



## **A GUIDE FOR PREPARATION OF RADIOACTIVE MATERIALS**

### **LICENSE APPLICATION FOR PORTABLE AND FIXED GAUGING DEVICES**

**Kansas Department of Health and Environment**

**Bureau of Environmental Health**

**Radiation Control Program**

**1000 SW Jackson, Suite 330**

**Topeka, Kansas 66612-1365**

**February 2013**

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The following procedures are for information purposes only and are not intended to be the only means for satisfying the requirements for licensees. These procedures may have to be supplemented to address new materials or methods. When adopting one of the procedures, the applicant must ensure all appropriate aspects of its licensed program are addressed.

## I. PURPOSE OF GUIDE

This guide provides guidance to an applicant in preparing a portable gauge or fixed gauge license application and describes the type of information needed to evaluate an application for a specific license for receipt, possession, use, and transfer of radioactive material contained in portable and fixed gauging devices. Within this document, the phrases "portable gauge" or "gauging devices," and the term "gauge" may be used interchangeably. **The Kansas Department of Health and Environment's**, Radiation Control Section, (the Department) regulations, listed below, apply to radioactive material licenses and should be used in conjunction with this guide. The applicant should carefully read the regulations. This guide does not substitute for an understanding of the regulations.

The Department's Regulations may be found at: <http://www.kdheks.gov/radiation/regs.html>

### APPLICABLE REGULATIONS

#### **Kansas Radiation Protection Regulations (KRPR):**

1. Part 1, "General."
2. Part 3, "Licensing of Sources of Radiation."
3. Part 4, "Standards for Protection against Radiation."
4. Part 10, "Notice, Instructions and Reports to Workers, Inspections."

## II. AS LOW AS REASONABLY ACHIEVABLE

The applicant should, in addition to complying with the requirements set forth in the Kansas Radiation Protection Regulations (KRPR), make every reasonable effort to maintain radiation exposures, and radioactive material effluents to unrestricted areas, **As Low As Reasonably Achievable (ALARA)**. Applicants should give consideration to the ALARA philosophy in the development of operating procedures and in the training of personnel using radioactive material.

Some of the items that should be considered to help maintain radiation exposures as low as reasonably achievable are discussed below. The discussion is not intended to be all inclusive, but should be used as a guide in establishing an operating philosophy for maintaining occupational radiation exposures as low as reasonably achievable.

### TIME, DISTANCE AND SHIELDING

Keep radiation exposure *as low as reasonably achievable (ALARA)* in an occupational setting. This is accomplished by the techniques of *time, distance, and shielding*.

**Time:** The shorter the time in a radiation field, the less the radiation exposure you will receive. Work quickly and efficiently. Plan your work before entering the radiation field.

**Distance:** The farther a person is from a source of radiation, the lower the radiation dose. Levels decrease by a factor of the square of the distance. Do not touch radioactive materials. Use remote handling devices, etc., to move materials to avoid physical contact.

**Shielding:** Placing a radioactive source behind a massive object or a lead shield provides a barrier that can reduce radiation exposure.

The habit of taking advantage of available shielding at temporary job sites also contributes to maintaining low occupational exposures. Again, this practice can and should be addressed during initial training, on-the-job training, and refresher training.

The most important single item is the routine use of survey meters to ensure that radioactive sources have been returned to the storage container after each operation. The necessity of performing adequate surveys should be emphasized during initial classroom training, on-the-job training, and refresher training of personnel.

In addition to providing for items as those listed above, the necessity of using the safety equipment that is provided should be emphasized during initial training of radiation workers.

Management can also contribute to maintaining low occupational exposures by spreading the workload among personnel so that the same person does not always receive the assignment that

involves the highest exposure. Management should review personnel monitoring records to identify those individuals who have exposures higher than the average and to try to establish and correct the cause.

III. **FILING AN APPLICATION**

The information submitted must be sufficient to allow the Department (KDHE) to determine that the proposed equipment, facilities, procedures, and controls are adequate to protect health and minimize danger to life and property. Information submitted should pertain to the specific activities for which authorization is sought and should be complete. Submission of incomplete information will result in delays because of the correspondence necessary to obtain supplemental information.

Applications should be mailed to:

**Kansas Department of Health and Environment**

**Bureau of Environmental Health**

**Radiation Control Program**

**1000 SW Jackson, Suite 330**

**Topeka, KS 66612-1365**

State licensees are required to comply with Department rules and regulations, license conditions, and the content of the submitted application, at least one copy of all information submitted to the Department shall be kept by the applicant for reference.

IV. **RADIOACTIVE MATERIALS APPLICATION FORM RH-1**

Two copies of the application Form RH-1 should be completed following the instructions provided with the form. One copy should be sent to KDHE; one should be filed and kept by the applicant. Since the space provided on the form is limited, additional sheets should be appended as necessary. Supplemental information should be labeled to identify the applicant and reference the items for which information is being given. The following examples deal with the indicated items of the Form RH-1.

**Item 1a - Applicant:** Provide the applicant or other legal entity (corporation, etc.) by name and mailing address in Item 1(a). Individuals should be designated as the applicant only if they are

acting in a private capacity and the use of radioactive material is not connected with their employment with a corporation or other legal entity.

**Example**

- |                                                                             |
|-----------------------------------------------------------------------------|
| 1. Public Engineering Company<br>123 Main Street, Suite A<br>Town, KS 66600 |
|-----------------------------------------------------------------------------|

**Item 1b – Locations of Use:**

Provide the actual sites of use in 1(b). Permanent facilities such as field office storage areas for the gauges or devices are identified in 1(b) by street address, city, and state. In addition, field locations of use should be specified as "temporary job sites of applicant throughout the state of Kansas".

**Example**

- |                                                    |
|----------------------------------------------------|
| 2. 456 Main Street, Building 12<br>Town, KS 66600  |
| Temporary job sites throughout the state of Kansas |

Attach additional sheets if more space is needed.

**Items 2 and 3: Self Explanatory.**

**Item 4 - Individual User(s):** Each person who will use radioactive material should be named and their qualifications provided. If users are not named on the license then the training records shall be retained by the licensee for review by the department. An authorized individual user shall be present and directly supervise use at any temporary job site. User qualifications include, at a minimum, the completion of a device manufacturer's or other approved training course or program.

**See Appendix A –Training Criteria**

**Example**

- |                                                                                                         |
|---------------------------------------------------------------------------------------------------------|
| 4. John Q. Public, Supervisor<br>Jane C. Jones<br>Joe T. Smith<br>See attached training and experience. |
|---------------------------------------------------------------------------------------------------------|

**Item 5 - Radiation Protection Officer:** Provide the name of the radiation protection officer in Item #5. Provide a statement with the application outlining the named individual's duties and responsibilities. The radiation protection officer is expected to coordinate the safe use of the nuclear gauging devices and ensure compliance with the requirements of the Kansas Radiation Protection Regulations, and applicable U.S. Department of Transportation regulations. **See Appendix B.**

**Example**

5. John Q. Public, RSO  
See attached training, list of duties and responsibilities.

**Item 6a and 6b - Radioactive Materials:** Identify each radionuclide to be used in a given gauge or device by isotope (for example, cesium-137, americium-241, etc.) in 6a. Identify the manufacturer, chemical or physical form (for example sealed source), Sealed Source and Device Registry number, model number and total activity or number of sources in millicuries in 6b (for operational flexibility, the applicant may request more sources or devices than they actually possess).

**Examples of two portable and one fixed gauge.**

6. Radioactive Material (Element and Mass Number)	7. Chemical and/or Physical Form	8. Maximum Quantity Licensee May Possess at One Time
---------------------------------------------------	----------------------------------	------------------------------------------------------

A. Cesium-137	Sealed source(s): (Smith Drawing No. S-148787)	3 source(s). No single source to exceed 8 millicurie(s).
B. Americium241/Beryllium	Sealed source(s): (Smith Drawing No. S-148788)	3 source(s). No single source to exceed 40 millicurie(s).
C. Americium-241	Sealed source(s): ( Smith Co. Model ABC-3)	2 source(s). No single source to exceed 50 millicurie(s).

**Item 7 – Purpose for Which Radioactive Material Will Be Used:** Provide the purpose for which the gauges or devices will be used, for example. "Moisture-density gauges to be used for measuring moisture content and surface density of construction materials."

## Example

A. To be used as components of Smith 1400 series moisture and density gauges for measuring moisture and surface density of construction materials.
B. To be used as components of Smith 1400 series moisture and density gauges for measuring moisture and surface density of construction materials.
C. To be used in Smith Co. Model ABC source holders for determination of fill levels of finished products on an industrial production line.

**Item 8 - Training:** Provide the documented training of each person who will directly supervise the use of the gauges or devices or who will have radiological safety responsibilities indicated in Item 4 above. Provide copies of all training certificates. The qualifications of users and radiation safety personnel should be commensurate with the proposed use. **Hazardous material (HAZMAT) training is required to be completed every three (3) years for persons who transport radioactive material.**

**Item 9 - Experience with Radiation:** Provide the experience of actual use of radioactive material, gauges or devices of each person who will directly supervise the use of the gauges or devices or who will have radiological safety responsibilities indicated in Item 4 above.

**Item 10 - Radiation Survey Instruments:** Describe the manufacturer, model number, quantity, radiation detected, range and use of radiation survey instruments. Radiation survey instruments may not normally be required if the applicant plans only to use the gauges and devices for their intended use and does not plan to perform non-routine maintenance on the gauges and/or devices involving access to the sources and source holders. If the applicant will not possess radiation survey instruments, the applicant is required to have access to radiation survey instruments in the event the radioactive material or device is damaged. Please provide documented justification and describe how radiation survey instruments will be obtained when needed.

Note: A radiation survey meter should—

- be capable of detecting gamma radiation; and
- be checked for functionality before use (e.g., with the gauge or a check source).

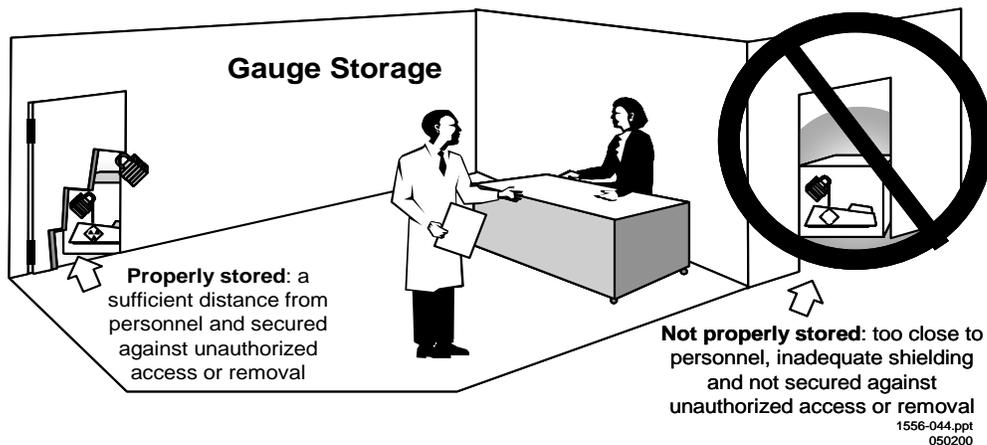
**Item 11 – Calibrations:** Describe the survey meter calibration procedure. If the applicant intends to contract out the calibration of survey instruments, the name, address and license number of the calibration firm should be specified together with the frequency of the calibration not to exceed annual.

**Item 12 - Personnel Monitoring:** Normally, personnel using portable moisture-density gauges are required to wear personnel monitoring devices such as film badges or thermoluminescence dosimeters (TLD). Users of devices exhibiting low radiation levels at the surface of the device, such as X-ray fluorescence (XRF) analyzers, etc., are not usually required to wear personnel monitoring devices, if justification is supplied. If personnel monitoring devices will be utilized,

specify the type of device, that is, film badges, thermoluminescence dosimeters (TLD), Optically Stimulated dosimeter (OSL and that is exchanged at a frequency recommended by the processor (monthly, quarterly etc.).

The name and address of the service provider. The service provider must be accredited by NVLAP (National Voluntary Laboratory Accreditation Program) for the device, radiation type and exposure expected to be encountered.

**Item 13 - Facilities and Equipment:** Provide a description of the security and storage of gauges or devices at each address listed in 1b when gauges or devices are not in actual use. Gauges and devices must be stored in such a manner as to ensure against unauthorized removal or unauthorized use as required by K.A.R.28-35-222a. Provide a simple annotated sketch of the storage area, closet, etc., at each address listed in 1b showing the relationship to actively occupied areas.



**Item 14 - Radiation Protection Program:** Provide procedures to ensure compliance with the provisions of Part 10, "Notices, Instructions and Reports to Workers, Inspections," and Part 4 "Standards for Protection against Radiation", of the KRPR's. Radiation safety and emergency procedures should be in the form of written instructions to users and cover the following items:



**NOTICE TO EMPLOYEES**  
STANDARDS FOR PROTECTION AGAINST RADIATION (Part 4)  
NOTICES, INSTRUCTIONS AND REPORTS TO WORKER: INSPECTIONS (Part 10)

In the Kansas Radiation Protection Regulations, the Department of Health and Environment Has Established Certain Provisions for the Options of Employees Engaged in Activities under an Agency License or Registration.

**YOUR EMPLOYER'S RESPONSIBILITY**

Your employer is required to:

1. Apply these regulations to work involving sources of radiation.
2. Post or otherwise make available to you a copy of the Department of Health and Environment regulations, licenses, and operating procedures which apply to work you are engaged in, and explain their provisions to you.
3. Post any Notice of Violation involving radiological working conditions, proposed imposition of civil penalties or orders.

**YOUR RESPONSIBILITY AS AN EMPLOYEE**

You should familiarize yourself with these provisions of the Department of Health and Environment regulations, and the operating procedures which apply to the work you are engaged in. You should observe their provisions for your own protection and that of your co-workers.

**WHAT IS COVERED BY THESE REGULATIONS**

1. Annual dose limits of individuals occupationally exposed to radiation and radioactive materials;
2. Measures to be taken after accidental exposure;
3. Personnel monitoring, surveys and equipment;
4. Caution signs, labels and safety interlock equipment;
5. Occupational dose records and reports;
6. Options for employees regarding Department inspections;
7. Related matters.

**CONTACTING THE DEPARTMENT**

Inquiries dealing with the matters outlined above can be sent to Radiation Control Program, Bureau of Environmental Health, Kansas Department of Health and Environment, 1000 Star Jackson, Suite 130, Topeka, Kansas, 66612-1365, call (785) 296-1560, FAX (785) 296-0994, or the internet at [www.kdhe.ks.gov/radiation](http://www.kdhe.ks.gov/radiation).

**REPORTS ON YOUR EXPOSURE HISTORY**

1. The Department of Health and Environment regulations require that your employer give you a written report if you receive an occupational dose in excess of any applicable limit as set forth in the regulations or in the license. The occupational dose limits for individuals are set forth in 28-35-212a, 28-35-212f, 28-35-212a and 28-35-212g of the regulations. These sections specify occupational dose limits for exposure to radiation and exposure to concentrations of radioactive materials in air or water.
2. If you work where personnel monitoring is required, or if you request information on your occupational dose.
  - a. Your employer must give you a written report, upon termination of your employment, of your occupational dose, or upon request, and
  - b. Your employer must advise you annually of your occupational dose.

**INSPECTIONS**

All licensed or registered activities are subject to inspection by representatives of the Department of Health and Environment. In addition, any employee or representative of the employee who believes that there is a violation of the Nuclear Energy Development and Radiation Control Act 48-1501 et seq, the regulations issued there under, or the terms of the employer's license or registration with regard to radiological working conditions in which the employee is engaged, may request an inspection by sending a notice of the alleged violation to the Kansas Department of Health and Environment. The request must set forth the specific grounds for the notice, and must be signed by the employee or a representative of the employee. During inspections, Agency inspectors may confer privately with employees, and any employee may bring to the attention of the inspectors any past or present conditions which they believe contributed to or caused any violation as described above.

**RAISING CONCERNS**

No licensee or registrant shall discharge or in any manner discriminate against any worker because the worker has filed any complaint, or instituted or caused to be instituted, any proceeding, or has testified or is about to testify in any proceeding, or because of the exercise by the worker on behalf of the worker or others of any option afforded by the regulations.

**POSTING REQUIREMENT**

Copies of this notice must be posted in a sufficient number of places where employees are engaged in activities licensed or registered pursuant to parts 2 and 3 of the Kansas Radiation Protection Regulations, to permit individuals the opportunity to observe a copy of this notice while on the way to or from the above mentioned activities.

**RH-3 form "Notice to Employees" must be posted.**

- (a) Safety measures to be used in transporting the devices in the applicants' vehicle (for example, fully secured within transportation vehicle and away from the passenger compartment). Transportation activities must be carried out in accordance with the requirements of K.A.R. 28-35-195a and K.A.R. 28-35-196a and the U.S. Department of Transportation regulations.
- (b) State that individual users are never to leave gauges unattended or unsecured. Describe the means of preventing unauthorized use or removal of gauges or devices from the designated place(s) of storage at the locations listed in 1b and at temporary job sites.
- (c) The procedure for conducting a **documented** physical inventory every six months. This inventory should include the quantities and kinds of radioactive materials, location of sources, the date and who conducted the inventory.
- (d) Emergency procedures to be followed in case of accidents involving damage or loss of the gauges or devices, including names and telephone numbers of the individual(s) with the applicant's organization who should be notified and who would, in turn, notify the local

police, Radiation Control Program and the NRC (if applicable). The expected time frame for decommissioning should be included.

- (e) Specific instructions prohibiting any maintenance on the gauges involving dismantling, removal of source holder(s) etc., except by the manufacturer of the device, unless the applicant has specifically requested authority for performing maintenance in the application. Describe any routine maintenance such as cleaning and lubrication of the gauge or device such as “routine maintenance of the gauge will be in accordance with the manufacturer instructions”.

If the applicant wishes to be authorized to perform maintenance and repair on gauges and devices involving access to the source holders, and/or dismantling of the shielding or shutter devices, specific information on the step-by-step procedures to be followed including radiation safety precautions must be supplied. In addition, the names of personnel and the specific pertinent training of the personnel who will be performing such maintenance and repair must be given.

- (f) Describe the procedure for leak testing the sealed sources requested in the application. Provide the name of the manufacturer of the leak test kit and service performing the analysis. If the applicant desires to perform his own leak tests and not use a leak test kit, the following information should be submitted.
  - (1) The name(s) and qualifications of personnel who will perform the leak test.
  - (2) The safety procedures to be followed during the testing to minimize exposure to personnel.
  - (3) The test procedures and materials to be used.
  - (4) The instrument type, manufacturer's name and model number used to assay the sample. The sampling and analysis methods must be capable of detecting the presence of 0.005 microcurie (185 Bq) of contamination.

## **Leak Test**

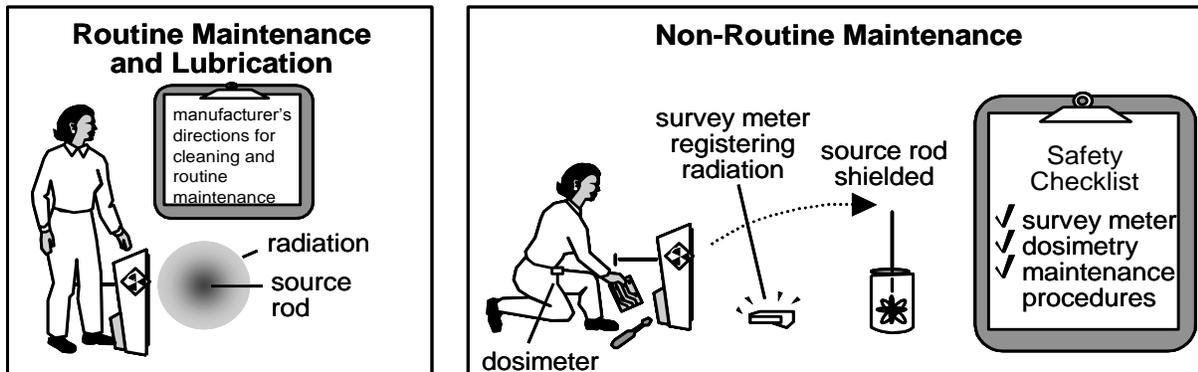
The Department requires testing to determine whether there is any radioactive leakage from the source in the device. The Department finds testing to be acceptable if it is conducted by an organization licensed by the NRC or an Agreement State. Licensees must maintain records of test results.

Manufacturers, consultants, and other organizations may be authorized by the NRC or an Agreement State to either perform the entire leak test process for other licensees or provide leak-test kits to licensees. In the latter case, the licensee is expected to take the leak test sample according to the gauge manufacturer's and the kit supplier's instructions and return it to the kit supplier for evaluation and reporting

results. Leak test samples should be collected at the most accessible area where contamination would accumulate if the sealed source were leaking.

## Maintenance.

All licensees need to perform routine cleaning and lubrication to ensure proper operation of the gauge. For nonroutine maintenance, most licensees rely on the gauge manufacturer or other service companies.



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**Item 15 - Waste Disposal:** Provide the means of disposal. Sealed sources containing radioactive material may be returned to the manufacturer, transferred to another licensee authorized to possess the specific quantity and form being transferred, or transferred to a licensed waste disposal firm.

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

**Note:** 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 the NRC or an Agreement State to accept radioactive waste from other persons, or another specific licensee authorized to possess the licensed material (i.e., their license specifically authorizes the type, form, and quantity of the byproduct material).

Before transferring radioactive material, the licensee must verify that the recipient is properly authorized to receive the licensed material and that the gauge(s) have a current leak test certificate.

**Item 16 – Certificate:** Provide the printed name and signature of the individual authorized to act on behalf of the applicant. Provide the date and contact information (telephone number and/or email address) for the certifying individual.

V. **Amendments and Renewals**

It is the licensee's obligation to keep the license current. If any of the information provided in the original application is to be modified or changed, the licensee must submit an application for a license amendment before the change takes place. The change is not in effect until the amendment has been issued.

Licenses are issued for a period of 5 years. Send a completed RH-1 application for renewal in its entirety to the address specified in this guide. Provide all the information required as if it were an application for a new license without referring to previously submitted information. Also, to continue the license after its expiration date, the licensee must submit an application for a license renewal at least 30 days before the expiration date.

VI. **Material Receipt and Accountability**

Licensees must do the following:

- \_ Maintain records of receipt, transfer, and disposal of gauges; and
- \_ Conduct physical inventories at intervals not to exceed 6 months.

**Vacating any Facility** K.A.R. 28-35-231a

Each licensee shall file written notice with the secretary 30 days before vacating any facility when the licensee decides to permanently discontinue all activities involving licensed materials authorized in that facility under the license.

## APPENDIX A

### **Criteria for Acceptable Training Courses for Portable and Fixed Gauge Users**

#### **Course Content**

Acceptable course content for training courses for portable gauge users includes the following:

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

#### **Course Examination**

Prospective gauge users participating in training courses should achieve at least a 70-percent score on a 25 to 50-question, closed-book, written test. The test should include the following:

- an emphasis on radiation safety of portable gauge storage, security of gauges while on job sites, 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 the prospective gauge user following the scoring of the test

#### **NOTE: Online Courses**

Online training for portable gauge users is acceptable. The online training topics should follow the suggested Course Content in Appendix A. Any online training should be supplemented by the practical training also described under course content. The applicant/licensee should demonstrate how it will meet the training described under course content and may consider providing a copy of the curricula covered in the course.

Online training courses should also include an examination described under Course Examination.

## **Instructor Training and Experience**

Instructors should have, at a minimum, the following:

- successful completion of a portable gauge user course
- successful completion of an 8-hour radiation safety course or RSO training course
- documentation of 8 hours of hands-on experience with portable gauges

**Note:** Maintain records of training for 3 years after the last use of licensed material by the authorized user.

## APPENDIX B

### Typical Radiation Safety Officer Duties and Responsibilities

- Licensed activities that the RSO considers unsafe are stopped.
- Possession, use, storage, and maintenance of sources and gauges are consistent with the limitations in the license, the Sealed Source and Device Registration Certificate(s), and the manufacturer's recommendations and instructions.
- Individuals who use gauges are properly trained.
- When necessary, personnel monitoring devices are used and exchanged at the proper intervals; records of the results of such monitoring are maintained.
- Gauges are properly secured.
- Proper authorities are notified in case of accident, damage to gauges, fire, or theft.
- Unusual occurrences involving the gauge (e.g., accident, damage) are investigated, cause(s) and appropriate corrective action(s) identified, and corrective action(s) taken.
- Audits are performed at least annually and documented, and corrective actions are taken.
- Licensed material is transported in accordance with all applicable Department and DOT requirements.
- Licensed material is disposed of properly.
- All required records are maintained.
- An up-to-date license is maintained, and amendment and renewal requests are submitted in a timely manner.
- Up-to-date operating, emergency, and security procedures are developed, maintained, distributed, and implemented.
- Nonroutine operations are performed by the manufacturer, distributor, or person specifically authorized by the NRC or an Agreement State.
- Documentation is maintained to demonstrate, by measurement or calculation, that the total effective dose equivalent to the individual member of the public likely to receive the highest dose from the licensed operation does not exceed the annual limit in K.A.R. 28-35-214a, "Dose limits for individual members of the public."
- When the licensee identifies violation(s) of regulations or license conditions or program weaknesses, corrective action(s) are developed, implemented, and documented.

## APPENDIX C

### OPERATING, EMERGENCY, AND SECURITY PROCEDURES

#### Operating Procedures

- If personnel dosimetry is provided, do the following:
  - Always wear the assigned dosimetry when using the gauge.
  - Never wear another person's dosimetry.
  - Never store dosimetry near the gauge.
- Before removing the gauge from its place of storage, ensure that, where applicable, each gauge source is in the fully shielded position and that, in gauges with a movable rod containing a sealed source, the source rod is locked (e.g., keyed lock, padlock, mechanical control) in the shielded position. Place the gauge in the transport case and lock the case.
- Sign out the gauge in a log book (that remains at the storage location), including the date(s) of use, name(s) of the authorized users who will be responsible for the gauge, and the temporary job site(s) where the gauge will be used.
- Block and brace the gauge to prevent movement during transport and lock the gauge in or to the vehicle. Follow all applicable DOT requirements when transporting the gauge.
- Use the gauge according to the manufacturer's instructions and recommendations.
- Do not touch the unshielded source rod with your fingers, hands, or any part of your body.
- Do not place hands, fingers, feet, or other body parts in the radiation field from an unshielded source.
- Unless absolutely necessary, do not look under the gauge when the source rod is being lowered into the ground. If you must look under the gauge to align the source rod with the hole, follow the manufacturer's procedures to minimize radiation exposure.
- After completing each measurement in which the source is unshielded, immediately return the source to the shielded position.
- Always maintain constant surveillance and immediate control of the gauge when it is not in storage. At job sites, do not walk away from the gauge when it is left on the ground. Take action necessary to protect the gauge and yourself from danger of moving heavy equipment.

- Always keep unauthorized persons away from the gauge.
- Perform routine cleaning and maintenance according to the manufacturer's instructions and recommendations.
- When the gauge is not in use at a temporary job site, place the gauge in a secured storage location.
- Before transporting the gauge, ensure that, where applicable, each gauge source is in the fully shielded position. Ensure that, in gauges with a movable source rod, the source rod is locked in the shielded position (e.g., keyed lock, padlock, mechanical control). Place the gauge in the transport case and lock the case. Block, brace, and lock the case to prevent movement during transportation.
- Return the gauge to its proper locked storage location at the end of the work shift.
- Log the gauge into the daily use log when it is returned to storage.
- If gauges are used for measurements with the unshielded source extended more than 3 feet beneath the surface, use piping, tubing, or other casing material to line the hole from the lowest depth to 12 inches above the surface. If the piping, tubing, or other casing material cannot extend 12 inches above the surface, cap the hole liner or take other steps to ensure that the hole is free of debris (and it is unlikely that debris will reenter the cased hole) so that the unshielded source can move freely (e.g., use a dummy probe to verify that the hole is free of obstructions).
- After making changes affecting the gauge storage area (e.g., changing the location of gauges within the storage area, removing shielding, adding gauges, changing the occupancy of adjacent areas, moving the storage area to a new location), reevaluate compliance with public dose limits and ensure proper security of the gauges.

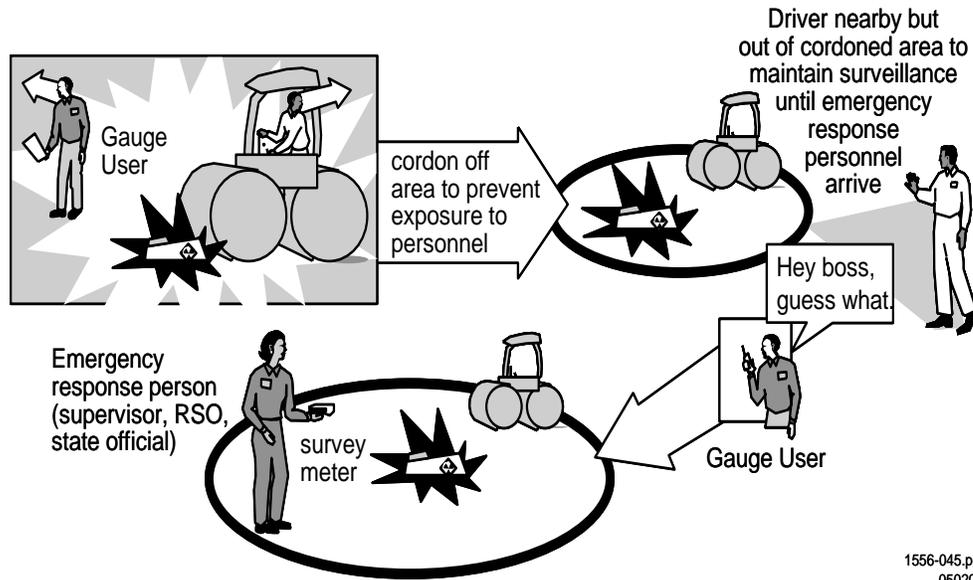
### **Emergency Procedures**

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

- 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 that there is no contamination present.
- Gauge users and other potentially contaminated individuals should not leave the scene until emergency assistance arrives.

- Follow your emergency notification phone log.

## Proper Handling of Incidents



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**Proper handling. Gauges are often damaged by heavy equipment at job sites; therefore, emergency procedures need to be followed to minimize radiation safety risk.**

**Note:** Lost or stolen gauges and, as illustrated above, gauges damaged by heavy equipment during use at job sites are the most common occurrences that present a potentially significant radiation safety risk. Operating, emergency, and security procedures must be developed to minimize these risks.

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

## Security Procedures

### Information to Consider when Developing Security Procedures

The following information provides guidance to assist the licensee in developing security procedures.

**K.A.R. 28-35-184a. Each portable gauge licensee shall use at least two independent physical controls that form tangible barriers to secure each portable gauge from unauthorized removal whenever the portable gauge is not under the control and constant surveillance of the licensee.**

**Note:** “Control and maintain constant surveillance” of portable gauges means being immediately present or in close proximity to the portable gauge so as to be able to prevent unauthorized removal of the portable gauge. The objective of security requirements is to reduce the opportunity for unauthorized removal and/or theft by providing a delay and deterrent mechanism.

At all times, licensees are required to maintain control and constant surveillance of the portable gauge when it is in use and, at a minimum, use two independent physical controls to secure the portable gauge from unauthorized removal while it is in storage. The physical controls used should be designed and constructed of materials suitable for securing the portable gauge from unauthorized removal, and both physical controls must be defeated in order for the portable gauge to be removed. The construction and design of the physical controls should be such that they will deter theft by requiring a more determined effort to remove the portable gauge. The security procedures should ensure that the two physical barriers chosen increase the deterrence value over that of a single barrier, and that the two physical barriers would make unauthorized removal of the portable gauge more difficult.

For example, using two chains may not be the most effective means of control. To provide adequate security, licensees are encouraged to use combinations of physical controls. K.A.R. 28-35-184a requires that each portable gauge licensee shall use a minimum of two independent physical controls. For example, if two chains are used, each chain and lock combination should physically be robust enough to provide both a deterrence and a reasonable delay mechanism. When two chains or cables are used, the second chain or cable should be substantially more robust and more difficult to cut than the first chain or cable.

**The following are examples of how two independent physical controls can be used to secure a portable gauge when it is stored at a licensed facility:**

- (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, access to which the licensee controls 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, nonportable 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.

- (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 at a Licensed Facility**

Long-term storage of a portable gauge is usually at a permanent facility listed in the license or license application. Routine storage of a portable gauge in a vehicle or at temporary or permanent residential quarters is usually reviewed by the Department and may be authorized during the licensing process. In accordance with the Department security regulations, when a portable gauge is stored at a licensed facility, the licensee would be specifically required to use a minimum of two independent physical controls to secure the gauge.

### **Securing a Portable Gauge at a Temporary Job Site or at Locations Other than a Licensed Facility**

When a job requires storage of a portable gauge at a temporary job site or at a location other than a licensed facility, the licensee should use a permanent structure for storage, if practicable to do so. When storing a portable gauge in temporary or permanent residential quarters, the licensee should limit access by storing the gauge in a separate room away from residents and other members of the public. The licensee must also meet the radiation exposure limits specified in K.A.R. 28-35-214a. "Dose limits for individual members of the public" (When a portable gauge is stored at a temporary job site or at a location other than an authorized facility, the licensee is required to use a minimum of two independent physical controls to secure the portable gauge).

### **The following are examples of how two independent physical controls are used to secure portable gauges at these locations:**

- (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 nonportable structure (e.g., construction trailer, sea container) and is physically secured by a chain or steel cable to a nonportable 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 inside a locked room within temporary or permanent residential quarters and is physically secured by a chain or steel cable to a permanent or nonportable structure (e.g., large metal drain pipe, support column)

such that an individual would not be able to open the transportation case or remove the portable gauge without removing the chain or cable.

- (3) 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.
- (4) 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 nonportable 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.

### **Transportation**

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

Initial and recurrent training must be given to all employees who transport portable gauges per the requirements of Subpart H, "Training," of 49 CFR Part 172.

A carrier may not transport a hazardous material by motor vehicle unless each of its hazmat employees involved in that transportation is trained as required by this part and subpart H of part 172 of this subchapter.

**A hazmat employee must receive the training required by this subpart at least once every three years.**

Some DOT requirements are 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.

If possible, the licensee should consider storing its portable gauges inside a locked facility or other nonportable structure overnight, instead of storing them in a vehicle.

As long as the licensee maintains constant control and surveillance while transporting the portable gauges, the licensee need only 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 portable gauge must be secured by two independent controls as required by K.A.R. 28-35-184a.

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 the event the package is modified, the modified package must be reevaluated by any of the methods described in 49 CFR 178.350, "Specification 7A; General Packaging, Type A. The reevaluation must be documented and maintained on file in accordance with DOT regulations.

Physical controls 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 nonportable cabinet, a locked room, or a secured building.

**Note:** A common use has been 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. 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, the Department and DOT recommend that this practice only be used for short periods of time, or when a portable gauge is in transit. A portable gauge should only be kept in a vehicle overnight if it is not practicable to provide temporary storage in a permanent structure. When a portable gauge is being stored in a vehicle, the licensee is specifically required to use a minimum of two independent physical controls to secure the portable gauge.

## Examples to secure portable gauges in a vehicle:

- (1) The locked transportation case containing the portable gauge is physically secured to a vehicle with brackets, and a chain or steel cable (attached to the vehicle) is wrapped around the transportation case such that the case cannot be opened unless the chain or cable is removed. In this example, the locked transportation case would count as one control because the brackets would prevent easy removal of the case. Looping the chain or cable only through the transportation case handle is not acceptable. See Figure-1 for an example of a transportation case.



Figure-1: Transportation Case

- (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-2 for an example of a box physically attached to a vehicle.



**Figure-2: Box physically attached to a vehicle**

**Note:** The photos in Figures-1 and 2 are only two examples of securing portable gauges. There are other ways that licensees may choose to secure their portable gauges.

- (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.