NUCLEAR TEST EQUIPMENT

GENERAL

The Office of Materials supplies test equipment containing radioactive isotopes for the purpose of determining the density and moisture content of soils, the density of asphaltic concrete, the density of PC Concrete, and asphalt cement content. Properly used, this equipment poses no serious threat to the health and safety of personnel. However, because of the nature of the energy source, certain precautions must be observed.

The conditions in the Nuclear Materials License, issued to the Iowa Department of Transportation control how its employees use, store, and transport nuclear testing equipment. The Office of Materials Training Course is based on the regulations set forth in its license and applies only to full time employees of the Iowa Department of Transportation. Intermittent and summer employees will not be certified nor will they be allowed to operate or transport a nuclear gauge. This training course DOES NOT qualify workers to use, store or transport nuclear gauges that are regulated under other nuclear materials license, such as city, county, contractors, and consulting firms.

A. Training

1. Personnel operating or transporting this equipment must have successfully completed a training course conducted by the Central Laboratory or a nuclear gauge manufacturer, in the principles of nuclear testing and safety practices.

2. A Certified Nuclear Gauge Operator Card and Certification will be issued to each employee who satisfactorily completes the training course. This certification shall be valid for one year from the date of initial issuance. A 90-day grace period will be allowed.

3. Re-certification will be issued upon satisfactory completion of a Re-certification Training Course.

4. Certification will be withdrawn from employees that abuse the nuclear gauge, abuse the use of the Thermo Luminescent Dosimeters (TLDs) or violate the safety rules outlined in this memorandum.

5. A current list of Certified Nuclear Gauge Operators will be issued to each District Materials Office after the training courses are completed.

B. Radiological Safety

1. All conditions in our Nuclear Materials License must be followed. (See Appendix A)

2. Employees under the age of 19 shall not be permitted to operate, or assist in the operation of nuclear gauges.

3. A female employee shall not operate or assist in operation of nuclear gauges if the employee is known to be pregnant.

4. Never place the radioactive source of the gauge in the "Use" position, unless the gauge is first placed on the roadway material, or calibration block.

5. When performing tests at the job site, the operator shall not leave the nuclear gauge unattended. Upon completion of tests, the nuclear gauge shall be locked in the vehicle or a secure building to prevent unauthorized use, loss, theft or damage.

6. Exposure TLDs are available at the Central Laboratory. A TLD must be worn at all times when operating or transporting a gauge. Ensure proper storage of TLDs when not in use. Do not store TLDs with a nuclear gauge.

7. One TLD shall be assigned to only one operator during a single exposure period. TLDs shall be returned not later than 10 days after the end of an exposure period, to the Central Laboratory and shall be accompanied by a completed "Nuclear TLD Badge Certification" Form. (See Appendix B.)

8. The Central Laboratory shall maintain the exposure reports from the company that provides the TLD service.

9. Never allow children near a gauge.

10. Always lift the gauge by the handle.

11. Never dismantle or enter the gauge beyond that required for routine maintenance.

12. Leak tests will be conducted only by Central Laboratory personnel at least twice a year.

13. When not in use the gauge handle shall be locked, and the container locked.

C. Exposure Limitations

1. In order to protect personnel from overexposure due to radiation, the maximum amount of exposure permitted is shown in the following table:

Type of Exposure	mRems (mSv) per Calendar Year
Whole Body; head and trunk; active Blood-forming organs; or gonads	5000 (50 mSv)
Lens of eyes	15,000 (150 mSv)
Extremities and skin of whole body	50,000 (500 mSv)

Because of the sensitivity of radiation to an unborn child, the exposure limit for an expectant mother is 500 mRem (5 mSv) for the entire pregnancy.

D. Transportation of Gauges

1. The individual responsible for physically transporting the nuclear gauge must provide secure measures to adequately prevent the unauthorized removal of the gauge from its place of storage during transport. It will be necessary to either (1) secure the gauge to the bed of the pickup with a chain and lock, (2) lock it inside the trunk of a vehicle, or (3) lock it inside the back end of a station wagon. When it is necessary to leave the vehicle and gauge unattended the keys must be removed from the ignition and the vehicle locked.

2. A shipping document must accompany the gauge during transit. This document identifies the radioactive material and its container. The shipping documents are manufacturer-specific. For example, a Troxler document must be used to transport a Troxler gauge and cannot be used to transport a Humboldt gauge. (See Appendix D.)

3. While the nuclear gauge is being transported the shipping document shall be within the driver's reach. Unattended vehicles containing gauges shall have the shipping document in view on the vehicle's seat.

4. For an overnight stay at a motel, hotel or other lodging place, the locked gauge must be left in the locked vehicle. In the case of pickup trucks, the gauge must be locked in the cab of the truck.

E. Storage of Gauges

1. When the gauge is not in field use, the normal storage will be at a Resident Construction Office or District Office. This should be a special area designated for this purpose; with a radiation caution sign posted to notify personnel of the existence of radiation. There should be three locks between the general public and the radioactive material (the lock on the gauge handle is considered one).

F. Accidents and Incidents

1. If a gauge is lost or stolen, notify the Radiation Safety Officer at the Central Laboratory IMMEDIATELY. If a gauge is involved in an accident follow the established Emergency Procedures. (See Appendix E.)