

**Kansas Department of Transportation
Standard Operating Manual**

		SOM: 1.13.2
SUBJECT: Radiological Safety Guidelines	VERSION: 4	PAGE: 1 of 8
	EFFECTIVE: 03/01/00	
INFORMATION CONTACT: Bureau of Materials and Research		
APPROVED: <i>E. Dean Carlson</i> , Secretary of Transportation		

POLICY STATEMENT:

Kansas Department of Transportation (KDOT) employees involved with nuclear gauges shall be trained in their operation. They shall be knowledgeable of all safety precautions and shall follow the guidelines when handling or transporting a nuclear gauge.

DEFINITIONS:

Nuclear Gauge. A portable device utilizing radioactive material to determine the density and/or hydrogen content of a material.

Film Badge. A small device that is carried by an individual to measure radiation exposure for a stated period of time. The individual to whom the film badge is assigned is the only person whose history shall be represented by the badge.

Survey Meter. A device capable of monitoring the level of radiation emitted by nuclear sources.

PROCEDURAL GUIDELINES:

General Operation

Construction Office Supervisors shall ensure that projects requiring nuclear gauges will, at all times, have a minimum of two KDOT employees on the job who are trained to use nuclear gauges and know the procedures to follow in case of an accident, theft, or fire. One of these employees shall be the operator.

Operators shall observe all safety procedures while using nuclear gauges to perform a test.

		SOM: 1.13.2
SUBJECT: Radiological Safety Guidelines	VERSION: 4	PAGE: 2 of 8
	EFFECTIVE: 03/01/00	

Operators shall keep their hands clear of the underside of the nuclear gauge except when removing extraneous material.

Operators shall be familiar with the operating procedures detailed in the operating manual for the nuclear gauge and/or instructions provided by the Bureau of Materials and Research.

Operators shall correct only nuclear gauge malfunctions or perform other maintenance which is specifically covered in the manual for that gauge.

Pregnant Employees

Any pregnant employee whose working assignment requires the use of the nuclear gauge can voluntarily declare the pregnancy. This declaration can be implemented or removed at any time by the employee. If the pregnant employee declares the pregnancy, then the employee is to provide written notification of the pregnancy to the Construction Office Supervisor and District Materials Engineer. Removing a declaration also requires written notification to both parties. The letter will provide a due date. The due date is necessary to determine exposure limits in accordance with Kansas Department of Health and Environment's (KDHE) K.A.R. 28-35-213b requirements.

The pregnant employee's District Materials Engineer will inform the employee of quarterly/monthly exposure rates each time the results are received. This will continue throughout the pregnancy.

Radiation exposures are to be monitored by the District Materials Engineer for compliance with K.A.R. 28-35-213b limits during the course of the pregnancy.

As an added precaution, the pregnant employee's use of nuclear gauges will be minimized whenever possible.

Film Badges

All operators and other authorized personnel, when using the nuclear gauge, shall wear a film badge. Badges are furnished by KDOT and shall be worn waist high. When not in use, badges shall be stored away from radioactive areas, heat sources, and video display devices. Badges shall not be stored in vehicles.

District records and communications regarding radiation exposure readings will be controlled by and filed in the District office. A copy of the records shall be sent to the Radiation Safety Officer

		SOM: 1.13.2
SUBJECT: Radiological Safety Guidelines	VERSION: 4	PAGE: 3 of 8
	EFFECTIVE: 03/01/00	

at the Materials and Research Center. Badges for the Headquarters personnel will be controlled by the Bureau of Materials and Research.

Daily Log and Survey of Nuclear Gauge with Survey Meter Check

A survey meter shall accompany the nuclear gauge at all times and shall be available for immediate use.

The operator shall maintain a daily log and perform a daily calibration check for each nuclear gauge, when it is in use. Those records shall be kept on D.O.T. Form No. 690, "Log and Standardization Check for Nuclear Meter." The forms shall be filed monthly.

Log Book. A field Log Book shall be established for each nuclear gauge and shall remain with the gauge at all times. The log book shall contain the following:

- telephone numbers of the Bureau of Materials and Research, Materials and Research Center; after-hours radiation emergency number; and office number of the company manufacturing the nuclear gauge;
- serial number of nuclear gauge;
- names of operators, dates of transfer to other operators, etc.;
- all survey meter readings and observations concerning the nuclear gauge;
- daily results of standardization check; and
- any other information deemed pertinent concerning use of nuclear gauge.

Survey of Nuclear Gauge with the Survey Meter. Nuclear gauges are to be scanned with a survey meter and the readings are to be recorded in the Field Log Book. For density gauges, readings are to be taken with the survey meter probe/sensor held at a distance of approximately 300 mm (12 in) from the four sides, top and bottom of the gauge with source of ionizing radiation closed and also at approximately 300 mm (12 in) from the bottom with the source open. Readings shall be taken upon initial receipt of the nuclear gauge, upon transferring the gauge, once per week (minimum) when used in the field, and in case of an accident, as set forth in this

		SOM: 1.13.2
SUBJECT: Radiological Safety Guidelines	VERSION: 4	PAGE: 4 of 8
	EFFECTIVE: 03/01/00	

directive. Any significant change in survey readings shall be noted and called to the attention of the District Materials Engineer. Readings greater than or equal to twice the normal (determined by person taking the initial survey) are considered a significant change.

Handling and Storage of Nuclear Gauge

Operators of nuclear gauges shall observe the following precautions:

- Never leave the gauge unattended unless properly stored; Whenever the gauge is being transported or stored, the case in which it is kept shall be locked;
- If a gauge is left in a vehicle, the vehicle should always be locked;
- The gauge and carrying case shall be protected from moisture at all times;
- Probes should always be in the locked or safe position (source of ionizing radiation closed) unless actually performing a test;
- When transporting the gauge by vehicle, the gauge shall be in a locked storage area in the pickup bed or van or locked trunk of car, at least 1.3 m (4 ft) from any occupant. A copy of this SOM shall accompany the nuclear gauge at all times. This document and the survey meter must be in the transport vehicle and immediately accessible to the driver during transport on a public highway. Additionally, the "Bill of Lading" must accompany the driver of the vehicle during the transportation of the gauge upon a public highway. This document must have the following information:
 1. Name of Shipper (KDOT);
 2. Description of the shipment (proper shipping name, material identification number, hazard class, type of package, name and activity of each nuclide, category of labeling, transport index, etc.);
 3. Emergency response telephone number; and
 4. Document must be signed by the shipper.

		SOM: 1.13.2
SUBJECT: Radiological Safety Guidelines	VERSION: 4	PAGE: 5 of 8
	EFFECTIVE: 03/01/00	

Gauges shall not be stored overnight in vehicles or field laboratories.

- At night, gauges shall be stored in a locked room or building which is signed with a standard "Caution Radioactive Material" sign furnished for that purpose. Signs should be on all building entrances and interior doors of the storage room;
- Gauges shall be stored in an area which is at least 1.3 m (4 ft) from the working or living area of any personnel;
- Project personnel employed by both the State and the contractor shall be fully informed that a nuclear gauge is in use on the project. Equipment operators should be alerted;
- For roadway paving operations, an extended red flag mounted on the vehicle or otherwise prominently displayed to mark the general location of the nuclear gauge when performing tests is recommended. A flashing light on the vehicle is also recommended; and
- When a nuclear gauge is transferred between operators, the gauge shall be scanned for radioactivity as set forth in this directive and the readings shall be recorded in the Field Log Book. The names of persons making the survey, date, and other pertinent data will also be recorded.

Accident Procedures

The operator and back-up personnel as well as the Construction Office Supervisor may familiarize themselves with KDHE Radiation Emergency Handout, 8th edition. In case of an accident involving a nuclear gauge the following steps, as a minimum, shall be taken. (See Attachment A for flowchart.) **The needs of an individual with a life-threatening injury take precedence.**

1. If the operator is injured, the back-up person will assume responsibility for any emergency procedure that may be required;
2. All road equipment or vehicles involved in the accident shall be stopped immediately and not allowed to be moved until the Construction Office Supervisor authorizes its removal;

		SOM: 1.13.2
SUBJECT: Radiological Safety Guidelines	VERSION: 4	PAGE: 6 of 8
	EFFECTIVE: 03/01/00	

3. The area where the accident occurred shall be isolated for a distance of at least 6 m (20 ft). Adjacent lanes carrying through traffic need not to be closed if the damaged gauge or accident area does not include that surface;
4. The nuclear gauge, accident area, and any equipment involved shall be scanned with the survey meter to determine radiation levels; **Readings greater than or equal to twice the normal (determined by person taking the initial survey) are considered a significant change.** Another approach is to find a damp rag and stick, then wipe a small region around the sources of the gauge. Move the damp rag at least 10 m (30 ft) from all nuclear gauges and take a reading with the survey meter. The meter will clearly indicate if there is any radioactive material on the rag.
 - a) If readings demonstrate no significant change from normal readings for the nuclear gauge, then attend to the injured. The nuclear gauge shall be placed in its transporting case unless damages prevent proper fit. The gauge will then be wrapped in heavy plastic and moved to a safe location. A second survey will be performed after the gauge is removed, then the area restrictions shall be lifted.
 - b) If readings demonstrate significant change from normal readings, the gauge shall not be moved and the area shall remain restricted until authorities from the KDHE authorize its removal. Attend to the injured, then complete a survey to determine if the injured has been contaminated (the survey will need to be completed away from the contaminated area).
 - If the injured is not contaminated, then send the person to the hospital.
 - If the injured is contaminated, send to the hospital and inform that the injured was involved in a "Radiation Accident."
5. Upon completing the examination of the extent of radiation hazard, i.e., damage to container only, leakage involving risk to personnel, probable extent of

		SOM: 1.13.2
SUBJECT: Radiological Safety Guidelines	VERSION: 4	PAGE: 7 of 8
	EFFECTIVE: 03/01/00	

contamination, etc., the operator or back-up person in charge shall proceed as follows:

Call:

(785)296-2231 Normal Weekday Hours: 8:00am - 5:00pm KDOT Materials and Research Center, Topeka. Ask for the Radiation Safety Officer. If unavailable, provide information to the person answering the phone.

(785) 827-4437 After Hours: Highway Patrol

- state: "This is a KDOT Radiation Emergency";
 - whether any injuries have occurred;
 - your name;
 - accident location and District where occurred; and
 - the city or nearest city and the telephone number from where you are placing the call.
6. Remain at your telephone until you receive a call from either the Radiation Safety Officer, District Materials Engineer, or KDHE;
 7. After reporting the information to the additional people who call, return to the location of the accident; and
 8. KDOT personnel involved in an accident shall prepare a detailed report of the accident as soon as possible. In addition, the Construction Office Supervisor or Area Engineer shall assemble facts pertinent to the accident.

Theft

If a nuclear gauge appears to have been stolen, the operator or supervisor shall notify the District Materials Engineer as soon as possible. The District Materials Engineer is to notify the Radiation Safety Officer and the manufacturer of the gauge.

Fire

If a fire department is involved in fighting a fire in a location where a nuclear gauge is kept, the operator or Construction Office

		SOM: 1.13.2
SUBJECT: Radiological Safety Guidelines	VERSION: 4	PAGE: 8 of 8
	EFFECTIVE: 03/01/00	

Supervisor shall immediately inform the fire fighters that radioactive material is involved.

The operator shall assist, if needed, in isolating the area, then notify the District Materials Engineer of the fire. The District Materials Engineer will notify the Radiation Safety Officer and the manufacturer of the gauge.

The local fire department should be informed of any location where a nuclear gauge is to be stored regularly or for an extended period of time.

Responsibilities

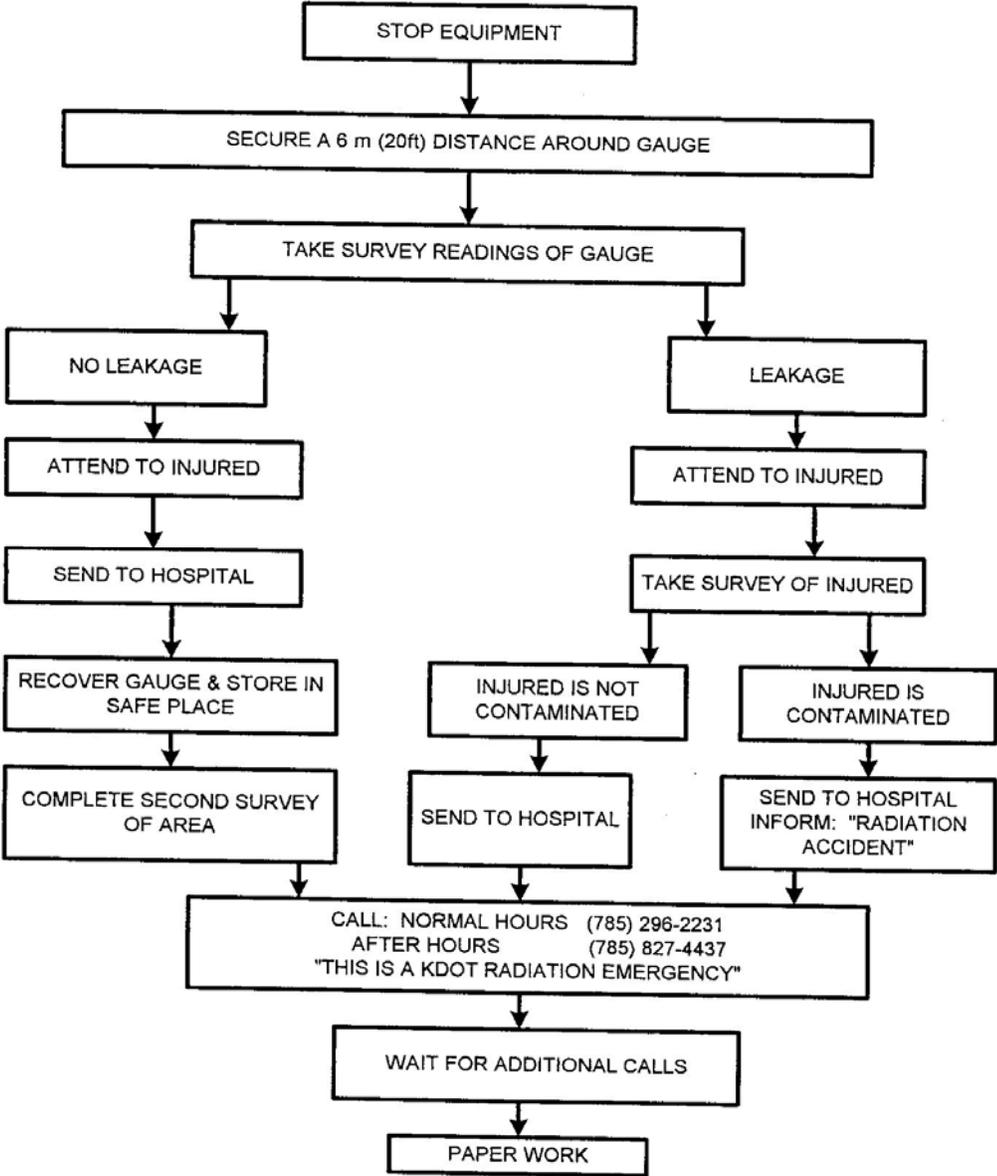
The Chief of the Bureau of Materials and Research and the District Materials Engineers shall be responsible for ensuring that nuclear gauge safety procedures are followed.

AUTHORITATIVE REFERENCES:

Note: The following references are for additional information only. Clarification of this policy may be obtained from the information contact listed.

- K.S.A. 48-1601
- K.S.A. 48-1624
- Radiation Emergency Handbook, 8th edition, Kansas Department of Health and Environment
- KDHE Radiation Protection Regulations, K.A.R. 28-35-213b

ACCIDENT PROCEDURES FLOW CHART



**KANSAS DEPARTMENT OF TRANSPORTATION
LOG AND STANDARDIZATION CHECK FOR NUCLEAR GAUGE**

GAUGE NO. _____ GAUGE MODEL _____ MONTH _____

WAS METER USED DURING THE MONTH? YES NO METER STORED AT _____

STANDARD COUNT _____ PREVIOUS STANDARD COUNT _____

DAY	TIME		COUNTY	PROJECT	STORAGE LOCATION	OPERATOR	DENSITY GAUGE	
	OUT	IN					DENSITY COUNT	MOISTURE COUNT