Commonwealth of Virginia
Radiation Protection Regulatory Guide

Guidance for Portable Gauges

ORH-720 A

Virginia Department of Health
Radioactive Materials Program
109 Governor Street, Room 730
Richmond, VA 23219
Phone (804) 864-8150

EXECUTIVE SUMMARY

Virginia Regulatory Guide (**VAREGS**) are issued to describe and make available to the applicant or licensee acceptable methods of implementing specific parts of **12VAC5-481 'Virginia Radiation Protection Regulations'** to delineate techniques used by the staff in evaluating past specific problems or postulated accidents, and to provide guidance to applicants, licensees, or registrants. VAREGS are not substitutes for **12VAC5-481 'Virginia Radiation Protection Regulations'**; therefore, compliance with them is not required. Methods and solutions different from those set forth in this guide will be acceptable if they provide a basis for the Virginia Department of Health (VDH), Radioactive Materials Program, to determine if a radiation protection program meets the current rule and protects health and safety.

Comments and suggestions for improvements in this VAREG are encouraged at all times and it will be revised, as appropriate, to accommodate comments and to reflect new information or experience. Comments should be sent to **Virginia Department of Health, Radioactive Materials Program, 109 Governor Street, Room 730, Richmond, VA 23219**.

This guide is available on our website: http://www.vdh.virginia.gov/Epidemiology/RadiologicalHealth/.

This VAREG 'Guidance for Portable Gauges' has been developed to streamline the application process for a Portable Gauge license. A copy of the VDH Form, 'Application for Radioactive Material License Authorizing the use of Portable Gauges', is located in **Appendix A** of this guide.

Appendix B through **M** provides examples, models and additional information that can be used when completing the application.

It typically takes 60-90 days for a license to be processed and issued if the application is complete. When submitting the application be sure to include the appropriate application fee listed in **12VAC5-490**.

In summary, the applicant will need to do the following to submit an application for a Portable Gauge license:

- Use this regulatory guide to prepare the VDH Form, 'Application for Radioactive Material License Authorizing the use of Portable Gauges' (**Appendix A**).
- Complete the VDH Form, 'Application for Radioactive Material License Authorizing the use of Portable Gauges' (**Appendix A**). See 'Contents of Application' of the guide for additional information.
- Include any additional attachments.

  All supplemental pages should be on 8 ½" x 11" paper.

Please identify all attachments with the applicant's name and license number (if a renewal).

- Avoid submitting proprietary information unless it is absolutely necessary**.** If submitted, proprietary information and other sensitive information should be clearly identified and a request made to withhold from public disclosure.
- Submit an original signed application along with attachments (if any). This submission can be made via scanned copies forwarded via facsimile or electronic mail or via postal mail of the documents.
- Submit the application fee (for new licensees only).
- Retain one copy of the licensee application and attachments (if any) for your future reference. You will need this information because the license will require that radioactive material be possessed and used in accordance with statements, representation, and procedures provided in the application and supporting documentation.

If you have any questions about the application process, please contact this office at (804) 864-8150.

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ABBREVIATIONS

ALARA	as low as reasonably achievable
ALI	annual limit on intake
bkg	background
Bq	Becquerel
CFR	Code of Federal Regulations
Ci	Curie
cc	centimeter cubed
cm^2	centimeters squared
cpm	counts per minute
DOE	United States Department of Energy
DOT	United States Department of Transportation
dpm	disintegrations per minute
GM	Geiger-Mueller
GPO	Government Printing Office
IN	Information Notice
mCi	millicurie
mR	milliroentgen
mrem	millirem
mSv	millisievert
NIST	National Institute of Standards and Technology
NRC	United States Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OSL	optical stimulated luminescent dosimeters
RG	Regulatory Guide
RQ	Reportable Quantities
RSO	Radiation Safety Officer
SI	International System of Units (abbreviated SI from the French Le Système Internationale d'Unites)
SS&D	Sealed Source and Devices Bulletin Board System (BBS)
SSD	Sealed Source and Device
SSDR	Sealed Source and Device Registration
Sv	Sievert
TEDE	total effective dose equivalent
TLD	thermoluminescent dosimeters
TI	Transportation Index
VDH	Virginia Department of Health
XRF	X-ray Fluorescence Analyzer
µCi	microcurie
%	percent

PURPOSE OF GUIDE

This document provides guidance to an applicant in preparing a license application for a portable gauge license. It also provides guidance on VDH's 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', 'gauging devices', 'devices', and the term 'gauge' may be used interchangeably.

This guide addresses the variety of radiation safety issues associated with portable gauges of many designs. 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 guide describes the information needed to complete VDH Form, 'Application for Radioactive Material License Authorizing the Use of Portable Gauges', (**Appendix A**).

The format for each item number in this guide is as follows:

- **Rule** - references the requirements of **12VAC5-481 'Virginia Radiation Protection Regulations'** applicable to the item;
- **Criteria** - outlines the criteria used to judge the adequacy of the applicant's response; and
- **Discussion** - provides additional information on the topic sufficient to meet the needs of most readers.

The information submitted in the application must be sufficient to demonstrate that proposed equipment, facilities, personnel, and procedures are adequate to protect the health and safety of the citizens of the Commonwealth of Virginia in accordance with agency guidelines. <u>Submission of incomplete or inadequate information will result in delays in the approval process for the license.</u> Additional information will be requested when necessary to ensure that an adequate radiation safety program has been established. Such requests for additional information will delay completion of the application's review and may be avoided by a thorough study of the rule and these instructions prior to submitting the application.

12VAC5-481 'Virginia Radiation Protection Regulations' requires the applicant and/or licensee to develop, document, and implement procedures that will ensure compliance with the rule. The appendices describe radiation protection procedures. Each applicant should read the rule and procedures carefully and then decide if

the procedure addresses specific radiation protection program needs at the applicant's facility. Applicants may adopt a procedure included in this VAREG or they may develop their own procedures to comply with the applicable rule.

In this guide, "dose" or "radiation dose" means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent (TEDE). These terms are defined in the **12VAC5-481-10.** Rem and Sievert (Sv), its SI equivalent (1 rem = 0.01 Sv), are used to describe units of radiation exposure or dose. These units are used because **12VAC5-481 'Virginia Radiation Protection Regulations', Part IV, 'Standards for Protection Against Radiation',** sets dose limits in terms of rem, not rad or roentgen. Furthermore, radioactive materials commonly used in medicine emit beta and photon radiation, for which the quality factor is 1; a useful rule of thumb is an exposure of 1 roentgen is equivalent to an absorbed dose of 1 rad and dose equivalent of 1 rem.

This VAREG provides the latest guidance, shows the requirements in terms of the **12VAC5-481 'Virginia Radiation Protection Regulations',** and provides a user-friendly format to assist with the preparation of a license application.

LICENSES

Applicants should study this document, related guidance, and all applicable regulations carefully before completing the VDH Form, 'Application for Radioactive Material License Authorizing the Use of Portable Gauges' (**Appendix A**). VDH expects licensees to provide requested information on specific aspects of their proposed radiation protection program in attachments to the application. When necessary, VDH may ask the applicant for additional information to gain reasonable assurance that an adequate radiation protection program has been established.

After a license is issued, the licensee must conduct its program in accordance with the following:

- Statements, representations, and procedures contained in the application and in correspondence with VDH;
- Terms and conditions of the license; and
- **12VAC5-481 'Virginia Radiation Protection Regulations'**.

THE 'AS LOW AS IS REASONABLY ACHIEVABLE (ALARA)' CONCEPT

12VAC5-481-630, Radiation protection programs, states that *"each licensee shall develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities"* and *"the licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are...ALARA."* This section also requires that licensees review the content of the radiation protection program and its implementation annually.

Applicants should consider the ALARA philosophy detailed in these reports when developing plans to work with licensed radioactive materials.

WHO REGULATES FACILITIES IN THE COMMONWEALTH OF VIRGINIA?

In the special situation of work at federally controlled sites in the Commonwealth of Virginia, it is necessary to know the jurisdictional status of the land to determine whether the Nuclear Regulatory Commission (NRC) or VDH has regulatory authority. The NRC has regulatory authority over land determined to be under "exclusive federal jurisdiction," while VDH has jurisdiction over non-exclusive federal jurisdiction land (see **Table 1**). Applicants and licensees are responsible for finding out, in advance, the jurisdictional status of the specific areas where they plan to conduct licensed operations. VDH recommends that applicants and licensees ask their local contacts 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 VDH or NRC regulatory requirements, as appropriate. The following table lists examples of regulatory authority.

Table 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 30.12**])	NRC
Non-federal entity in non-Agreement State, U.S. territory, or possession	NRC
Non-federal entity in Virginia at non-federally controlled site	VDH
Non-federal entity in Virginia at federally-controlled site not subject to exclusive federal jurisdiction	VDH
Non-federal entity in Virginia at federally-controlled site subject to exclusive federal jurisdiction	NRC

A current list of Agreement States (states that have entered into agreements with the NRC that give them the authority to license and inspect radioactive material used or possessed within their borders), including names, addresses, and telephone numbers of responsible officials are maintained by the NRC Office of Federal and State Materials and Environmental Management Programs and is available on their website: http://nrc-stp.ornl.gov/.

MANAGEMENT RESPONSIBILITY

VDH endorses the philosophy that effective radiation protection program management is vital to safe operations that comply with VDH regulatory requirements.

"Management" refers to the chief executive officer or other individual having the authority to manage, direct, or administer the licensee's activities or that person's delegate or delegates.

To ensure adequate management involvement, a management representative (i.e., chief executive officer or delegate) must sign the submitted application acknowledging management's commitments to and responsibility for all the following:

- Radiation protection, security and control of radioactive materials, and compliance with rule;
- Knowledge about the contents of the license application;
- Compliance with current VDH and United States Department of Transportation (DOT) regulations and the licensee's operating and emergency procedures;
- Provision of 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;
- Appointment of a qualified individual who has agreed in writing to work as the RSO.

Management may delegate individuals (i.e., an RSO or other designated individual) to submit amendment requests to VDH. A correspondence delegation letter must be completed, signed by management and submitted to VDH. A sample letter has been included in **Appendix M**.

SAFETY CULTURE

Nuclear safety culture is defined as the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment. Individuals and organizations performing regulated activities bear the primary responsibility for safely handling and securing these materials. Experience has shown that certain personal and organizational traits are present in a positive safety culture. A trait, in this case, is a pattern of thinking, feeling, and behaving that emphasizes safety, particularly in goal conflict situations (e.g., production versus safety, schedule versus safety, and cost of the effort versus safety). **Table 2** show traits of a positive nuclear safety culture.

Table 2: Traits of a Positive Nuclear Safety Culture

Trait	Result
Leadership: Safety Values and Actions	Leaders demonstrate a commitment to safety in their decisions and behaviors
Problem Identification and Resolution	Issues potentially impacting safety are promptly identified, fully evaluated, and promptly addressed and corrected commensurate with their significance
Personal Accountability	All individuals take personal responsibility for safety
Evaluating Work Processes	The process of planning and controlling work activities is implemented so that safety is maintained
Continuous Learning	Opportunities to learn about ways to ensure safety are sought out and implemented
Environment for Raising Concerns	A safety conscious work environment is maintained where personnel feel free to raise safety concerns without fear of retaliation, intimidation, harassment, or discrimination
Effective Safety Communications	Communications maintain a focus on safety
Respectful Work Environment	Trust and respect permeate the organization
Questioning Attitude	Individuals avoid complacency and continually challenge existing conditions and activities in order to identify discrepancies that might result in error or inappropriate action

Individuals and organizations performing regulated activities are expected to establish and maintain a positive safety culture commensurate with the safety and security significance of their activities and the nature and complexity of their organizations and functions. This applies to all licensees, holders of quality assurance programs approvals, vendors, and suppliers of safety-related components, and applicants for a license or quality assurance program approval, subject to VDH authority. More information relating to safety culture can be found at: http://www.nrc./about-nrc/regulatory/enforcement/safety-culture.html

APPLICABLE RULE

It is the applicant's or licensee's responsibility to obtain, read, and follow **12VAC5-481 'Virginia Radiation Protection Regulations'**.

The following Parts of **12VAC5-481 'Virginia Radiation Protection Regulations'** contain requirements applicable to Portable Gauge licensees:

- Part I, 'General Provisions'
- Part III, 'Licensing of Radioactive Materials'
- Part IV, 'Standards for Protection Against Radiation'
- Part X, 'Notices, Instructions and Reports to Workers; Inspections
- Part XIII, 'Transportation of Radioactive Material'

For an electronic copy, go to our web site at: http://www.vdh.virginia.gov/Epidemiology/RadiologicalHealth/.

HOW TO FILE

Applicants for a materials license should do the following:

- Be sure to use the most current guidance from VDH in preparing an application.
- Complete VDH Form, 'Application for Radioactive Material License Authorizing the Use of Portable Gauges' (**Appendix A**).
- For each separate sheet, other than 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 on 8 ½ x 11 – inch paper.
- Avoid submitting proprietary information unless it is absolutely necessary. If submitted, proprietary information and other sensitive information should be clearly identified and a request made to withhold from public disclosure.
- Submit an original, signed application. This submission can be made using scanned copies forwarded via facsimile or electronic mail or via postal mail of the documents.
- Retain one copy of the license application for your future reference.

Deviations from the suggested wording of responses as shown in this VAREG or submission of alternative procedures will require a more detailed review.

Note: Personal employee 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 VDH.

WHERE TO FILE

Applicants wishing to possess or use radioactive material in the Commonwealth of Virginia are subject to the requirements of **12VAC5-481 'Virginia Radiation Protection Regulations'** and must file a license application with:

Virginia Department of Health
Radioactive Materials Program
109 Governor Street, Room 730
Richmond, VA 23219

LICENSE FEES

The appropriate fee must accompany each application or license amendment request. Refer to **12VAC5-490** to determine the amount of the fee. VDH will not issue the new license prior to fee receipt. Once technical review has begun, no fees will be refunded. Application fees will be charged regardless of the VDH's disposition of an application or the withdrawal of an application.

Licensees are also subject to annual fees; refer to **12VAC5-490**.

Direct all questions about the VDH's fees or completion of **Item 10** of VDH Form, 'Application for Radioactive Material License Authorizing the Use of Sealed Sources in Portable Gauges' (**Appendix A**) to: **Virginia Department of Health, Radioactive Materials Program, 109 Governor Street, Room 730, Richmond, Virginia 23219** or **(804) 864-8150**.

CONTENTS OF AN APPLICATION

Item 1: Type of Application

Obtain the correct application form for either a new license or a renewal, check the appropriate box and, if appropriate, list the license number for a renewal.

This guide is written to instruct a new licensee in the process of applying for a radioactive material license. Not all discussions will be appropriate to a licensee renewing an existing license.

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.

Notify the agency of changes in mailing address.

The licensee must also provide sufficient information for the agency to ensure the proposed corporation or controlling legal entity is a valid entity. Verification of this identity can be accomplished by submitting a copy of the company's license from the NRC or another Agreement State or a government contract or certification, etc.

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

Timely Notification of Change of Ownership or Control

Rule: 12VAC5-481-330, 12VAC5-481-450, 12VAC5-481-500

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

Discussion: Transfer of control may be the results of mergers, buyouts, or majority stock transfers. Although it is not VDH's intent to interfere with the business decisions of licensees, it is necessary for licensees to obtain prior VDH written consent.

This is to ensure the following:

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

Appendix C identifies the information to be provided about changes of ownership or control.

Notification of Bankruptcy Proceedings

Rule: 12VAC5-481-500

Criteria: 12VAC5-481-500 states: "*Each licensee shall notify the agency in writing immediately following the filing of a voluntary or involuntary petition for bankruptcy under any Chapter of Title 11 (Bankruptcy) of the United States Code by or against: 1. The licensee 2. An entity (as that term is defined in 11 USC §101 (15)) controlling the licensee or listing the license or licensee as property of the estate; or 3. An affiliate (as that term is defined in 11 USC §101 (2)) of the licensee*" and "*...shall indicate the bankruptcy court in which the petition for bankruptcy was filed and the date of filing of the petition*".

Discussion: Even though a licensee may have filed for bankruptcy, the licensee remains responsible for compliance with all regulatory requirements. VDH 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). VDH shares the results of its determinations with other entities involved (e.g., trustees) so that health and safety issues can be resolved prior to completion of bankruptcy proceedings.

Licensee must notify VDH in writing immediately of the filing of a bankruptcy petition.

Item 3: Contact Person

Criteria: Identify the individual who can answer questions about the application and include his or her telephone number. Also include business cell phone numbers and e-mail addresses.

Discussion: This is typically the proposed radiation safety officer, unless the applicant has named a different person as the contact. The agency will contact this individual if there are questions about the application.

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

Item 4: Address(es) Where Licensed Material Will Be Used or Possessed

Rule: **12VAC5-481-450, 12VAC5-481-500**

Criteria: Most applicants need to provide two types of information in response to **Item 4**:

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

Discussion: Specify the street address, city, and state or other descriptive address (such as on Highway 58, 5 miles east of the intersection of Highway 58 and State Route 19, Anytown, VA, Zip) 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 a VDH inspector to find the storage location. **A Post Office Box address is not acceptable.**

Being granted a VDH 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 jobsites (i.e., locations where work is conducted for limited periods of time and from which gauge users are NOT dispatched to jobsites for other customers), specify "*temporary job sites anywhere in Virginia where VDH maintains jurisdiction*". The agency prohibits long-term or routine storage in vehicles or personal residences not listed on the license.

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

Item 5: Radiation Safety Officer (RSO)

Rule: 12VAC5-481-450, 12VAC5-481-630

Criteria: Radiation Safety Officers (RSOs) must have adequate training and experience. The agency will accept successful completion of one of the following as evidence of adequate training and experience:

- Portable gauge manufacturer's course for users or for RSOs
- 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 described in **Appendix E**. The agency requires the name of the RSO on the license to ensure that licensee management has identified a responsible, qualified person and that the named individual knows of his or her designation as RSO.

Note:

- It is important to notify the agency, as soon as possible, of changes in the designation of the RSO**.**
- In the event of a large licensee, a letter may be required delegating responsibility to the individual named as the Radiation Safety Officer by a member of management. A correspondence delegation letter must be completed, signed by management and submitted to VDH. A sample letter has been included in **Appendix M**
- Alternative responses will be reviewed against the criteria listed above.

Item 6: Training for Individuals Working in or Frequenting Restricted Areas

Rule: 12VAC5-481-450, 12VAC5-481-630, 12VAC5-481-840, 12VAC5-481-2260, 12VAC5-481-2270, 12VAC5-481-2280, 12VAC5-481-2310

Criteria: Authorized users (AUs)must have adequate training and experience. The agency finds that successful completion of one of the following as evidence of adequate training and experience:

- Portable gauge manufacturer's course for users
- 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.

Annual radiation safety training must be provided to individuals working in or frequenting restricted areas who receive or are likely to receive 100 mrem per year (**12VAC5-481-2270**).

Notes:

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

Item 7: Radioactive Material

Item 7.1: Sealed Sources and Devices

Rule: 12VAC5-481-440, 12VAC5-481-450, 12VAC5-481-500

Criteria: Licensees will only be authorized for the requested maximum limit of sealed sources and devices registered by the NRC or another Agreement State.

Discussion: A maximum possession limit, per isotope, is required to be requested; this should reflect the total number of sealed sources and devices containing a particular isotope (i.e., Cesium-137) that would ever be possessed at any one time, including inactive sources being held for storage and devices awaiting shipment. This should also include sources and devices expected to be purchased at in the future. This limit is isotope specific (i.e., one limit for Cesium-137 and another for Americium-241) and not allowed to be exceeded; that is, the total of all sources and devices in the licensee's possession cannot exceed this limit. An amendment request must be made and an amended license received prior to obtaining more sources and devices.

Possession limits can be obtained from information provided by the manufacturer; specifically, the activity provided by the manufacturer on the sources and devices the licensee anticipates acquiring. This information will list each isotope with the activity for the source and device. A simple calculation can be performed with this information by totaling the number of each source and device, per isotope, that the licensee expects to possess at any one time. For example; a licensee anticipates possessing three gauges. The manufacturer states that each gauge has a maximum quality of 20 mCi of Cesium-137 and 50 mCi of Americium-241. The licensee is able to perform the simple calculation (20 multiplied by 3 and 50 multiplied by 3) to request a 60 mCi maximum possession limit for Cesium-137 and a 150 mCi maximum possession limit of Americium-241.

Licensees are also required to maintain a limit per device. This is separate from the maximum possession limit; this limit is applied to each source and device itself and is typically determined by the manufacturer's Sealed Source and Device Registration Certificate.

NRC or other Agreement States performs a safety evaluation of gauges before authorizing a manufacturer to distribute the gauges to specific licensees. The safety evaluation is documented in a Sealed Source and Device Registration (SSDR) Certificate, also called an SSDR Sheet. When issuing a portable gauge license, VDH usually provides a generic authorization to allow the licensee to possess and use any sealed source/device combination that has been registered by the NRC or another Agreement State. This method of authorization allows licensees flexibility in obtaining new source/device combinations without having to amend their licenses.

Consult with the proposed supplier to ensure that sources and devices conform to the SSDR Certificates registered with NRC or another 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 VDH's prior permission in a license amendment.

SSDR 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 are specified. Except as specifically approved by VDH, licensees are required to use gauges according to their respective SSDR Certificates. Applicants should obtain a copy of the certificate and review it with the manufacturer, distributor or with the agency, to ensure that they understand and comply with the requirements of the SSDR.

Note*:* If necessary and manufacturer cannot supply the certificate, SSDR certificates are also available by calling the agency at (804) 864-8150.

Item 7.2: Purpose(s) for Which Licensed Material Will Be Used

Rule: 12VAC5-481-440, 12VAC5-481-450, 12VAC5-481-500

Criteria: Proposed activity is authorized by **12VAC5-481 'Virginia Radiation Protection Regulations'** 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 SSDR Certificate, and as authorized on a VDH license.

Discussion: Specifically describe how each device will be used. The typical portable gauge license authorizes use "to measure physical properties of materials." If the gauging device(s) will be used for the purposes listed on the SSD registration certificate, or as recommended by the manufacturer, state this on the application. If the gauging device(s) will be used for purposes other than those listed on the SSD registration certificate or manufacturer's instructions, specify these other purposes and include a safety analysis supporting the request.

Note:

- A VDH license does not relieve a licensee from complying with other applicable federal, state, or local regulations.
- Unusual uses will be evaluated on a case-by-case basis and the authorized use condition will reflect approved uses.

Item 7.3: Financial Assurance and Recordkeeping for Decommissioning

Rule: 12VAC5-481-100, 12VAC5-481-450, 12VAC5-481-500, 12VAC5-481-510, 12VAC5-481-570, 12VAC5-481-571, 12VAC5-481-1161

Criteria: A licensee authorized to possess licensed material in excess of the limits specified in **12VAC5-481-450 C** must meet the requirements for decommissioning financial assurance.

All licensees are required to maintain, in an identified location, records of information important to decommissioning of the facility until the site, or any area, is released for unrestricted use. Licensees must transfer records important to decommissioning either to the new licensee before licensed activities are transferred or assigned in accordance with **12VAC5-481-500** or to VDH before the license is terminated.

Discussion: VDH wants to ensure that decommissioning will be carried out with minimum impact on public and occupational health and safety and the environment. There are two parts to the rule: financial assurance that applies to SOME licensees, and recordkeeping that applies to ALL licensees.

The requirements for financial assurance are specific to the types and quantities of radioactive material authorized on a license. Most portable gauge applicants and licensees do not need to comply with the financial

assurance. The standard portable gauge license needs to specify the maximum number of gauges that the licensee may possess, notification will be made during the review process if financial assurance is required. Implementing 12VAC5-481-450 C will not require changing the possession limit requested. 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.

Reference: NRC Regulatory Guide 3.66, "*Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70 and 72*", is available from the NRC upon request.

Item 8: Facilities and Equipment

Rule: 12VAC5-481-450, 12VAC5-481-500, 12VAC5-481-630, 12VAC5-481-640, 12VAC5-481-720, 12VAC5-481-730, 12VAC5-481-840, 12VAC5-481-850, 12VAC5-481-860, 12VAC5-481-880

Criteria: Facilities and equipment must be adequate to protect health and to minimize danger to life or property.

Discussion: 12VAC5-481-450 A states that an application will be approved if, among other things, the applicant's proposed equipment, facilities, and procedures are adequate to minimize danger to the public's health and safety. **12VAC5-481-840** states that sources of radiation shall be secured against unauthorized removal from the place of storage (using a minimum of two separate tangible barriers) and, when in an unrestricted area and not in storage, shall be under the constant surveillance and immediate control of the licensee or registrant. Refer to **Appendix L** for further security guidance.

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 'Public Dose' and 'Operating and Emergency Procedures'.

Provide the following on the facility diagrams:

- Drawings should be to scale, and indicate the scale used;
- Location, room numbers, and principal use of each room or area where radioactive material is used or stored;
- Location, room numbers, and principal use of each adjacent room (e.g., office, file, toilet, closet, hallway), including areas above, beside, and below; and,
- If multiple locations of storage, indicate address on diagram.

Item 9: Radiation Safety Program

Item 9.1: Audit Program

Rule: 12VAC5-481-450, 12VAC5-481-490, 12VAC5-481-500, 12VAC5-481-630, 12VAC5-481-990

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

- Compliance with the VDH 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) **(12VAC5-481-630)**; 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 the agency. All areas indicated in **Appendix F** may not be applicable to every licensee and may not need to be addressed during each audit.

Currently the agency's emphasis in inspections is to perform actual observations of work in progress. As a part of their audit programs, applicants should consider performing unannounced audits of gauge 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; NRC Information Notice (IN) 96-28, "*Suggested Guidance Relating to Development and Implementation of Corrective Action*", provides guidance on this subject. The agency will review the licensee's audit results and determine if corrective actions are thorough, timely, and sufficient to prevent recurrence. If violations are identified by the licensee and these steps are taken, the agency can exercise discretion and may elect not to cite a violation. The agency's goal is to encourage prompt identification and prompt, comprehensive correction of violations and deficiencies.

With regard to audit records, **12VAC5-481-990** requires licensees to maintain records of audits and other reviews of program content and implementation. The agency 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.

Item 9.2: Termination of Activities

Rule: 12VAC5-481-100, 12VAC5-481-450, 12VAC5-481-500, 12VAC5-481-510, 12VAC5-481-570, 12VAC5-481-571, 12VAC5-481-1161

Criteria: The licensee must do the following:

- Notify the agency, in writing, within 60 days of:
  - The expiration of its license;
  - A decision to permanently cease licensed activity at the entire site or in any separate building or outdoor area if it contains residual radioactivity making it unsuitable for release according to VDH requirements;
  - No principal activities have been conducted at the entire site under the license for a period of 24 months;

- No principal activities have been conducted for a period of 24 months in any separate building or outdoor area if it contains residual radioactivity making it unsuitable for release according to VDH requirements.
- Submit a decommissioning plan, if required by **12VAC5-481-510;**
- Decommissioning, as required by **12VAC5-481-510 & 12VAC5-481-1161;**
- Submit to the agency, a completed VDH form 'Certificate of Disposition of Materials' (**Appendix N)** and demonstrate that the premises are suitable for release for unrestricted use (e.g. results of final survey); and
- Before a license is terminated, send the records important to decommissioning to the agency as required by **12VAC5-481-571**. If licensed activities are transferred or assigned in accordance with **12VAC5-481-500**, 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 under 'Radioactive Materials' on 'Financial Assurance and Record keeping for Decommissioning'.

Licensees must use the VDH Form, 'Certificate of Disposition of Materials' (**Appendix N**) when submitting for termination of a license.

Item 9.3: Instruments

Rule: 12VAC5-481-450, 12VAC5-481-490, 12VAC5-481-630, 12VAC5-481-640, 12VAC5-481-720, 12VAC5-481-750, 12VAC5-481-1000

Criteria: A radiation survey meter should:
- Be capable of detecting gamma radiation
- Be calibrated on an interval not to exceed 12 months and after each instrument servicing.
- 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.

Portable gauges licensees are required by **12VAC5-481-450 A** to have equipment, facilities, and procedures which are adequate to minimize danger to public health and safety. VDH requires that a calibrated radiation survey instrument be available when a portable gauge is used.

Note: Prior to non-routine maintenance that requires removing the source or source rod from the gauge a calibrated and operable radiation survey instrument will be required.

Item 9.4: Material Receipt and Accountability

Rule: 12VAC5-481-100, 12VAC5-481-450, 12VAC5-481-490, 12VAC5-481-500, 12VAC5-481-570, 12VAC5-481-571, 12VAC5-481-630, 12VAC5-481-840, 12VAC5-481-900, 12VAC5-481-980, 12VAC5-481-1090, 12VAC5-481-3091, 12VAC5-481-3100

Criteria: Licensees must do the following:
- Develop procedures for ordering and safely opening packages of licensed material;
- 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: 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 **12VAC5-481-450 C**.

'Cradle to Grave' accountability refers to maintaining the radioactive material from the moment it becomes a part of your organization (receipt of, creation, etc) through performing the physical inventories (ensuring the material's location, etc) until it leaves your organization (through transfer, return to manufacturer/distributor, or disposal to properly licensed facility).

Maintain inventory records that contain the following types of information:

- Radionuclide and amount (in units of Bq or curies) of radioactive material in each sealed source;
- Manufacturer's name, model number, and serial number of each sealed source;
- Manufacturer's name, model number, and serial number of each device;
- Location of each sealed source and device;
- Date of the inventory; and
- Name of individual performing inventory; and
- For materials transferred or disposed of, the date of the transfer or disposal, name and license number of the recipient, description of the affected radioactive material (e.g., radionuclide, activity, manufacturer's (or distributor's) name and model number, serial number).

Maintain a utilization log that contains the following types of information:

- Date(s) of use;
- Name(s) of the authorized users who will be responsible for the gauge;
- Temporary jobsite(s) where the gauge will be used.
- Log the gauge into the utilization log when it is returned to storage.

Item 9.5: Occupational Dosimetry

Rule: 12VAC5-481-630, 12VAC5-481-640, 12VAC5-481-700, 12VAC5-481-710, 12VAC5-481-750, 12VAC5-481-760, 12VAC5-481-770, 12VAC5-481-1040, 12VAC5-481-1130, 12VAC5-481-1140, 12VAC5-481-2280

Criteria: Applicants must do either of the following:

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

OR

- Maintain, for inspection by the agency, 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 as shown in **Table 3**.

Discussion: Under conditions of routine use, a personnel monitoring device (dosimetry) is not required. However a written evaluation demonstrating that users are not likely to exceed 10 percent of the applicable

limits as shown in **Table 3** is required. **Appendix I Part 1** provides guidance on preparing this written evaluation.

Licensees should reevaluate need for dosimetry upon significant program changes.

Licensees providing dosimetry should use either film badges or optically stimulated luminescent (OSLs) that are supplied by an NVLAP-approved processor. The exchange frequency for film badges is usually monthly due to technical concerns about film fading. Applicants should verify that the processor is NVLAP-approved. Consult the NVLAP-approved processor for its recommendations for exchange frequency and proper use.

Licensees requesting authorization for non-routine maintenance must provide users dosimetry.

Table 3: Occupational Dose Limits For Adults

Occupational Dose Limits for Adults (12VAC5-481-640)	
Body Location	Dose (Annual)
Total Effective Dose Equivalent (TEDE)	5 Rem (0.05 Sv)
Dose to the skin of the whole body or any extremity*	50 Rem (0.5 Sv)
Dose to lens of the eyes	15 Rem (0.15 Sv)
*Extremities includes the arms below the elbows and the legs below the knees	

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 United States Government Printing Office and on the Internet at the following address: http://ts.nist.gov/ts/htdocs/210/214/dosim.htm**.**

Item 9.6: Public Dose

Rule: 12VAC5-481-630, 12VAC5-481-720, 12VAC5-481-730, 12VAC5-481-840, 12VAC5-481-1050, 12VAC5-481-1100, 12VAC5-481-1110, 12VAC5-481-3070, 12VAC5-481-3080

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 100 millirem (1 millisievert) in one year, and the dose in any unrestricted area will not exceed 2 millirem (0.02 millisievert) 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. Gauges should be stored away from occupied areas.

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, emergency, and security procedures for security and surveillance specified in **Item 9.7** 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 (in a locked area) to prevent unauthorized access or use. If the gauges are not in storage, then authorized users must maintain constant surveillance to ensure that members of the public, who could be coworkers, do not get near the gauges or use them and thus receive unnecessary radiation exposure.

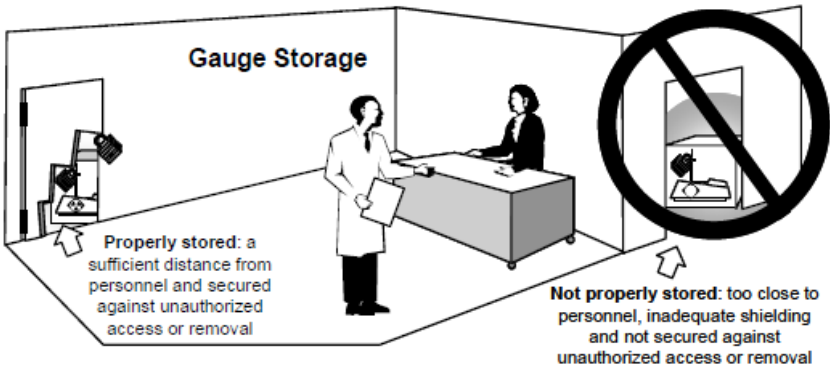

Figure 1: Gauge Storage

Public dose is also affected by the choice of storage location and conditions (see **Figure 1**). Since 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 or the exterior surface of an outside wall) does not exceed 100 mrem (1 mSv) in a year or 2 mrem (0.02 mSv) in any one hour. Use the concepts of time, distance, and shielding when choosing a permanent or temporary storage location. Decreasing the time spent near a gauge, increasing the distance from the gauge, and using shielding (i.e., brick, concrete, lead, or other solid walls) will reduce the radiation exposure. As a rule of thumb, gauges should be stored as far away as possible from areas that are occupied by members of the public.

Information provided by the manufacturer or vendor on anticipated radiation levels of sealed sources and tracer materials, both inside their respective transport containers and outside the transport container at given distances, is the type of information needed to make public dose calculations. 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.

Item 9.7: Operating and Emergency Procedures

Rule: 12VAC5-481-450, 12VAC5-481-490, 12VAC5-481-630, 12VAC5-481-750, 12VAC5-481-840, 12VAC5-481-860, 12VAC5-481-880, 12VAC5-481-900, 12VAC5-481-1090, 12VAC5-481-1100, 12VAC5-481-1110, 12VAC5-481-1150, 12VAC5-481-2260, 12VAC5-481-3091

Criteria: Each applicant must 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
- require reporting to the agency, pursuant to **12VAC5-481-1110**, when a stuck source cannot be retrieved.

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

Discussion: Lost or stolen gauges and gauges damaged by heavy equipment during use at job sites are the most common occurrences that present a potentially significant radiation safety risk. Operating and emergency procedures shall be developed to minimize these risks. The agency considers security of gauges extremely important and lack of security is a significant violation.

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

To avoid lost or stolen gauges, licensees must keep the gauges under constant surveillance (when in use or idle) or secured against unauthorized use or removal through leaving in secured position in a locked area (i.e.; trailer, shed, etc). Notify VDH when gauges are lost, stolen, or certain other conditions are met.

See **Appendix H** for sample operating and emergency procedures and **Appendix L** for security guidance.

Note: Telephone notifications shall be made to the agency at (804) 864-8150 during normal business hours (8 a.m. – 4:30 p.m.) For immediate notifications after normal business hours, the 24 hour emergency telephone number is (804) 674-2400 or (800) 468-8892. Identify the emergency as radiological.

Item 9.8: Leak Tests

Rule: 12VAC5-481-180, 12VAC5-481-740, 12VAC5-481-1010, 12VAC5-481-1150

Criteria: VDH requires testing to determine whether there is any radioactive leakage from the source in the device. The agency finds testing to be acceptable if it is conducted by an organization approved by VDH**,** the NRC or another Agreement State or according to procedures approved by VDH.

Discussion: 12VAC5-481-740 requires performance of leak tests at intervals approved by the NRC or another Agreement State and specified in the SSDR Sheet. The measurement of the leak test sample is a quantitative analysis requiring that instrumentation used to analyze the sample must be capable of detecting 0.005

microcurie (185 becquerels) of radioactivity. **Appendix J** discusses leak testing and contains samples of performing leak tests.

Manufacturers, consultants, and other organizations may be authorized by VDH, the NRC or another 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. Licensees may also be authorized to conduct the entire leak test sequence themselves.

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

Item 9.9: Maintenance

Rule: 12VAC5-481-450, 12VAC5-481-490 B, 12VAC5-481-500, 12VAC5-481-630, 12VAC5-481-640, 12VAC5-481-980

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 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 VDH limits must be performed by the gauge manufacturer or a person specifically authorized by VDH, the NRC or another 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.

Discussion: VDH 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 licensee 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 VDH, the NRC or another 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.

Item 9.10: Transportation

Rule: 12VAC5-481-100, 12VAC5-481-570, 12VAC5-481-571, 12VAC5-481-630, 12VAC5-481-840, 12VAC5-481-2980, 12VAC5-481-3000, 12VAC5-481-3091, 12VAC5-481-3010, 12VAC5-481-3020, 12VAC5-481-3070, 12VAC5-481-3080, 12VAC5-481-3100, 12VAC5-481-3110, 12VAC5-481-3130, 49 CFR Parts 171-178

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

Discussion: DOT requirements are often overlooked by portable gauge licensees. The labeling of the transport container must be maintained in a legible condition. The licensee must properly block and brace the transportation case to ensure that the gauge does not shift during transport. The licensee must have emergency response information, including current emergency response telephone numbers that meet the requirements of **49 CFR Part 172, Subpart G**. Initial and recurrent training must be given to all employees who transport gauges. The licensee shall maintain transportation shipping records in accordance with the DOT requirements. These are some of the most often overlooked requirements.

During an inspection the agency inspects and enforces DOT's regulations governing the transport of radioactive materials. **Appendix K** lists major DOT regulations and provides a sample shipping paper for portable gauges. See **Appendix L** for information on security requirements.

Item 9.11: Waste Management - Gauge Disposal and Transfer

Rule: 12VAC5-481-100, 12VAC5-481-450, 12VAC5-481-500, 12VAC5-481-510, 12VAC5-481-570, 12VAC5-481-571, 12VAC5-481-630, 12VAC5-481-910, 12VAC5-481-980, 12VAC5-481-2980, 12VAC5-481-3100

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

Discussion: 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 VDH**,** the NRC or another 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 radionuclide and the use).

Before transferring radioactive material, a licensee must verify that the recipient is properly authorized to receive it using one of the methods described in **12VAC5-481-570 D**. In addition, all packages containing radioactive sources must be prepared and shipped in accordance with VDH and DOT regulations. Records of the transfer must be maintained as required by **12VAC5-481-100** and **12VAC5-481-571.**

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

Item 10: Specific License Fee

For a listing of application fees, please see **12VAC5-490**. On VDH Form, **'**Application for Radioactive Material License Authorizing the Use of Portable Gauges', enter the fee category and the amount.

Item 11: Certification

Individuals acting in a private capacity are required to sign and date VDH Form, 'Application for Radioactive Material License Authorizing the Use of Portable Gauges' (**Appendix A**). Otherwise, senior representatives of the corporation or legal entity filing the application should sign and date VDH Form, 'Application for Radioactive Material License Authorizing the Use of Portable Gauges' (**Appendix A**).

Representatives signing an application must be authorized to make binding commitments and sign official documents on behalf of the applicant. The agency will return all unsigned applications for proper signature.

Note:

- It is a violation of **12VAC5-481-30** to make a willful false statement or representation on applications or correspondence.
- When the application references commitments, those items become part of the licensing conditions and regulatory requirements.

Appendix A

VDH Form
‘Application For Radioactive Material License Authorizing the Use of Portable Gauge Devices’

Virginia Department of Health
Radioactive Materials Program
(804) 864-8150

APPLICATION FOR A NEW RADIOACTIVE MATERIAL LICENSE AUTHORIZING THE USE OF PORTABLE GAUGES

The Virginia Department of Health (VDH) is requesting disclosure of information. Completion of this form is required to obtain a Radioactive Material License. Failure to provide all requested information may result in denial or delay of a Radioactive Material License.

Instructions – Complete all items. Refer to VAREG 'Guidance for Portable Gauges' for additional information. Use supplementary sheets if necessary. Retain a copy and submit the original of the entire application to: Virginia Department of Health, Radioactive Materials Program, 109 Governor Street, Room 730, Richmond, VA 23219.

APPLICATION TYPE

Item 1 Type of Application (Check box)

☐ New License

CONTACT INFORMATION

Item 2 Applicant - Name and Mailing Address	**Item 3 Contact Person – Name**
, -	
Applicant - Telephone Number (Include area code) ( ) - x	Contact Person - Telephone Number (Include area code) ( ) - x

LOCATION OF RADIOACTIVE MATERIAL

Item 4 List all Address(es) where radioactive material(s) will be used or possessed. Attach additional pages if necessary.

	Address (Do not use Post Office box)	**Telephone Number (Include area code)**
☐ Used ☐ Stored ☐ Used/Stored	, -	( ) - x
☐ Used ☐ Stored ☐ Used/Stored	, -	( ) - x
☐ Used ☐ Stored ☐ Used/Stored	, -	( ) - x

Are portable gauge devices used at temporary jobsites?: ☐ Yes ☐ No

Are portable gauge devices stored at temporary jobsites?: ☐ Yes ☐ No

If yes, check the following boxes:

- ☐ We will perform and maintain documentation of radiation surveys to ensure that radiation levels are less than 2 mR in any one hour and 100 mR/yr at all temporary job site storage locations.
- ☐ We will store the device at the temporary job site in a locked room, trailer or other secure location to prevent unauthorized removal of the device.
- ☐ We will minimize exposures for occupational and non-occupational workers when selecting storage location.

RADIATION SAFETY OFFICER

Item 5 Radiation Safety Officer (RSO) (check one box)

Name – Radiation Safety Officer	Telephone Number (Include area code) ( ) - x

☐ Before obtaining radioactive material, the proposed RSO will have successfully completed one of the training courses described in the Criteria section titled 'Radiation Safety Officer (RSO)' in VAREG 'Guidance for Portable Gauges '.

OR

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

AUTHORIZED USERS

Item 6 Training for Individuals Working In or Frequenting Restricted Areas (check one box)

☐ Before using radioactive material, authorized users will have successfully completed one of the training courses described in the Criteria section titled 'Training for Individuals Working In or Frequenting Restricted Areas' in VAREG 'Guidance for Portable Gauges'.

NOTE: If using an in-house training program, submit copy of course content, sample course examination and course instructor qualifications.

OR

☐ Documentation of the training and experience for the proposed gauge user(s) is attached.

NOTE: These individuals will be listed on the license as authorized users. An amendment request is required to add new authorized users.

RADIOACTIVE MATERIAL

Item 7 Radioactive Material (Attach additional pages if necessary)

Element and mass number	Maximum activity per source and total maximum activity per model number
Device manufacturer and model number	Intended Use

FACILITIES AND EQUIPMENT

Item 8 Facilities And Equipment (Check box and attach diagram.)

☐ Diagrams of radioactive material storage area(s) are attached.

RADIATION SAFETY PROGRAM

Item 9 Radiation Safety Program

Item 9.1 Audit Program

The applicant is not required to submit its audit program to the agency for review during the licensing phase. This matter will be examined during an inspection.

Item 9.2 Termination Of Activities (Check box)

☐ We will notify VDH, in writing, within 60 days of the decision to permanently cease radioactive material use. (**12VAC5-481-510**)

Item 9.3 Instruments (Check one box)

☐ We will possess and use a radiation survey meter that meets the Criteria in the section titled 'Instruments' in VAREG 'Guidance for Portable Gauges'.

OR

☐ We will submit an alternative procedure for determining source integrity after an incident involving the portable gauge(s). (Procedures are attached)

Item 9.4 Material Receipt And Accountability (Check one box)

☐ We will conduct physical inventories, at intervals not to exceed 6 months, to account for all portable gauges received and possessed under the license

OR

☐ We will submit a description of the frequency and procedures for ensuring that no gauge has been lost, stolen or misplaced. (Procedures are attached)

Item 9.5 Occupational Dosimetry (Check one box)

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

OR

☐ We will maintain, for inspection by VDH, 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 **12VAC5-481-640**. (See **Appendix I** in VAREG 'Guidance for Portable Gauges'.)

Item 9.6 Public Dose

No response is required in this license application; however, the licensee's evaluation of public dose will be examined during an inspection.

Item 9.7 Operating and Emergency Procedures (Check one box)

☐ We will implement and maintain the operating and emergency procedures in **Appendix H** of VAREG 'Guidance for Portable Gauges' and provide copies of these procedures to all gauge users and at each job site.

OR

☐ Operating and emergency procedures will be implemented, maintained and provided to all gauge users at each job site and will meet criteria in the section titled 'Radiation Safety Program - Operating and Emergency Procedures' in VAREG 'Guidance for Portable Gauges'. (Procedures are attached)

Item 9.8 Leak Tests (Check one box)

☐ Leak tests will be performed by an organization authorized by VDH, the NRC or another Agreement State to provide leak testing services to other licensees; or by using a leak test kit supplied by an organization licensed by VDH, the NRC or another Agreement State to provide leak test kits to other licensees according to kit supplier's instructions.

List Name and License number of organization authorized to perform or analyze leak test: (Specify whether VDH, NRC, or another Agreement State)

Organization Name _____ License Number _____

Issuing Agency _____

NOTE: An alternate organization may be used to perform or analyze leak test, without amending the license, provided the organization is specifically authorized by VDH, the NRC, or another Agreement State.

OR

☐ We will perform leak testing and sample analysis and will follow the model procedures in **Appendix J** of VAREG 'Guidance for Portable Gauges'.

OR

☐ We will submit alternative procedures. (Procedures are attached)

Item 9.9 Maintenance (Check one box for routine cleaning and lubrication and one for non-routine maintenance)
Routine cleaning and lubrication:

☐ We will implement and maintain procedures for routine maintenance of our gauge(s) according to each manufacturer's recommendations and instructions.

OR

☐ Alternative procedures are attached.

Non-routine maintenance:

☐ We will send the gauge(s) to the manufacturer or other person authorized by VDH, the NRC or another Agreement State to perform non-routine maintenance or repair operations that require the removal of the source or source rod from the gauge(s).

OR

☐ We will provide the information listed in **Appendix G** of VAREG 'Guidance for Portable Gauges' to support a request to perform this work 'in house'.

Item 9.10 Transportation

No response is needed during the license process; this issue will be reviewed during inspection.

Item 9.11 Waste Management - Gauge Disposal And Transfer (Check box)

☐ We will transfer the gauge to the manufacturer for disposal or transfer the device to a specific licensee, authorized to receive radioactive material.

SPECIFIC LICENSE FEE

Item 10 License Fees (Refer to **12VAC5-490**.)

Application Fee Enclosed (For new applications):
☐ Yes ☐ No Amount Enclosed $ _____

CERTIFICATION (To be signed by an individual authorized to make binding commitments on behalf of the applicant.)

Item 11

I hereby certify that this application was prepared in conformance with **12VAC5-481 'Virginia Radiation Protection Regulations'** and that all information contained herein, including any supplements attached hereto, is true and correct to the best of my knowledge and belief.

SIGNATURE - Applicant Or Authorized Individual	Date signed

Print Name and Title of above signatory

Virginia Department of Health
Radioactive Materials Program
(804) 864-8150

APPLICATION FOR RENEWAL OF A RADIOACTIVE MATERIAL LICENSE AUTHORIZING THE USE OF PORTABLE GAUGES

The Virginia Department of Health (VDH) is requesting disclosure of information. Completion of this form is required to renew a Radioactive Material License. Failure to provide all requested information may result in denial or delay of a Radioactive Materials License.

Instructions – Complete all items. Refer to VAREG 'Guidance for Portable Gauges' for additional information. Use supplementary sheets if necessary. Retain a copy and submit the original of the entire application to: Virginia Department of Health, Radioactive Materials Program, 109 Governor Street, Room 730, Richmond, VA 23219.

APPLICATION TYPE

Item 1 Type of Application (Check box)

☐ Renewal License Number

CONTACT INFORMATION

☐ as listed on current license

OR

Item 2 Applicant - Name and Mailing Address	**Item 3 Contact Person – Name**
, -	
Applicant - Telephone Number (Include area code) ( ) - x	Contact Person - Telephone Number (Include area code) ( ) - x

LOCATION OF RADIOACTIVE MATERIAL

Item 4 List all Address(es) where radioactive material(s) will be used or possessed. Attach additional pages if necessary.

☐ as listed on current license

OR

☐ as listed on current license and please add the listed additional locations

OR

☐ see provided information for current information

	Address (Do not use Post Office box)	**Telephone Number (Include area code)**
☐ Used ☐ Stored ☐ Used/Stored	, -	( ) - x
☐ Used ☐ Stored ☐ Used/Stored	, -	( ) - x

Are portable gauge devices used at temporary jobsites?: ☐ Yes ☐ No

Are portable gauge devices stored at temporary jobsites?: ☐ Yes ☐ No

If yes, check the following boxes:

☐ We will perform and maintain documentation of radiation surveys to ensure that radiation levels are less than 2 mR in any one hour and 100 mR/yr at all temporary job site storage locations.

☐ We will store the device at the temporary job site in a locked room, trailer or other secure location to prevent unauthorized removal of the device.

☐ We will minimize exposures for occupational and non-occupational workers when selecting storage location.

RADIATION SAFETY OFFICER

Item 5 Radiation Safety Officer (RSO) (check one box)

☐ as listed on current license
OR
☐ proposed new RSO (include training certificate)

Telephone Number (Include area code)
( ) - x

Name – Radiation Safety Officer

AUTHORIZED USERS

Item 6 Training for Individuals Working In or Frequenting Restricted Areas (check one box)

☐ Before using radioactive material, authorized users will have successfully completed one of the training courses described in the Criteria section titled 'Training for Individuals Working In or Frequenting Restricted Areas' in VAREG 'Guidance for Portable Gauges'.

NOTE: If using an in-house training program, submit copy of course content, sample course examination and course instructor qualifications.

OR

☐ Current license list all authorized users

OR

☐ Documentation of the training and experience for the proposed gauge user(s) is attached.

NOTE: These individuals will be listed on the license as authorized users. An amendment request is required to add new authorized users.

RADIOACTIVE MATERIAL

Item 7 Radioactive Material (Attach additional pages if necessary)

☐ Correct as listed on license
OR
☐ Correct as listed on license and see below for additional material/gauges
OR
☐ See below for all requested material/gauges

Element and mass number	Maximum activity per source and total maximum activity per model number
Device manufacturer and model number	Intended Use

FACILITIES AND EQUIPMENT

Item 8 Facilities And Equipment (Check box and attach diagram.)

☐ Diagrams of radioactive material storage area(s) are attached.

RADIATION SAFETY PROGRAM

Item 9 Radiation Safety Program

Item 9.1 Audit Program

The applicant is not required to submit its audit program to the agency for review during the licensing phase. This matter will be examined during an inspection.

Item 9.2 Termination Of Activities (Check box)

☐ We will notify VDH, in writing, within 60 days of the decision to permanently cease radioactive material use. (**12VAC5-481-510**)

Item 9.3 Instruments (Check one box)

☐ We will possess and use a radiation survey meter that meets the Criteria in the section titled 'Instruments' in VAREG 'Guidance for Portable Gauges'.

OR

☐ We will submit an alternative procedure for determining source integrity after an incident involving the portable gauge(s). (Procedures are attached)

Item 9.4 Material Receipt And Accountability (Check one box)

☐ We will conduct physical inventories, at intervals not to exceed 6 months, to account for all portable gauges received and possessed under the license.

OR

☐ We will submit a description of the frequency and procedures for ensuring that no gauge has been lost, stolen or misplaced. (Procedures are attached)

Item 9.5 Occupational Dosimetry (Check one box)

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

OR

☐ We will maintain, for inspection by VDH, 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 **12VAC5-481-640**. (See **Appendix I** in VAREG 'Guidance for Portable Gauges'.)

Item 9.6 Public Dose

No response is required in this license application; however, the licensee's evaluation of public dose will be examined during an inspection.

Item 9.7 Operating and Emergency Procedures (Check one box)

☐ We will implement and maintain the operating and emergency procedures in **Appendix H** of VAREG 'Guidance for Portable Gauges' and provide copies of these procedures to all gauge users and at each job site.

OR

☐ Operating and emergency procedures will be implemented, maintained and provided to all gauge users at each job site and will meet criteria in the section titled 'Radiation Safety Program - Operating and Emergency Procedures' in VAREG 'Guidance for Portable Gauges'. (Procedures are attached)

Item 9.8 Leak Tests (Check one box)

☐ Leak tests will be performed by an organization authorized by VDH, the NRC or another Agreement State to provide leak testing services to other licensees; or by using a leak test kit supplied by an organization licensed by VDH, the NRC or another Agreement State to provide leak test kits to other licensees according to kit supplier's instructions.

List Name and License number of organization authorized to perform or analyze leak test: (Specify whether VDH, NRC, or another Agreement State)

Organization Name _____ License Number _____

Issuing Agency _____

NOTE: An alternate organization may be used to perform or analyze leak test, without amending the license, provided the organization is specifically authorized by VDH, the NRC, or another Agreement State.

OR

☐ We will perform leak testing and sample analysis and will follow the model procedures in Appendix J of VAREG 'Guidance for Portable Gauges'.

OR

☐ We will submit alternative procedures. (Procedures are attached)

Item 9.9 Maintenance (Check one box for routine cleaning and lubrication and one for non-routine maintenance)
Routine cleaning and lubrication:

☐ We will implement and maintain procedures for routine maintenance of our gauge(s) according to each manufacturer's recommendations and instructions.

OR

☐ Alternative procedures are attached.

Non-routine maintenance:

☐ We will send the gauge(s) to the manufacturer or other person authorized by VDH, the NRC or another Agreement State to perform non-routine maintenance or repair operations that require the removal of the source or source rod from the gauge(s).

OR

☐ We will provide the information listed in **Appendix G** of VAREG 'Guidance for Portable Gauges' to support a request to perform this work 'in house'.

Item 9.10 Transportation

No response is needed during the license process; this issue will be reviewed during inspection.

Item 9.11 Waste Management - Gauge Disposal And Transfer (Check box)

☐ We will transfer the gauge to the manufacturer for disposal or transfer the device to a specific licensee, authorized to receive radioactive material.

SPECIFIC LICENSE FEE

Item 10 License Fees (ONLY REQUIRED WITH INITIAL APPLICATION**)**

CERTIFICATION (To be signed by an individual authorized to make binding commitments on behalf of the applicant.)

Item 11

I hereby certify that this application was prepared in conformance with **12VAC5-481 'Virginia Radiation Protection Regulations'** and that all information contained herein, including any supplements attached hereto, is true and correct to the best of my knowledge and belief.

SIGNATURE - Applicant Or Authorized Individual	Date signed
Print Name and Title of above signatory	

Revision 2 September 30, 2014

Attachment A
Portable Gauge Applicant's Checklist

Yes	No	Item	Material Needed
		Application	Used the correct form (New for new licensees or Renewal for renewing licensees)
		Application	Checked at least one box and filled in all the required information, as needed, for all Items
		Item 5	Attached training information, as needed
		Item 6	Attached training information, as needed
		Item 8	Attached facility diagram
		Item 9.3	Checked box or attached alternate procedures
		Item 9.4	Checked box or attached alternate procedures
		Item 9.7	Checked box or attached alternate procedures
		Item 9.8	Checked at least one box and, if needed, attached alternate procedures including analysis instrumentation information
		Item 9.9	Routine: checked box or attached alternate procedure
		Item 9.9	Non-Routine: checked box or attached information contains all the requirements of Appendix G

Appendix B

Reserved

Appendix C

Information Needed for Transfer of Control Application

Information Needed for Transfer of Control Application

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

Control: Control of a license is in the hands of the person or persons who are empowered to decide when and how that license will be used. That control is to be found in the person or persons who, because of ownership or authority explicitly delegated by the owners, possess the power to determine corporate policy and thus the direction of the activities under the license.

Transferee: A transferee is an entity that proposes to purchase or otherwise gain control of a VDH licensed operation.

Transferor: A transferor is a VDH licensee selling or otherwise giving up control of a licensed operation.

1. Provide a complete description of the transaction (transfer of stocks or assets, or merger). Indicate whether the name has changed and include the new name. Include the name and telephone number of a licensee contact who VDH may contact if more information is needed.

2. Describe any changes in personnel or duties that relate to the licensed program. Include training and experience for new personnel.

3. Describe any changes in the organization, location, facilities, equipment or procedures that relate to the licensed program.

4. Describe the status of the surveillance program (surveys, wipe tests, quality control) at the present time and the expected status at the time that control is to be transferred.

5. Confirm that all records concerning the safe and effective decommissioning of the facility will be transferred to the transferee or to VDH, as appropriate. These records include documentation of surveys of ambient radiation levels and fixed and/or removable contamination, including methods and sensitivity.

6. Confirm that the transferee will abide by all constraints, conditions, requirements and commitments of the transferor or that the transferee will submit a complete description of the proposed licensed program.

References: The information above is derived from Information Notice 89-25, Revision 1, "*Unauthorized Transfer of Ownership or Control of Licensed Activities*," which is available at the NRC's webpage at http://www.nrc.gov.

Appendix D

Criteria for Acceptable Training Courses for Portable Gauge Users

Criteria for Acceptable Training Courses for Portable Gauge Users

Course Content

The following are areas in which VDH considers it important that an individual have expertise for the competent operation of portable gauges using sealed sources of radioactive material. The course shall be at least 8 hours in length. Online training is acceptable if it includes all of the content indicated below and practical training.

I. PRINCIPLES AND FUNDAMENTALS OF RADIATION SAFETY

A. Types and Characteristics of Radiation
   1. Alpha, Beta, Gamma, X-ray and Neutron Radiation
   2. Exposure: Natural versus Man-made Radiation
   3. Irradiation versus Contamination/Internal vs. External
   4. Radioactive Material Used in Portable Gauges

B. Units of Radiation Dose and Quantities of Radioactivity
   1. Curie, Rad, Rem and Roentgen
   2. Prefixes
   3. SI Units

C. Basic Math and Calculations Related to Radioactivity
   1. Radioactive Decay
   2. Dose Rates from the sources commonly used
   3. Inverse Square Law

D. Biological Effects of Radiation
   1. Acute, Chronic, and Genetic Effects of Exposure
   2. Radiation Protection Standards
   3. The ALARA Philosophy

E. Radiation levels from Radioactive Sealed Sources
   1. Survey Meter Use for Portable Gauge Users

F. Methods of Controlling Radiation Dose
   1. Time
   2. Distance
   3. Shielding

II. STATE AND FEDERAL REGULATIONS

A. **12VAC5-481 'Virginia Radiation Protection Regulations'**
B. Title 10, Code of Federal Regulations, US Nuclear Regulatory Commission
C. Title 49, Code of Federal Regulations, US Department of Transportation

III. LICENSING AND INSPECTION

A. License Items and Conditions
B. Notices, Instructions and Reports to Workers
C. Inspection by the Agency

IV. OPERATING AND EMERGENCY PROCEDURES

A. Operating Procedures
   1. Training and Supervision
   2. Personnel Monitoring
   3. Availability of Procedures
   4. Security of the Gauges When Stored and At The Work Location
   5. ALARA Philosophy
   6. Transportation of the Gauges and Security
   7. General Rules of Use
   8. Posting and Labeling Requirements
   9. Routine Maintenance
   10. Radiation Surveys Using Survey Meters at the Work Site
   11. Recordkeeping

B. Emergency Procedures
   1. Preventive Measures
   2. Emergency Response
   3. Notification Requirements
   4. Case Histories

V. TRANSFER/ DISPOSAL REQUIREMENTS

A. State and NRC Regulations
B. Transportation Requirements

VI. PRACTICAL TRAINING

A. Transport/ Storage Containers
B. Hands-on Training Specific to the Gauge
   1. Proper Use
   2. Safe Handling
   3. Demonstration of Measurements of Various Materials
   4. Use of Survey Meters by Portable Gauge Users.

VII. Q&A SESSION

Course Examination

- 25-50 question, closed-book written test -- 70 percent grade

    - 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

Typical Duties and Responsibilities of the Radiation Safety Officer

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

- Stopping licensed activities that the RSO considers unsafe
- 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 manufacturer's recommendations and instructions
- Individuals using 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 taken
- Licensed material is transported in accordance with all applicable DOT requirements
- Licensed material is disposed of properly
- Appropriate records are maintained
- Up-to-date license is maintained and amendment and renewal requests submitted in a timely manner
- Ensure two independent physical barriers are used for portable gauges not under constant supervision.
- Up-to-date operating, emergency, and security procedures are developed, maintained, distributed, and implemented
- Non-routine operations are performed by the manufacturer or in accordance with accepted procedures submitted with the license
- Documentation is maintained to demonstrate, by measurement or calculation, that public dose does not exceed the annual limit in **12VAC5-481-730**
- When violation(s) of regulations or license conditions are identified, corrective action(s) are developed, implemented, and documented
- All posting requirements of **12VAC5-481** are met, include current notice to workers, in the appropriate location(s).

Appendix F

Portable Gauge Audit Checklist

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._____
Audit date Range: _____

_____
(Signature)

1. AUDIT HISTORY

a. Last audit of this location conducted on (date) _____
b. Were previous audits conducted yearly? **(12VAC5-481-630)**
c. Were records of previous audits maintained? **(12VAC5-481-990)**
d. Were any deficiencies identified during 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 filed, was VDH prior consent obtained or was the VDH notified?
c. If the RSO was changed, was license amended? Does new RSO meet VDH training requirements?
d. If the designated contact person changed, was agency notified?
e. Does the license authorize all of the radionuclides contained in gauges possessed?
f. Are the gauges as described in the Sealed Source and Device Registration (SSDR) Certificate or Sheet? Have copies of (or access to) SSDR Certificates? Have manufacturers' manuals for operation and maintenance?
g. Are the actual uses of gauges consistent with the authorized uses listed on the license?
h. Is 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 **12VAC5-481-2270?** Refresher training provided, as needed **(12VAC5-481-2270)**?
b. Did each gauge operator attend an approved course prior to using 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 observations of operators using the gauge in a field situation?
f. Operating gauge? Performing routine cleaning and lubrication? Transporting gauge? Storing gauge?

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

h. HAZMAT training provided as required? **[49 CFR 172.700; 172.701; 172.702; 172.703; 172.704]**

4. RADIATION SURVEY INSTRUMENTS

a. If the licensee possesses its own survey meter, does it meet VDH'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 **(12VAC5-481-750)**?

d. Are calibration records maintained **(12VAC5-481-1000)*?***

5. GAUGE INVENTORY AND ACCOUNTABILITY

a. Is a record kept showing the receipt of each gauge? **(12VAC5-481-100, 12VAC5-481-571)**

b. Are all gauges received physically inventoried every six month?

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

d. Is the portable gauge utilization log completed as required each time of use?

6. PERSONNEL RADIATION PROTECTION

a. Are ALARA considerations incorporated into the radiation protection program? (**12VAC5-481-630**)

b. Is documentation kept showing that unmonitored users receive <10% of limit?

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

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

e. Is external dosimetry required? Is dosimetry provided to users?

   1) Is the dosimetry supplier NVLAP approved? **(12VAC5-481-750)**

   2) Are the dosimeters exchanged monthly for film badges and at industry recommended frequencies?

   3) Are dosimetry reports reviewed by the RSO when they are received?

   4) Are the records VDH Forms or equivalent? (**12VAC5-481-1040**)

      VDH Form, 'Cumulative Occupational Exposure History' completed?

      VDH Form, 'Occupational Exposure Record for a Monitoring Period' completed?

   5) If a worker declared her pregnancy, did licensee comply with **12VAC5-481-710**?

      Were records kept of embryo/fetus dose per **12VAC5-481-1040**?

f. Are records of exposures, surveys, monitoring, and evaluations maintained? (**12VAC5-481-990, 12VAC5-481-1000, 12VAC5-481-1040, 12VAC5-481-1080**)

g. Are annual exposure reports given to employees who receive greater than 100 mrem per year? (**12VAC5-481-2280**)

7. PUBLIC DOSE

a. Are gauges stored in a manner to keep doses below 100 mrem in a year? **(12VAC5-481-720, 12VAC5-481-730)**

b. Has a survey or evaluation been performed per **12VAC5-481-730**? 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? **(12VAC5-481-720)**

d. Are gauges being stored in a manner that would prevent unauthorized use or removal? **(12VAC5-481-840)**

e. Records maintained? **(12VAC5-481-1050)**

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 (with current telephone numbers) of the operating and emergency procedures?

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 the agency 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 VDH notified?

10. MAINTENANCE OF GAUGES

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

b. Does the source or source rod remain attached to the portable 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 **12VAC5-481-640** limits)?

11. TRANSPORTATION

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

b. Package performance test records on file?

c. Special form sources documentation? **(49 CFR 173.476(a)**)

d. Package has 2 labels (ex. Yellow-II) with TI, Nuclide, Activity, and Hazard Class*?* **(49 CFR 172.403, 49 CFR 173.441)**

e. Package properly marked*?* **(49 CFR 172.301, 49 CFR 172.304, 49 CFR 172.310, 49 CFR**

172.324)

f. Package closed and sealed during transport? **(49 CFR 173.475(f)**)

g. Shipping papers prepared and used? **(49 CFR 172.200(a)**)

h. Shipping papers contain proper entries? {Shipping name, Hazard Class, Identification Number (UN Number), Total Quantity, Package Type, Nuclide, RQ, Radioactive Material, Physical and Chemical Form, Activity, category of label, TI, Shipper's Name, Certification and Signature, Emergency Response Phone Number, Cargo Aircraft Only (if applicable)} **(49 CFR 172.200; 172.201; 172.202; 172.203; 172.204; 172.604)**

i. Shipping papers within drivers reach and readily accessible during transport? **(49 CFR 177. 817(e)**)

j. Secured against movement? **(49 CFR 177.834)**

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? **(12VAC5-481-1090)**

b. Did any reportable incidents occur? Were reports made? **(12VAC5-481-1100)**

c. Did any overexposures and high radiation levels occur? Reported? **(12VAC5-481-1110)**

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

14. POSTING AND LABELING

a. VDH Form, 'Notice to Employees' posted? **(12VAC5-481-2260 C)**

b. The agency regulations, license documents posted or a notice posted? **(12VAC5-481-2260 A)**

c. Other posting and labeling? **(12VAC5-481-850, 12VAC5-481-860, 12VAC5-481-880, 12VAC5-481-2260)**

15. RECORD KEEPING FOR DECOMMISSIONING

a. Records kept of information important to decommissioning? **(12VAC5-481-450 C)**

b. Records include all information outlined **(12VAC5-481-450 C)**

16. BULLETINS AND INFORMATION NOTICES

a. Are VDH's Information Notices received?

b. Appropriate training and action taken in response?

17. SPECIAL LICENSE CONDITIONS OR ISSUES

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

18. DEFICIENCIES IDENTIFIED IN AUDIT; CORRECTIVE ACTIONS

a. Summarize problems/deficiencies identified during audit.

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

c. Provide any other recommendations for improvement.

19. EVALUATION OF OTHER FACTORS

a. Senior licensee management is appropriately involved with the radiation protection program and/or Radiation Safety Officer (RSO) oversight?

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

c. Licensee has sufficient staff to support the radiation protection program?

Appendix G

Information Needed to Support Portable Gauge Licensee's Request to Perform Non-Routine Maintenance

Information Needed to Support Portable Gauge Licensee'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 VDH limits. 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 the VDH limits.

A typical moisture-density gauge contains 10 millicuries (0.37 gigabecquerels) of cesium-137 and 40 millicuries (1.5 gigabecquerels) of americium-241 as a neutron source. In about 9 minutes, an unshielded cesium-137 source of this activity can deliver 5 rems (0.05 sievert) 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 5 rems (0.05 sievert) per year.

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

- Describe the types of work, maintenance, cleaning, repair, etc., to be performed that necessitate detaching the source or source rod from the device or that could cause personnel to receive radiation doses exceeding VDH limits. The principal reason for obtaining this information is to assist in the evaluation of the qualifications of individuals who will conduct the work and the radiation safety procedures they will follow.

- Identify who will perform non-routine maintenance, their training and experience, and why they are competent to perform non-routine maintenance.

- Submit procedures for safe handling of the radioactive source while the source or source rod is detached from the gauge. These procedures should ensure the following:
  - doses to personnel and members of the public are within regulatory limits and ALARA (e.g., use of shielded containers or shielding);
  - the source or source rod is secured against unauthorized removal access or under constant surveillance;
  - appropriate labels and signs are used; and
  - manufacturer's instructions and recommendations are followed.

- Confirm that individuals performing non-routine maintenance on gauges will always wear both whole body and extremity monitoring devices.

- Verify possession of at least one survey instrument meeting the following criteria:
  - Be capable of detecting gamma radiation;
  - Be capable of measuring from 1 to 50 mrem/hr (0.01 to 0.5 mSv/hr);
  - Be calibrated at least annually with radionuclide point sources emitting radiation of the same type and energy of the sealed sources in the gauge;
  - Be calibrated at least 2 points located at approximately 1/3 and 2/3 of each scale; readings within ±20% are acceptable;

- Be calibrated by a person specifically licensed by VDH, the NRC**,** or another 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 (**12VAC5-481-1000)**.

- Describe steps to be taken to ensure that radiation levels in areas where non-routine maintenance will take place do not exceed **12VAC5-481-720** 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 **12VAC5-481-1050.**

Appendix H

Operating and Emergency Procedures

Operating Procedures

- If personnel dosimetry is provided:
    - Always wear your assigned OSL, TLD, or film badge when using the gauge.
    - Never wear another person's OSL, TLD, or film badge.
    - Never store your OSL, 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 the utilization log (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 jobsite(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 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.

- Perform routine cleaning and maintenance according to the manufacturer’s instructions and recommendations.

- When the gauge is not in use at a temporary jobsite, place the gauge in a secured location (e.g., locked in the trunk of a car or locked in a storage shed).

- Prior to 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.

- Return the gauge to its proper locked storage location at the end of the work shift.

- Log the gauge into the utilization log when it is returned to storage.

- 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.

- 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 actions necessary to protect the gauge and yourself from danger of moving heavy equipment.

- Always keep unauthorized persons away from the gauge.

- 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).

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 persons in the order listed below of the situation:

NAME*	WORK PHONE NUMBER*	HOME PHONE NUMBER*
_____	_____	_____
_____	_____	_____
_____	_____	_____

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

Note: Telephone notifications shall be made to the agency at **(804) 864-8150 during business hours, (804) 674-2400** or **(800) 468-8892, which is staffed 24 hours/day. Identify the emergency as radiological.**

RSO and Licensee Management

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

- If portable gauges are used for measurements with the unshielded source extended more than 3 feet below the surface, contact persons listed on the emergency procedures who 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 VDH as required. (Even if not required to do so, you may report **ANY** incident to the agency by calling **(804) 864-8150** during normal business hours. For immediate notifications after normal business hours, the 24 hour emergency telephone number is **(804) 674-2400** or **800-468-8892.** Identify the emergency as a radiological emergency. VDH notification is required when gauges containing licensed material are lost or stolen (**12VAC5-481-1090**), when gauges are damaged or involved in incidents that result in doses in excess of limits (**12VAC5-481-1100, 12VAC5-481-1110)**, and when it becomes apparent that attempts to recover a source stuck below the surface will be unsuccessful.

- Reports to VDH must be made within the reporting timeframes specified by the regulations.

- Reporting requirements are found in **12VAC5-481-1090, 12VAC5-481-1100, 12VAC5-481-1110,** and **12VAC5-481-1150**.

Appendix I

Dosimetry-Related Guidance

Appendix I, Part 1

Worksheet for Demonstrating that Unmonitored Users Are Not Likely to Exceed 10 Percent of the Allowable Limits

Worksheet for Demonstrating that Unmonitored Individuals Are Not Likely to Exceed 10 Percent of the Allowable Limits

Instructions: To meet the requirement of **12VAC5-481-760** complete **Steps 1** through **6** and sign and date the evaluation on the line provided.

Disclaimer: If there is a change in workload or if a new source is acquired a new evaluation will need to be performed.

Step 1.

Determine the radiation level while the shutter is open in one of the following ways. Record the results below.

- Obtain from the manufacturer's specifications: the radiation level approximately 30 centimeters from the portable gauge when shutter is open, or

- Measure the radiation level with a calibrated survey meter.

  When making the radiation measurement while the shutter is open, place the survey instrument approximately 30 centimeters from the portable gauge while following good radiation safety practices.

_____ mrem per hour

Step 2.

Record the average number of minutes per week that the portable gauge is used with the shutter in open position.

_____ minutes per week

Step 3.

Divide the minutes per week (**Step 2.**) by 60 to determine hours per week and record below.

_____minutes per week (**Step 2.**) / 60

= _____ hours per week

Step 4.

Multiply the hours per week (**Step 3.**) by 52 weeks to equal hours per year and record below.

_____hours per week (**Step 3**.) X 52 weeks

= _____ hours per year

Step 5.

Multiply hours per year (**Step 4.**) by mrem per hour (**Step 1.**) to equal mrem received per year and record below.

_____hours per year (**Step 4.**) X _____mrem per hour (**Step 1.**)

= _____ mrem per year

Step 6.

Is the # of mrem per year (**Step 5.**) greater than 500? ☐ Yes ☐ No

- If yes provide dosimetry as required by **12VAC5-481-760.**
- If no, proceed to **Step 7.**

Step 7.

Is the # of mrem per year (**Step 5.**) greater than 100? ☐ Yes ☐ No

- If yes, and you have an employee that is a declared pregnant worker, as defined by **12VAC5-481-10,** provide dosimetry to that individual. In addition, provide annual radiation safety training as required **by12VAC5-481-2270** to all employees that use the portable gauge.
- If no, you are not required under **12VAC5-481 'Virginia Radiation Protection Regulations'** to provide dosimetry to your employees.

_____ _____

Signature of Person Performing the Evaluation | Date

Appendix I, Part 2

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

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 mSv (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 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.

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

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

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

Calculation Method

Note: 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.

The calculation 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 Registration (SSDR) Sheet or the manufacturer's literature, and (3) no credit is taken for any shielding found between the gauges and the unrestricted areas. Part 1 of the calculation 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 portion 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 calculation method through Part 1 or Part 2. The results of these calculations typically result in higher radiation levels than would exist at typical facilities, but provide a method for estimating conservative doses which could be received.

Example 1

To better understand the calculation 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 VDH regulations.

The secretary's desk is near the wall separating the reception area from the designated, locked gauge storage area, where the company is storing its three gauges. Joe measures the distances from each gauge to the wall and looks up in the manufacturer's literature the radiation levels individuals would encounter for each gauge. Joe draws a sketch (see **Figure 2**) and summarizes his Findings.

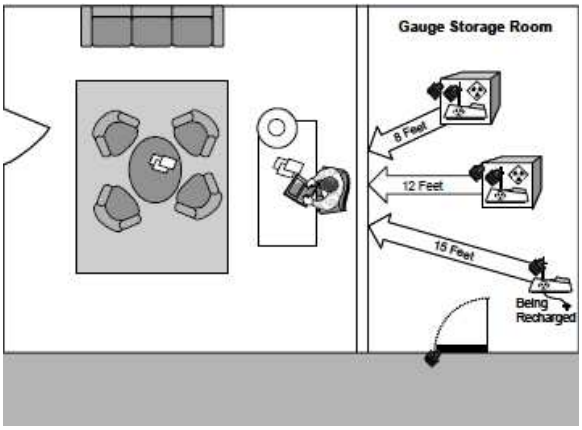

Figure 2: Public Dose Sketch

Findings:

Joe finds that gauge #1 and #2 are stored in transportation containers, gauge #3 is not in a transport container as it is always being recharged. Gauge #1 is documented as reading 2 mrem/hr at 1 ft and is 8 ft away from the secretary's desk. Gauge #2 is documented as reading 8 mrem/hr at 1 ft and is 12 ft away from the secretary's desk. Gauge #3 is documented as reading 2 mrem/hr at 3 ft and is 15 ft away from the secretary's desk.

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 **12VAC5-481-720.** So, taking a 'worst case' approach, he assumes: 1) the gauges are constantly present (i.e., 24 hr/d), 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 hr/d). Joe proceeds to calculate the dose she might receive hourly and yearly from each gauge as shown in **Tables 4, 5,** and **6** below.

Table 4, Calculation 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 hr/d x 365 d/yr = **MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGE 1**, in mrem in a year.	0.031 x 24 x 365 = 0.031 x 8760 = **272**	

Table 5, Calculation 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	
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 hr/d x 365 d/yr = **MAXIMUM ANNUAL DOSE RECEIVED FROM GAUGE 2**, in mrem in a year	0.056 x 24 x 365 =0.056 x 8760 = **491**	

Table 6, Calculation 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 hr/d x 365 d/yr = **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 7, Calculation Method, Part 1---Total Hourly and Annual Dose Received from Gauge 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 calculation method.

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

Example 1: Part 2

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

Table 8, Calculation 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 hr/day; the remainder 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/week)	3
	C. Average number of weeks per year in area (e.g., secretary works all year)	52
10	Multiply the results of Step 9.A. by the results of Step 9.B. by the results of Step 9.C. = **AVERAGE NUMBER OF HOURS IN AREA OF CONCERN PER YEAR**	5 x 3 x 52 = **780**
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**

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

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

Example 1, Part 3

Again Joe reviews his assumptions and recognizes that the gauges 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.

Summary of Information:

- Gauge #1 is located in the storage area continuously (24 hr/d).
- Gauge #2 is located in the storage area continuously (24 hr/d) for 8 months of the year and at temporary job sites for the remaining 4 months of the year.
- Gauge #3 is located in the storage area overnight only, it is used each day at temporary job sites and returned at the end of the day. The gauge is only present during the secretary's first and last hours of work each day.
- The secretary is sitting at the desk 5 hours/day, 3 days/week, and 52 weeks/year.

Table 9, Calculation 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 actions.

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

- Consider whether the assumptions used to determine occupancy and the time each gauge 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 **12VAC5-481-2270**.

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.

Note: 12VAC5-481-1050 requires licensees to maintain records demonstrating compliance with the dose limits for individuals members of the public.

Combination Measurement-Calculation 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 (i.e., a 'work' year of 40 hr/wk for 52 wk/yr) is equal to less than 0.5 microsievert (0.05 mrem) per hour.

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

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

Licensees may also choose to use environmental film badges, TLDs, or OSLs 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.

Note: TLDs used for personnel monitoring 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 supplier and choose more sensitive TLDs to be 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 Example 1, **Figure 2**, and Findings paragraph. 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 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 film badge received 100 mrem.

Table 10. Combination Measurement-Calculation 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 d/yr x 24 hr/d = 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 which could be received in any one hour. **Step 4** indicates that the annual dose received would be much greater than the 100 mrem in a year allowed by the regulations.		
PART 2		
At this point Joe can adjust for a realistic estimate of the time the secretary spends in the area as he did in Part 2 of Example 1.		
PART 3		
If the results of Joe's evaluation in Part 2 show that the annual dose received in a year exceeds 100 mrem, then he can make adjustments for realistic estimates of the time spent in the area of concern while the gauges 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 hr/d for the 30 days that the TLD was in place.)		

Appendix J

Requests to Perform Leak Testing and Sample Analysis

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; and
- 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).
- A liquid scintillation or gas-flow proportional counting system will be used to count samples from gauges containing 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 SSDR Certificate.

Procedure for Performing Leak Testing and Analysis

- For each source to be tested, list identifying information such as gauge serial number, radionuclide, and 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 0.005 microcurie (185 Bq) 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: $\frac{[(\text{cpm from std}) - (\text{cpm from bkg})]}{\text{activity of std in Bq}}$ = 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: $\frac{[(\text{cpm from wipe sample}) - (\text{cpm from bkg})]}{\text{efficiency in cpm/Bq}}$ = Bq on wipe sample

- Sign and date the list of sources, data, and calculations. Retain records for 5 years.
- If the wipe test activity is 0.005 microcurie (185 Bq) or greater, notify the RSO so that the source can be withdrawn from use and disposed of properly. Also notify VDH.

Appendix K

Major DOT Regulations; Sample Bill of Lading

Major DOT Regulations and 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 A_1 and A_2, table of A_1 and A_2 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

Portable gauges are generally shipped either as excepted packages for limited quantities of radioactive material or as Type A packages. Packages may be shipped as limited quantities if the radiation level at any point on the external surface of the package does not exceed 0.005 mSv/hour (0.5 mrem/hour). Packages with higher radiation levels are shipped as Type A packages. The following tables summarize labeling, marking, and shipping paper requirements for Type A packages.

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.			
• Labeling is required to be: (1) placed near the required marking of the proper shipping name, (2) printed or affixed to the package surface, (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. • Two labels are required on opposite sides of the package, excluding the bottom.			
Determination of Required Label			
Size: *Sides:* ≥ 100 mm *Border:* 5-6.3 mm	 49 CFR 172.436	 49 CFR 172.438	 49 CFR 172.440
	WHITE-I	YELLOW-II	YELLOW-III
Required when:	Surface radiation level ≤ 0.005 mSv/hour (0.5 mrem/hour)	0.005 mSv/hour (0.5 mrem/hour) < surface radiation level ≤ 0.5 mSv/hour (50 mrem/hour)	0.5 mSv/hour (50 mrem/hour) < surface radiation level ≤ 2 mSv/hour (200 mrem/hour)
Or:	TI = 0 [1 meter dose rate < 0.5 mrem/hour]	TI ≤ 1 [1 meter dose rate ≤ 1 mrem/hour]	1 < TI ≤ 10 [1 meter dose rate ≤ 10 mrem/hour]
Content on Radioactive Labels			
RADIOACTIVE label must contain (entered using a durable, weather-resistant means): (1) The radionuclides in the package. Symbols (e.g., Cs-137) 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. (3) The Transport Index (TI) in the supplied box. The TI is entered only on YELLOW-II and YELLOW-III labels.			
Some Special Considerations for Labeling Requirements			
• Radioactive material, excepted packages (e.g., Limited Quantity, Radioactive Instrument and Article) are excepted from labeling. • The "Cargo Aircraft Only" label is typically required for radioactive materials packages shipped by air [§172.402(c)]			

Marking Packages (49 CFR 172.300-308) 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.		
Always Required, Unless Excepted	**Sometimes Required**	**Optional**
• 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 truckload lot and entire contents of freight container are shipped from one consignor to one consignee (§172.301(d))	• If in excess of 50 kg, Gross Weight • If hazardous substance, "RQ" in association with the proper shipping name • The package type if Type A or Type B (1/2" or greater letters) • The specification-required markings (see §178.350-353) • For approved packages, the certificate ID number	• Both the name and address of consignor and consignee are recommended. • Other markings (e.g., advertising) are permitted, but must be sufficiently away from markings and labeling
Some Special Considerations 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 packages (§173.421) must bear the marking "radioactive" on the outside of the inner package, or the outer package itself, and are excepted from other marking. • Empty (§173.428) and Radioactive Instrument and Article (§173.424) packages are excepted from marking.		

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.	
Always Required, Unless Excepted	**Sometimes Required**
• The basic desription, 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) • The total quantity (mass), in appropriate units • The name of each radionuclide 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). • 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)	• If hazardous substance, "RQ" as part of the basic description **Optional** • The type of packaging (e.g., Type A) • Other information is permitted (e.g., functional description of product), provided it does not confuse or detract from the proper shipping name or other required information • Emergency response hazards and guidance information (§§172.600-604) may be entered on the shipping papers, or may be carried with the shipping papers
Some Special Considerations/Exceptions for Shipping Paper Requirements	
• Shipments of Radioactive Material, excepted packages, under UN2908-UN2911 (e.g., Limited Quantity, Empty, or 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. • 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.	

SAMPLE BILLS OF LADING

	DATE **SHIP DATE**	P.O. NO.	SHIPPER NO.
CONSIGNEE **RED E. WAITING**	SHIPPER/CONSIGNOR (FROM) **ABC PAVING COMPANY**		
DEF PAVING INTERNATIONAL	**456 MAIN STREET**		
123 DIRT ROAD	**ANY OTHER TOWN, USA 67890**		
ANYTOWN, USA 12345			

PHONE NO.	EMERGENCY RESPONSE NUMBER (REQUIRED IN HM COLUMN MARKED) **123-456-7890**	ROUTE

Number of Packages	HM *	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Weight (lb)	Class or Rate Ref.	Cube (Optional)
1	**x**	**RQ, Radioactive Material, Type A package,**			
		Special Form, 7, UN3332			
		Cs-137, 0.30 GBq (8.0 mCi)			
		Am-241, 1.48 GBq (40 mCi)			
		Radioactive Yellow II Label, TI = 0.3			
		Dim 35 x 45 x 78 cm			
		Emergency Contact: (123) 456-7890			

THIS IS TO CERTIFY THAT THE ABOVE-NAMES MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

SHIPPER/CONSIGNOR **WANDA SHIPPITT**	CARRIER **SB FREIGHTWAYS**
AUTHORIZED SIGNATURE DATE	AUTHORIZED SIGNATURE

Your Company's Letterhead

BILL OF LADING

Shipper: ABS Paving Company
456 Main Street
Any town, USA

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

CS-137, 0.30 GBq (8.0 mCi) Am-241, 1/48 GBq (40.0 mCi)

Radioactive Yellow II Label, TI = 0.3

EMERGENCY CONTACT: (123) 456-7890*

(Signature)
SHIPPER

SAMPLE SHIPPERS DECLARATION FOR DANGEROUS GOODS

Shipper	Air Waybill No. 548974 Page of Pages Shipper's Reference Number 856
Consignee APEX TESTING LABS 355 MAIN STREET ATLANTA, GA USA	
Two completed and signed copies of this Declaration must be handed to the operator	**WARNING** **Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties.**

TRANSPORT DETAILS		
This shipment is within the limitations prescribed for: *(delete non applicable)*		Airport of Departure CHICAGO, OHARE
PASSENGER AIRCRAFT	CARGO AIRCRAFT ONLY	
Airport of Destination: ATLANTA, HARTSFIELD		Shipment Type: *(delete non-applicable)* XXXXXXXXXXXXXX RADIOACTIVE

NATURE AND QUANTITY OF DANGEROUS GOODS
UN NUMBER OR IDENTIFICATION Number, Proper Shipping name, Class or Division (subsidiary risk), Packing Group (if required), and all other required information

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

Cs-137, 0.30 GBq (8 mCi)

Am-241, 1.48 GBq (40 mCi)

All packed in one Type A package

II-Yellow, TI = 0.6, Dim 35 x 42 x 75 cm

Additional Handling Information This shipment may be carried on passenger aircraft outside U.S. jurisdiction.

Emergency response sheet attached to Dangerous Goods Declaration

Emergency Telephone Number **(011) 123-456-7890**

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable International and National Governmental Regulations. I declare that all of the applicable air transport requirements have been met	Name/Title of Signatory A. BROWN, SHIPPING MANAGER Place and Date RICHMOND, VA JAN. 1, 2007 Signature (see warning above)

Appendix L

Security Guidance

Security Guidance

VDH regulations require a portable gauge licensee to use a minimum of two independent physical controls that form tangible barriers to secure portable gauges from unauthorized removal whenever the portable gauge **is not** under the control and constant surveillance by the licensee. "*Control and maintain constant surveillance*" of portable gauges means being immediately present or remaining in close proximity to the portable gauge to prevent unauthorized removal of the portable gauge. The objective of the security guidance is to reduce the opportunity for unauthorized removal and/or theft by providing a delay and deterrent mechanism.

The following security requirements apply to portable gauge licensees regardless of the location, situation, and activities involving the portable gauge. Licensees are required to either maintain control and constant surveillance of the portable gauge when in use or use two independent physical controls to secure the portable gauge from unauthorized removal while in storage. The physical controls used must be designed and constructed of materials suitable for securing the portable gauge from unauthorized removal, and both physical controls must be defeated in order for the portable gauge to be removed. Using two chains is not the preferred method; licensees are encouraged to use other combinations.

As long as the licensee maintains constant control and surveillance while transporting the portable gauges, the licensees need only to comply with the DOT requirements for transportation (e.g., placarding, labeling, shipping papers, blocking and bracing). However, if the licensee leaves the vehicle and portable gauge unattended (e.g., while visiting a gas station, restaurant, store), the licensee needs to ensure that the portable gauge is secured by two independent controls in order to comply with the requirements of **12VAC5-481-840 D**.

While transporting a portable gauge, a licensee should not modify the transportation case if it is being used as the Type A container for transporting the device. This includes, but is not limited to, drilling holes to mount the case to the vehicle or to mount brackets or other devices used for securing the case to the vehicle. In order to maintain its approval as a Type A shipping container, the modified package must be re-evaluated by any of the methods described in **49 CFR Part 178.350** or **173.461(a)**. The re-evaluation must be documented and maintained on file in accordance with DOT regulations.

Physical controls used may include, but are not limited to, a metal chain with a lock, a steel cable with a lock, a secured enclosure, a locked tool box, a locked camper, a locked trailer, a locked trunk of a car, inside a locked vehicle, a locked shelter, a secured fenced-in area, a locked garage, a locked non-portable cabinet, a locked room, or a secured building. To assist licensees, examples of two independent physical controls are provided below.

Securing a Portable Gauge at a Licensed Facility

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

1. The portable gauge or transportation case containing the portable gauge is stored inside a locked storage shed within a secured outdoor area, such as a fenced parking area with a locked gate;

2. The portable gauge or transportation case containing the portable gauge is stored in a room with a locked door within a secured building for which the licensee controls access by lock and key or by a security guard;

3. The portable gauge or transportation case containing the portable gauge is stored inside a locked, non-portable cabinet inside a room with a locked door, if the building is not secured;

4. The portable gauge or transportation case containing the portable gauge is stored in a separate secured area inside a secured mini-warehouse or storage facility; or

5. The portable gauge or transportation case containing the portable gauge is physically secured to the inside structure of a secured mini-warehouse or storage facility.

Securing a Portable Gauge in a Vehicle

12VAC5-481 'Virginia Radiation Protection Regulations', Part XIII 'Transportation of Radioactive Material' requires that licensees who transport licensed material, or who may offer such material to a carrier for transport, must comply with the applicable requirements of the DOT that are found in **49 CFR Parts 170 through 189**.

Licensees commonly use a chain and a padlock to secure a portable gauge in its transportation case to the open bed of a pickup truck, while using the vehicle for storage. Because the transportation case is portable, a theft could occur if the chain is cut and the transportation case with the portable gauge is taken. If a licensee simply loops the chain through the handles of the transportation case, a thief could open the transportation case and take the portable gauge without removing the chain or the case. Similarly, because the transportation case is also portable, it must be protected by two independent physical controls if the portable gauge is inside. A lock on the transportation case, or a lock on the portable gauge source rod handle, is not sufficient because both the case and the gauge are portable.

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

Examples of two such independent physical controls approved by VDH to secure portable gauges in this situation are --

1. The locked transportation case containing the portable gauge is physically secured to a vehicle with brackets, and a chain or steel cable (attached to the vehicle) is wrapped around the transportation case such that the case can not be opened unless the chain or cable is removed (see **Figure 3**);

Figure 3: Security Example #1

2. The portable gauge or transportation case containing the portable gauge is stored in a box physically attached to a vehicle, and the box is secured with (1) two independent locks; (2) two separate chains or steel cables attached independently to the vehicle in such a manner that the box cannot be opened without the removal of the chains or cables; or (3) one lock and one chain or steel cable is attached to the vehicle in such a manner that the box cannot be opened without the removal of the chain or cable (see **Figure 4**); or

Figure 4: Security Example #2

3. The portable gauge or transportation case containing the portable gauge is stored in a locked trunk, camper shell, van, or other similar enclosure and is physically secured to the vehicle by a chain or steel cable in such a manner that one would not be able to open the case or remove the portable gauge without removal of the chain or cable.

Note: The examples and **Figures 3 and 4** are only not prescriptive; there are other ways that licensees may choose to secure their portable gauges.

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

When a job requires storage of a portable gauge at a temporary jobsite or at a location other than a licensed facility, the licensee should use a permanent structure for storage, if practicable. When storing a portable gauge at a temporary jobsite, the licensee should limit access by storing the gauge as far away from members of the public as possible. The licensee must also meet the radiation exposure limits specified in **12VAC5-481-720**. When a portable gauge is stored at a temporary jobsite or at a location other than an authorized facility, the licensee is required to use two independent physical controls to secure the portable gauge. **Examples of two independent physical controls to secure portable gauges at these locations are --**

1. At a temporary job site, the portable gauge or transportation case containing the portable gauge is stored inside a locked building or in a locked non-portable structure (e.g., construction

trailer, sea container, etc.), and is physically secured by a chain or steel cable to a non-portable structure in such a manner that an individual would not be able to open the transportation case or remove the portable gauge without removing the chain or cable. A lock on the transportation case or a lock on the portable gauge source rod handle would not be sufficient because the case and the portable gauge are portable;

2. The portable gauge or transportation case containing the portable gauge is stored in a locked garage, and is within a locked vehicle or is physically secured by a chain or steel cable to the vehicle in such a manner that an individual would not be able to open the transportation case or remove the portable gauge without removing the chain or cable; or

3. The portable gauge or transportation case containing the portable gauge is stored in a locked garage, and is within a locked enclosure or is physically secured by a chain or steel cable to a permanent or non-portable structure in such a manner that an individual would not be able to open the transportation case or remove the portable gauge without removing the chain or cable.

Appendix M

Model Delegation of Authority (RSO)

Memo to: Radiation Safety Officer

From: Chief Executive Officer

Subject: Delegation of Authority

You, _____, have been appointed Radiation Safety Officer and are responsible for ensuring the safe use of radiation. You are responsible for managing the radiation protection program; identifying radiation protection problems; initiating, recommending, or providing corrective actions; verifying implementation of corrective actions; stopping unsafe activities; and ensuring compliance with the rule. You are hereby delegated the authority necessary to meet those responsibilities, including prohibiting the use of radioactive material by employees who do not meet the necessary requirements and shutting down operations where justified by radiation safety. You are required to notify management if staff do not cooperate and do not address radiation safety issues. In addition, you are free to raise issues with the Virginia Department of Health, Radioactive Materials Program at anytime. It is estimated that you will spend _____ hours per week conducting radiation protection activities.

_____

Signature of Management Representative

I accept the above responsibilities,

_____

Signature of Radiation Safety Officer

cc: Affected department heads.

Appendix N

VDH Form
‘Certificate of Disposition of Materials’

Virginia Department of Health
Radioactive Materials Program
(804) 864-8150

CERTIFICATE OF DISPOSITION OF MATERIALS

Completion of this form is required to complete termination of a Radioactive Material License as outlined in **12VAC5-481-500**. Failure to provide information will result in this request for termination of a specific license not being processed.

Instructions – Complete all items. Retain one copy and submit original to Virginia Department of Health, Radioactive Materials Program, 109 Governor Street, Room 730, Richmond, VA 23219.

CONTACT INFORMATION

Item 1 Name and Mailing Address of Applicant:	**Item 2 Virginia Radioactive Material License Number**
	Item 3 Contact Person – Name
, -	**Contact Person - Telephone Number** (Include area code) ( ) - x

TERMINATION AND DISPOSITION INFORMATION

The following information is provided in accordance with **12 VAC 5-481-510.** (Check all that apply)

☐ **Item 4** All use of radioactive material authorized under the above referenced license has been terminated.

☐ **Item 5** Radioactive contamination has been removed to the levels outlined in **12VAC5-481-1161 B.**

☐ **Item 6** All radioactive material previously procured and/or possessed under the authorization granted by the above referenced license has been disposed of as follows. (Check all that apply)

☐ Transferred to: Name Address

Who is (are) authorized to possess such material under Licensed Number:

Issued by (Licensing Agency):

☐ Decayed, surveyed and disposed of as non-radioactive waste.

☐ No radioactive material has ever been procured and/or possessed by the licensee under the authorization granted by the above referenced license.

☐ Other (Attach additional pages)

☐ **Item 7** Attached are radiation surveys or equivalent as specified in **12VAC5-481-510 L**. Specify the survey instrument(s) used and certify that each instrument is properly calibrated as required in **12VAC5-481-510 K**.

☐ **Item 8** Records required to be maintained for the license termination requested are available at the following location(s):

Name:

Address:

Contact Person Telephone Number: ( ) - x

Additional remarks (Attach additional pages if necessary.)

CERTIFICATION (To be completed by an individual authorized to make binding commitments on behalf of the applicant.)

Item 10.

The undersigned, on behalf of the licensee, hereby certifies that licensable quantities of radioactive material under the jurisdiction of the Virginia Department of Health are not possessed by the licensee. It is therefore requested that the above referenced radioactive material license be terminated.

SIGNATURE - Applicant or Authorized Individual	**Date signed**

Print Name and Title of above signatory

Revision 1