 29 ± 5 mm (1.1 ± 0.2 in.) above horizontal centerline	**RADIOACTIVE PLACARD (International)**	**RADIOACTIVE PLACARD FOR HIGHWAY ROUTE CONTROLLED QUANTITY** (either domestic or international placard could be in middle)

Some Special Considerations/Exceptions for Placarding Requirements

- Domestically, substitution of the UN ID number for the word “RADIOACTIVE” on the placard is prohibited for Class 7 materials. However, some import shipments may have this substitution in accordance with international regulations.
- Bulk packages require the orange, rectangular panel marking containing the UN ID number, which must be placed adjacent to the placard (see §172.332) [NOTE: except for LSA/ SCO exclusive use under §173.427, as above].
- If placarding for more than one hazard class, subsidiary placards must not display the hazard class number. Uranium Hexaflouride (UF_6) shipments $\geq$ 454 kg (1001 lbs) require both RADIOACTIVE and CORROSIVE (Class 8) placarding.
- For shipments of radiography cameras in convenience overpacks, if the overpack does not require a RADIOACTIVE – YELLOW III label, vehicle placarding is not required (regardless of the label which must be placed on the camera).

Package and Vehicle Contamination Limits (49 CFR 173.443)

This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials

NOTE: All values for contamination in DOT rules are to be averaged over each 300 cm^2
Sufficient measurements must be taken in the appropriate locations to yield representative assessments

$\beta\gamma$ means the sum of beta emitters, gamma emitters, and low-toxicity alpha emitters
" means the sum of all other alpha emitters (i.e., other than low-toxicity alpha emitters)

The Basic Contamination Limits for All Packages: 49 CFR 173.443(a), Table 11	General Requirement: Non-fixed (removable) contamination must be kept as low as reasonably achievable (ALARA)
	$\beta\gamma$: 0.4 Bq/cm^2 = 40 Bq/100 cm^2 = 1x10^{-5} µCi/cm^2 = 2200 dpm/100 cm^2
	α: 0.04 Bq/cm^2 = 4 Bq/100 cm^2 = 1x10^{-6} µCi/cm^2 = 220 dpm/100 cm^2

The following exceptions and deviations from the above basic limits exist:

Deviation from Basic Limits	**Regulation 49 CFR §§**	**Applicable Location and Conditions Which must Be Met:**
10 times the basic limits	173.443(b) and 173.443(c) Also see 177.843 (highway)	On any external surface of a package in an exclusive use shipment, during transport including end of transport. Conditions include: • Contamination levels at beginning of transport must be below the basic limits. • Vehicle must not be returned to service until radiation level is shown to be ≤ 0.005 mSv/hr (0.5 mrem/hr) at any accessible surface, and there is no significant removable (non-fixed) contamination.
10 times the basic limits	173.443(d) Also see 177.843 (highway)	On any external surface of a package, at the beginning or end of transport, if a closed transport vehicle is used, solely for transporting radioactive materials packages. Conditions include: • A survey of the interior surfaces of the empty vehicle must show that the radiation level at any point does not exceed 0.1 mSv/hr (10 mrem/hr) at the surface, or 0.02 mSv/hr (2 mrem/hr) at 1 meter (3.3 ft). • Exterior of vehicle must be conspicuously stenciled, "For Radioactive Materials Use Only" in letters at least 76 mm (3 inches) high, on both sides. • Vehicle must be kept closed except when loading and unloading.
100 times the basic limits	173.428	**Internal** contamination limit for excepted package-empty packaging, Class 7 (Radioactive) Material, shipped in accordance with 49 CFR 173.428. Conditions include: (1) The basic contamination limits (above) apply to **external** surfaces of package. (2) Radiation level must be ≤ 0.005 mSv/hr (0.5 mrem/hr) at any external surface. (3) Notice in §173.422(a)(4) must accompany shipment. (4) Package is in unimpaired condition & securely closed to prevent leakage. (5)Labels are removed, obliterated, or covered, and the "empty" label (§172.450) is affixed to the package.

In addition, after any incident involving spillage, breakage, or suspected contamination, the modal-specific DOT regulations (§177.861(a), highway; §174.750(a), railway; and §175.700(b), air) specify that vehicles, buildings, areas, or equipment have "no significant removable surface contamination" before being returned to service or routinely occupied. The carrier must also notify offeror at the earliest practicable moment after incident.

Appendix K

STRAIGHT BILL OF LADING

ORIGINAL — NOT NEGOTIABLE

Shipper No. _____

Carrier No _____

Date _____

Page 1 of 1

(Name of carrier) (SCAC)

TO: Consignee Builders, Inc. **

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec. 1.

Street 5678 Jefferson Davis Highway **

Destination Arlington, VA** Zip Code 22222**

FROM: Shipper Moisture Density Measurements, Inc. **

Street 1234 A Street, NW **

Origin Washington, DC 20000**

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class, Identification Number (UN or NA) per 172.101, 172.202, 172.203	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1	RQ	Radioactive material, special form				
		n.o.s. 7 UN2974				
		0.41GBq (11 mCi) Cs-137 and				
		1.9GBq (50 mCi) Am-241:Be	2.31 GBq			
			(61 mCi)			
		RADIOACTIVE - YELLOW II				
		TI = 0.4 **				
		USDOT 7A TYPE A				
		Emergency Response Telephone No.: 1-800-000-0000 (24 hr/d)**				
		** SUBSTITUTE APPROPRIATE INFORMATION FOR				
		YOUR GAUGE AND YOUR SHIPMENT				

PLACARDS TENDERED: YES ☐ NO ☐

REMIT C.O.D. TO: ADDRESS

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 _____

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 ~~rail~~ highway ~~water~~ according to applicable INTERNATIONAL and NATIONAL GOVERNMENT REGULATIONS.
John Jones Signature

COD Amt: $

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.
_____ Signature of Consignor

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

TOTAL CHARGES: $

FREIGHT CHARGES: PREPAID (Prepaid when box is left blank) ☐ Check box if charges are to be collect

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 (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this 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 and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

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

PER

CARRIER

PER

DATE

1

Permanent post office address of shipper.

STYLE F65 LABELMASTER Div. of Franconian Labelmark Co., Chicago, IL 60648 312/478-0900

Appendix L

Sample Portable Gauge License

NRC FORM 374

U.S. NUCLEAR REGULATORY COMMISSION

PAGE 1 OF 5 PAGES

CORRECTED COPY

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Moisture Density Measurements, Inc.	3. License number 99-0000-01
2. 1234 Main Street Washington, DC 20001	4. Expiration date May 31, 2010 5. Docket No. 030-0000 Reference No.

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Cesium 137	A. Sealed sources [insert manufacturer name] Model No. [insert model number]	A. No single source to exceed the maximum activity specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State
B. Americium 241	B. Sealed neutron sources [insert manufacturer name] Model No. [insert model number]	B. No single source to exceed the maximum activity specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State

9. Authorized use:

A. and B. In [insert manufacturer name] Model No. [insert model number] portable gauging devices for measuring physical properties of materials.

SAMPLE

NRC FORM 374A	U.S. NUCLEAR REGULATORY COMMISSION	PAGE 2 of 5 PAGES
		License Number 99-00000-01
MATERIALS LICENSE **SUPPLEMENTARY SHEET**		Docket or Reference Number 030-00000
CORRECTED COPY		

CONDITIONS

10. Licensed material may be used or stored at the licensee's facilities located at _____ and may be used at temporary job sites of the licensee anywhere in the United States where the U.S. Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material.

    [THE ABOVE CONDITION IS USED FOR NON-FEDERAL ENTITIES. THE FOLLOWING CONDITION IS USED FOR FEDERAL ENTITIES.]

OR

    Licensed material may be used or stored at the licensee's facilities located at _____ and may be used at temporary job sites of the licensee anywhere in the United States.

11. Licensed material shall only be used by, or under the supervision and in the physical presence of, individuals who have received the training described in the (application/letter) dated fill in date.

12. The Radiation Safety Officer for this license is _____.

13.. 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 10 CFR 30.35(d), 40.36(b), and 70.25(d) for establishing financial assurance for decommissioning.

[THE ABOVE CONDITION IS NOT USED IF THE APPLICANT PROVIDES EVIDENCE OF FINANCIAL ASSURANCE.]

14. A. Sealed sources shall be tested for leakage and/or contamination at intervals not to exceed the intervals specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or by an Agreement State.

    B. In the absence of a certificate from a transferor indicating that a leak test has been made within the intervals specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or by an Agreement State prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.

    C. Sealed sources need not be tested if they are in storage and are not being used. However, when they are removed from storage for use or transferred to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

SAMPLE

NRC FORM 374A	U.S. NUCLEAR REGULATORY COMMISSION	PAGE 3 of 5 PAGES
		License Number 99-00000-01
MATERIALS LICENSE **SUPPLEMENTARY SHEET**		Docket or Reference Number 030-00000
CORRECTED COPY		

D. The leak test shall be capable of detecting the presence of 0.005 microcurie (185 becquerels) of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie (185 becquerels) or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission in accordance with 10 CFR 30.50(c)(2) and the source shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations.

E. Tests for leakage and/or contamination shall be performed by persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services. In addition, the licensee is authorized to collect leak test samples but not perform the analysis; analysis of leak test samples must be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

[SECTION "E" ABOVE IS USED IF THE LICENSEE IS NOT AUTHORIZED TO PERFORM LEAK TEST ANALYSIS. THE FOLLOWING SECTION "E" IS USED IF THE LICENSEE IS AUTHORIZED TO COLLECT AND ANALYZE LEAK TEST SAMPLES.]

E. Tests for leakage and/or contamination shall be performed by the licensee or other persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services. In addition, the licensee is authorized to collect leak test samples for analysis by persons specifically licensed by the Commission or an Agreement State to perform such services.

F. Records of leak test results shall be kept in units of microcuries and shall be maintained for 3 years.

15. Sealed sources or source rods containing licensed material shall not be opened or sources removed or detached from source rods or gauges by the licensee, except as specifically authorized.

16. The licensee shall conduct a physical inventory every six months, or at other interval approved by the U.S. Nuclear Regulatory Commission, to account for all sealed sources and/or devices received and possessed under the license.

17. Except for maintaining labeling as required by 10 CFR Part 20 or 71, the licensee shall obtain authorization from the U.S. Nuclear Regulatory Commission 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 Registration Certificates issued either by the Commission pursuant to 10 CFR 32.210 or by an Agreement State.

18. Each portable nuclear gauge 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 or its container must be locked when in transport, storage or when not under the direct surveillance of an authorized user.

SAMPLE

NRC FORM 374A	U.S. NUCLEAR REGULATORY COMMISSION	PAGE 4 of 5 PAGES
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CORRECTED COPY		

19. Any cleaning, maintenance, or repair of the 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 U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

[THE ABOVE CONDITION IS USED IF THE LICENSEE IS NOT AUTHORIZED TO PERFORM NON-ROUTINE MAINTENANCE. THE FOLLOWING CONDITION IS USED IF THE LICENSEE IS AUTHORIZED TO PERFORM NON-ROUTINE MAINTENANCE.]

20. The licensee may detach the source or source rod from gauges for the purpose of cleaning, maintenance, or repair of the gauges in accordance with procedures outlined in the (application/letter) (dated/received) fill in date.

21. A. If the licensee uses unshielded sealed sources extended more than 3 feet below the surface, the licensee shall use surface casing that extends from the lowest depth to 12 inches above the surface and other appropriate procedures to reduce the probability of the source or probe becoming lodged below the surface. If it is not feasible to extend the casing 12 inches above the surface, the licensee shall implement procedures to ensure that the cased hole is free of obstruction before making measurements.

    B. If a sealed source or a probe containing sealed sources becomes lodged below the surface and it becomes apparent that efforts to recover the sealed source or probe may not be successful, the licensee shall notify the U.S. Nuclear Regulatory Commission and submit the report required by 10 CFR 30.50(b)(2) and (c). The licensee shall not abandon the sealed source or probe without obtaining the Commission's prior written consent.

22. The licensee is authorized to transport licensed material only in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

SAMPLE

NRC FORM 374A U.S. NUCLEAR REGULATORY COMMISSION	PAGE 5 of 5 PAGES
MATERIALS LICENSE **SUPPLEMENTARY SHEET**	License Number 99-00000-01
	Docket or Reference Number 030-00000
CORRECTED COPY	

23. Except as specifically provided otherwise in 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. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

    A. Application dated (insert date)
    B. Letter dated (insert date)

SAMPLE

For the U.S. Nuclear Regulatory Commission

Date _____ By _____

Division of Nuclear Materials Safety
Region I
King of Prussia, Pennsylvania 19406

Appendix M

Review Checklist for Portable Gauge Application

ITEM 1: ACTION TYPE

ACTION TYPE:	ADMINISTRATIVE REVIEW:
❒ New ❒ Amendment ❒ Renewal	❒ Current Guidance Used ❒ References in Application Based On Current Regulations

ITEM 2: LEGAL IDENTITY

NAME:	

ITEMS 2 AND 3: ADDRESS

STORAGE & LOCATION OF USE	MAILING ADDRESS
Temporary Job Sites ❒ YES ❒ NO	

ITEM 4: PERSON TO BE CONTACTED ABOUT THIS APPLICATION

CONTACT PERSON:	
TELEPHONE:	

ITEMS 5 AND 6: MATERIALS TO BE POSSESSED AND USES

Yes	No	Radioisotope	Model No.	Quantity	Use As Listed on SSD Certificate	Specify Other Uses Not Listed on SSD Certificate
		Cesium-137	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in Sealed Source and Device Registration (SSDR) Certificate	Yes ❒ Specific description of the gauge use: _____ _____ _____ _____ _____ _____	❒ Not applicable _____ ❒ Uses are:
		Americium-241	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in SSDR Certificate	Yes ❒ Specific description of the gauge use: _____ _____ _____ _____ _____ _____	❒ Not applicable _____ ❒ Uses are:
		Californium-252	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in SSDR Certificate	Yes ❒ Specific description of the gauge use: _____ _____ _____ _____ _____ _____	❒ Not applicable _____ ❒ Uses are:

Yes	No	Radioisotope	Model No.	Quantity	Use As Listed on SSD Certificate	Specify Other Uses Not Listed on SSD Certificate
		Other Isotope (Specify):	Sealed source manufacturer or distributor and model number: _____ Device manufacturer or distributor and model number: _____	Not to exceed either the maximum activity per source or maximum activity per device as specified in SSDR Certificate	Yes ❒ Specific description of the gauge use: _____ _____ _____ _____ _____ _____	❒ Not applicable _____ ❒ Uses are:
Financial Assurance Required and Evidence of Financial Assurance Provided						

ITEMS 7 THROUGH 11: TRAINING AND EXPERIENCE, FACILITIES AND EQUIPMENT, RADIATION SAFETY PROGRAM, AND WASTE MANAGEMENT

ITEM NUMBER AND TITLE	SUGGESTED RESPONSE	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
ITEM 7 INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE – RADIATION SAFETY OFFICER NAME_____	Before obtaining licensed materials, the proposed RSO will have successfully completed one of the training courses described in Criteria in the section entitled "Individual(s) Responsible for Radiation Safety Program and Their Training and Experience – Radiation Safety Officer" in NUREG-1556, Vol. 1, dated September 2001. ***Optional Response*** Criteria for Acceptable Training Courses for Radiation Safety Officer/Portable Gauge Users Course Content • 1.5 to 2 hours of radiation safety and regulatory requirements; • 1.5 to 2 hours practical explanation of gauge theory and operation (including test runs). Course Examination • 25- to 50-question written (closed book) test – 70 percent grade. Course Instructor Qualifications • Bachelor's degree in a physical or life science or engineering with successful completion of both a portable gauge user course and 8-hour radiation safety course and 8 hours hands-on of experience with portable gauges. **OR**				

ITEM NUMBER AND TITLE	SUGGESTED RESPONSE	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
ITEM 7 (CONTINUED)	• An individual with the following training: — Successful completion of portable gauge user course; — Successful completion of 40-hour radiation safety course; — 30 hours of hands-on experience with portable gauges.				
ITEM 8 TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS	Before using licensed materials, authorized users will have successfully completed one of the training courses described in Criteria in the section entitled "Training for Individuals Working In or Frequenting Restricted Areas" in NUREG-1556, Vol. 1, Rev. 1, dated September 2001. ***Optional Response*** Review optional response against criteria listed under Item 7.				
ITEM 9 FACILITIES AND EQUIPMENT	No information needs to be submitted in response to this item; key issues are addressed under "Radiation Safety Program – Public Dose" and "Radiation Safety Program – Operating and Emergency Procedures."	Separate Item 9 Response Need Not Be Submitted With Application			
ITEM 10 RADIATION SAFETY PROGRAM – AUDIT PROGRAM	The applicant is *not* required to, and should not, submit its audit program to NRC for review during the licensing phase.	Need Not Be Submitted With Application			
ITEM 10 RADIATION SAFETY PROGRAM – TERMINATION OF ACTIVITIES	The applicant is *not* required to submit a response to the termination of activities section during the initial application. However, when the license expires or at the time the licensee ceases operations, NRC Form 314 must be submitted.	Need Not Be Submitted With An Individual With the Following Training			
ITEM 10 RADIATION SAFETY PROGRAM – INSTRUMENTS	We will either possess and use, or have access to and use, a radiation survey meter that meets the Criteria in the section entitled "Radiation Safety Program – Instruments" in NUREG-1556, Vol. 1, Rev. 1, dated September 2001, in the event of an incident. ***Optional Response*** A radiation survey meter should satisfy the following criteria: • Be capable of detecting gamma radiation; • Be checked for functionality before use.				

ITEM NUMBER AND TITLE	SUGGESTED RESPONSE	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
ITEM 10 RADIATION SAFETY PROGRAM – 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. ***Optional Response*** Frequency and procedures to ensure no gauge is lost, stolen or misplaced, and if possession exceeds threshold, comply with financial assurance requirements in 10 CFR 30.35.				
ITEM 10 RADIATION SAFETY PROGRAM – OCCUPATIONAL DOSIMETRY	Either we will maintain, for inspection by NRC, documentation demonstrating that unmonitored individuals are not likely to receive a radiation dose in excess of 10 percent of the allowable limits in 10 CFR Part 20 or we will provide dosimetry processed and evaluated by an NVLAP-approved processor that is exchanged at a frequency recommended by the processor. ***Optional Response*** Alternative response demonstrates compliance with 10 CFR Part 20 requirements.				
ITEM 10 RADIATION SAFETY PROGRAM – PUBLIC DOSE	The applicant is *not* required to submit a response to public dose section during the licensing phase. This matter will be examined during an inspection.	Need Not Be Submitted With Application			

ITEM NUMBER AND TITLE	SUGGESTED RESPONSE	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
ITEM 10 RADIATION SAFETY PROGRAM – OPERATING & EMERGENCY PROCEDURES	We will implement and maintain the operating and emergency procedures in Appendix H of NUREG-1556, Vol. 1, Rev. 1, dated September 2001 and provide copies of these procedures to all gauge users and at each job site. **OR** Operating and emergency procedures will be developed, implemented, and maintained and will meet the criteria in the section entitled "Radiation Safety Program – Operating and Emergency Procedures" in NUREG-1556, Vol. 1, Rev. 1, dated September 2001. ***Optional Response*** • Instructions to use gauge and perform routine maintenance per manufacturer's recommendations and instructions; • Instructions to maintain security during storage and transportation; • Instructions to keep the gauge 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 damaged gauge; • Steps to take, and whom to contact, when a gauge has been damaged; • If gauges are used for measurements greater than 3 feet beneath the surface: use of surface casing or other procedures to ensure free movement of source in hole; instructions, procedures to retrieve a stuck source; NRC reporting requirements; • Copies provided to personnel and available at each job site.				

ITEM NUMBER AND TITLE	SUGGESTED RESPONSE	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
ITEM 10 RADIATION SAFETY PROGRAM – LEAK TEST	Leak tests will be performed at intervals approved by NRC or an Agreements State and will be specified in the SSDR Sheet. Leak tests will be performed by an organization authorized by NRC or an Agreement State to provide leak testing services for other licensees or using a leak test kit supplied by an organization authorized by NRC or an Agreements State to provide leak test kits to other licensees and according to the kit supplier's instructions. ***Optional Response*** Provide the information in Appendix J supporting a request to perform leak testing and sample analysis: • Individual who will make the analysis; qualifications to make quantitative measurements; • Leak test frequency as specified in the appropriate SSDR Sheet; • How and where test samples taken; materials to be used; methods of handling samples to prevent or minimize exposure to personnel; • Type of instrument(s) used, counting efficiency, and minimum levels of detection for each radionuclide. ***Note:*** *An instrument capable of making quantitative measurements should be used; hand-held survey meters will not normally be considered adequate for measurements.* • Standard calibration sources including for each: the radionuclide, quantity, accuracy, and traceability to primary radiation standards; ***Note:*** *Accuracy of standards should be within ±5 percent of the stated value and traceable to a primary radiation standard such as those maintained by the National Institutes of Standards and Technology (NIST).* • Sample calculation to convert measurement data to becquerels (or microcuries); • Instructions on actions, notifications regarding leaking source.				

ITEM NUMBER AND TITLE	SUGGESTED RESPONSE	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
ITEM 10 RADIATION SAFETY PROGRAM – MAINTENANCE	*Routine Cleaning and Lubrication* We will implement and maintain procedures for routine maintenance of our gauges according to each manufacturer's recommendations and instructions. ***Optional Response*** • Considers ALARA; • Ensures gauge functions as designed; • Ensures source integrity not compromised. *Non-Routine Maintenance* We will send the gauge to the manufacturer or other person authorized by 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. ***Optional Response*** Provide the information listed in Appendix G supporting a request to perform non-routine maintenance in-house. • Types of work to be performed; • Who will perform maintenance, training, experience, why competent; • Handling procedures: doses to public, personnel ALARA and regulatory limits; security; posting; manufacturing instructions and recommendations; • Use of whole-body and extremity monitoring or evaluation to demonstrate that individuals are not likely to receive greater than 10 percent of allowable limits; • Possess survey instrument (detects gamma radiation; range 1-50 mrem/hr; annual calibration w/point source at 2 points/scale; readings within $\pm$20 percent; calibrated by NRC/Agreement State licensee; checked before use); • 10 CFR 20.1301 surveys (when and where instrument survey performed, records for 3 years).				

ITEM NUMBER AND TITLE	SUGGESTED RESPONSE	APPLICANT'S RESPONSE			
		YES	NO	OTHER	
				YES	NO
ITEM 10 RADIATION SAFETY PROGRAM – TRANSPORTATION	The applicant is *not* required to submit a response to transportation section during the licensing process. However, this issue will be reviewed during inspection.	Need Not Be Submitted With Application			
ITEM 11 WASTE DISPOSAL – GAUGE DISPOSAL AND TRANSFER	The applicant is *not* required to submit a response to waste management section during the licensing process. However, the licensee should develop, implement, and maintain gauge transfer and disposal procedures in its radiation safety program.	Need Not Be Submitted With Application			