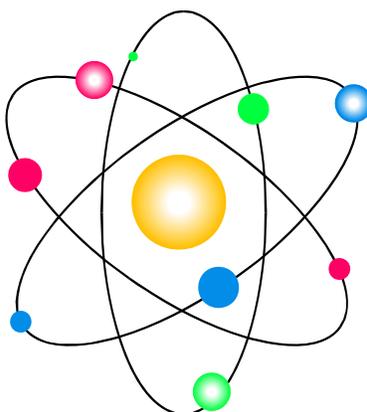




RADIOACTIVE MATERIALS REGULATORY GUIDE



PORTAL MONITORING SYSTEMS



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REGULATORY GUIDE FOR PORTAL MONITORING SYSTEMS

PURPOSE

Regulatory Guides are issued to describe and make information such as acceptable methods for implementing specific parts of the Minnesota Department of Health's Radioactive Materials Rules, Chapter 4731. The information in this guide is not a substitute for training in radiation safety or for developing and implementing an effective radiation safety program. Regulatory guides are not substitutes for regulations and compliance with them is not required.

Comments and suggestions for improvements in these guides are encouraged, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience.

INTRODUCTION

Every reasonable effort should be made to maintain radiation exposures and releases of radioactive material as low as reasonably achievable (ALARA). The handling of radioactive material always poses a potential health and safety risk from radiation, contamination, or both. There is also a possibility for financial damage associated with removal of contamination from land, equipment, or buildings.

To minimize health and financial risks, an increasing number of facilities have installed radiation detection devices at their entrances to identify vehicles containing radioactive material. While the types and manufacturers of these devices may vary, all systems employ similar procedures to prevent radioactive material from being received, processed, or transferred.

DISCUSSION

To use radiation detection systems effectively, a company must develop procedures for the use of the equipment and train the personnel responsible for its operation. A thorough understanding of what an alarm indicates, how to respond to the alarm, and who must be notified is imperative if problems are to be minimized. Another important but frequently overlooked item is record keeping. This guide addresses each item in as generic terms as possible. It is the responsibility of each company to tailor the information to the equipment and physical layout at their facility.

Minnesota Department of Health rules require that the dose limit for members of the public not exceed 2.0 millirem in any one hour. It is important that access to any vehicle containing radioactive material be restricted when radiation levels of 2.0 mR/hr or greater are identified. Move the vehicle to an isolated area of the facility and warn others to stay clear.

Contamination of personnel and the environment may result from improper handling of radioactive material. If the source is not properly sealed or if the sealed source is leaking, the personnel handling the material may become contaminated and the contamination may be spread to the environment. Take precautions (e.g., wear gloves and have a container readily available) when attempting to segregate the load, to find the source, or to handle the radioactive material.

DEPARTMENT OF TRANSPORTATION SPECIAL PERMIT (DOT-E 10656)

Shipments of waste, scrap metal, related metal recycling materials found to contain small amounts of unidentified radioactive material may be offered for transportation and will not be subject to the classification, packaging, and hazardous communication requirements. Each shipment requires an approval signed by a state radiation official and compliance with other requirements of the special permit.

Using the DOT special permit establishes accountability for the shipment, which means that the materials will not be improperly disposed of or taken to another facility that may not have detection equipment. In addition, by returning the material to the originator, the facility that identified the presence of radioactive material can avoid the costs associated with separation, survey, and disposal.

THE ROLE OF THE MINNESOTA DEPARTMENT OF HEALTH

The Minnesota Department of Health can issue a DOT special permit for containers with significant radiation levels. However, to minimize the risk of exposures to members of the public, Minnesota Department of Health will not normally permit shipments with surface radiation levels that exceed 2.0 mR per hour (mR/hr). Radiation levels on the surface of a bulk container are not likely to exceed 2.0 mR/hr. Most shipments have had radiation levels in the microR/hr (μ R/hr) range and can be shipped using the DOT special permit. Therefore, Minnesota Department of Health normally will collect the information necessary for the DOT special permit (see Appendix A) and fax copies to the appropriate locations.

Minnesota Department of Health discourages separating large shipments to find the radioactive material. In the separation process, loose radioactive material could be deposited on employee's gloves, clothing, or skin. In addition, if proper precautions are not taken, an employee could ingest or inhale radioactive material. It is more appropriate to isolate the load and to contact Minnesota Department of Health. Minnesota Department of Health will then assist in locating and isolating the source(s).

The Minnesota Department of Health maintains a list of radioactive waste brokers. Minnesota Department of Health will provide a current list to assist in the proper disposal of radioactive material that the facility possesses.

EQUIPMENT

After the equipment is installed, it must be maintained according to the manufacturer's specifications. This may include periodic operational checks, maintenance, and calibrations. Hand held survey instruments should be considered part of the detection system. The routine checks, maintenance and calibration are as important as the rest of the system components.

Regardless of design, all radiation detection systems can be rendered useless if the object being monitored passes the detector too quickly. Any vehicle passing the detector must maintain a steady, slow speed. Most equipment requires that the speed be between three and five miles per hour. Your company should establish and enforce the speed limit specified by the equipment manufacturer. The appropriate speed should be posted so that the vehicle operator is aware of the restriction.

The facility should establish an alarm set-point that will minimize the number of false alarms. Minor fluctuations in the background radiation levels are common and "spikes" in background levels can cause false alarms if the set-points are too low. Facilities must balance the need to detect low levels of radiation with the need to avoid spurious alarms. **In general, an alarm set-point that is approximately twice background is a good compromise.** For example, the equipment should be set in the range of 20 to 24 μ R/hr if the average background level is 12 μ R/hr. False alarms can cause the facility to reject unnecessarily shipments of material. They also can cause employees to distrust the equipment and to become complacent with regard to alarms.

PROCEDURES

False Alarms

When an alarm is activated, most equipment manuals inform the user to clear the alarm condition and instruct the vehicle operator to pass by the detector another time. Observe the vehicle as it passes the detector. If the alarm is activated, attempt to identify the approximate location along the side of the vehicle.

If there is no alarm the second time, a third pass should be made.

If there is no alarm in the second or third pass, the initial alarm can be considered a false alarm. Record the following:

- date and time of the initial alarm
- background level
- alarm level
- shipping company
- type of vehicle
- a brief description of its contents

If the system has radiation level indications, record the maximum level detected.¹

Alarms Greater Than 2.0 mR/hr

If the alarm repeats and if the detection system indicates a radiation level greater than 2.0 mR/hr, the vehicle operator should be directed to a remote location. Notify the appropriate personnel in your company. The driver should be directed to move away from the vehicle. Survey the driver and the truck/tractor cab for elevated radiation levels.

Slowly scan the vehicle with a hand held survey instrument. Mark the areas with higher radiation levels on the side(s) of the vehicle. Record the radiation levels detected with the hand held survey instrument.

Record the following additional information:

- vehicle license plate number, or
- trailer license plate number if a tractor trailer

Do not attempt to locate or remove the source of radiation.

***Notify the Minnesota Department of Health at:
(651) 201-4400 – Monday through Friday, 8:00 a.m. to 4:30 p.m., or***

***Minnesota Duty Officer
(651) 649-5451 - After Hours and on Holidays***

If the driver of the vehicle leaves before an Minnesota Department of Health representative arrives, Minnesota Department of Health will notify local law enforcement.

Alarms Less Than 2.0 mR/hr

If the alarm repeats and if the detection system indicates a radiation level less than 2.0 mR/hr, the vehicle operator should be directed move the vehicle to an area that will not interfere with normal traffic flow. Notify the appropriate personnel in your company. The driver should be asked to exit the cab of the truck or tractor. Survey the driver and the truck/trailer cab for elevated radiation levels.

Record the following additional information:

¹ Some systems have recording devices such as paper tapes or computer printouts. It is not necessary to duplicate any information that is automatically recorded. However, any additional information should be identified so that it can be linked to the automated record. Date and time are usually sufficient to link the data.

- vehicle license plate number, or
- trailer license plate number if a tractor trailer

Slowly scan the vehicle with a hand held survey instrument. Mark the areas with higher radiation levels on the side(s) of the vehicle. Record the radiation levels detected with the hand held survey instrument.

If hand held surveys indicate radiation levels greater than 2.0 mR/hr, the vehicle operator should be directed to a remote location and the driver should be directed to move away from the vehicle.

Do not attempt to remove the source of radiation.

**Notify the Minnesota Department of Health at:
(651) 201-4400 – Monday through Friday, 8:00 a.m. to 4:30 p.m., or**

**Minnesota Duty Officer
(651) 649-5451 - After Hours and on Holidays**

TRAINING

Personnel stationed at the facility entrance should be trained to accomplish the checks necessary to verify that the equipment is operating properly. The equipment must be maintained in accordance with the manufacturer's instructions. Equipment users should be familiar with the procedures for in-coming vehicles and should know how to interpret any detection equipment readouts. Specifically, they should know how to identify radiation levels (background and alarm levels) so that the information can be correctly communicated to the company management and the Minnesota Department of Health.

The users should also be aware of any anomalies associated with the equipment and the appropriate response. As an example, background radiation levels may rise significantly with a change in the weather. Experience has shown that temperature inversions, which produce foggy conditions, can cause the background levels to increase causing false alarms. In these weather conditions, an untrained operator could incorrectly identify the shipment as one containing radioactive material.

Perhaps the most common problem is caused by unfamiliarity with the hand held survey equipment. Frequently, the radiation levels are communicated as being in the mR/hr range when, in reality, they are in the μ R/hr range (1000 times less). Training and experience in the use of the survey instrument are crucial. Ultimately, the precautions that should be taken and the immediacy of the Minnesota Department of Health's response depend on the survey data.

All personnel involved must understand that separation should not be accomplished unless directed by Minnesota Department of Health. The desire to locate and remove the source of radiation may result in the contamination of personnel or the environment.

RECORD KEEPING

Record keeping assists in identifying the appropriate response; provides a complete and accurate record of the occurrences; and develops historical data for the types of vehicles being monitored. Although these records are not specifically mandated by Minnesota Department of Health regulations, they parallel the requirements for licensed radiological programs. Because of the potential health and safety issues, it is important that the data be correctly recorded for future reference.

When data is transmitted to Minnesota Department of Health, it may also be transmitted to the carrier, the company that owns the material and agencies outside Minnesota (e.g., other health departments or the US Nuclear Regulatory Commission). Frequently, there is a need to refer to the information to answer

questions from the parties involved. Accurate records will greatly enhance the company's ability to address any unforeseen issues.

In the procedures discussed above, several pieces of information have been listed. Whatever formats your company chooses, the following should be collected for a vehicle that has caused a legitimate alarm:

- date and time of the initial alarm
- background level
- alarm level
- shipping company
- type of vehicle
- brief description of its contents
- vehicle license plate number, or
- trailer license plate number if a tractor trailer

In addition, it may be beneficial to maintain a log of telephone calls to the carrier's office, the company that owns the material, or the Minnesota Department of Health. Along with the time of the calls, include the names of the individuals that were contacted.

Annex A

DOT-SP 10656 SHIPMENT APPROVAL FORM

Approval Number: **MN - - 07 -**

(Refer to SP 10656, paras. 8a-8b)

This shipment of scrap metal or related materials for recycle contains unidentified radioactive material causing low level radiation outside the vehicle. Shipment is under Special permit DOT-SP 10656 without a determination of materials meeting or not meeting the regulatory definition of radioactive material. The shipment is a minor radiological concern based on considerations of the U.S. Department of Transportation and the state official signing this shipment approval document.

DETAILS OF DETECTION SITE, MATERIALS, AND ORIGIN		
FACILITY: Name:		Type:
Address:		
(1) Contact Person:	Ph. :	Fax.:
<input type="checkbox"/> Highway or <input type="checkbox"/> Rail	Vehicle type:	ID. No.:
Owner:	Operator:	
(2) Contact Person:	Ph. :	Fax.:
Description of waste and release risk factors:		
Radiation Measurement:	Date/Time Performed:	
mrem/hr (max):	Location on vehicle:	
Inst. Mfgr./Type/Model:	Background mrem/hr:	
Surveyor Name:	Ph.:	
Shipment Origin:	Company:	Address:
(3) Contact person:	Ph.:	Fax.:
RADIATION CONTROL OFFICIALS (Detection, Origin, Destination States)		
Detection State Official (receiving radiation detection info)	Name:	
(4) Organization: Minnesota Department of Health	Ph.:	Fax.: (651) 201-4606
Origin State Official (prior to detection)	Name:	
(5) Organization:	Ph.:	Fax.:

Destination State Official (after detection)

Name:

(6) Organization:

Ph.:

Fax.:

DESTINATION FOR RADIOACTIVE MATERIAL IDENTIFICATION AND/OR DISPOSITION

If carrier and shipper to this location are different than (2) and (3), show info in REMARKS

Company Name:

Location:

(7) Contact person:

Ph.:

Fax.:

E-10656 Approval Number: **MN - - 07 -**

APPROVAL OF SHIPMENT AND SPECIAL CONDITIONS				
CONDITIONS:				
(8) Signature:	Ph.:	Fax.: (651) 201-4606		
Title:	Organization: Minnesota Department of Health		Date:	
IDENTIFICATION OF RADIOACTIVE MATERIAL AND DISPOSITION INFORMATION AT DESTINATION				
(9) Name:	Title:	Date:		
Organization:	Ph.:	Fax.:		
RECORD OF TRANSMITTALS (Shipment Approvals and Identification/Disposition) Circumstances may influence distribution				
Shipment Approvals -- (Sent by (4) or (8)) to <u>(Show date sent)</u>				
(1)	(2)	(3)	(5)	(6)
(7)	OED CRCPD		OTHER	
Record of Identification and Disposition -- (Sent by (7), (9), or) to				
(3)	(5)	(6)	(4) or (8)	OED CRCPD
OTHER				
REMARKS, OTHER INFORMATION:				

In case of an emergency, notify the National Response Center 1-800-424-8802 and the (8) authorizing official and give the Special Permit Number and Approval Number.