ATC ASSOCIATES INC.
Environmental, Geotechnical and Materials Professionals

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April 27, 2006

Loren J. Heuter
United States Nuclear Regulatory Commission
Region lll
2443 Warrenville Rd. Suite 210
Lisle, Il 60532-4352

We respectfully request an amendment to License No. 13-17732-01 by adding the following training source to item 12 of the license. We feel than an on-line alternative for training will enhance our ability to train our employees in a timely manner to meet our market demands as well as present an economical alternative to our operations. Enclosed is the course curriculum. An expeditious response in this matter would be greatly appreciated.

Respectfully,
ATC Associates Inc.

Robert M. Ramsey
Radiation Safety Officer

RECEIVED MAY 0 2 2006

NI FORM 313 U. S. NUCLEAR REGULATORY COMMISSION

(10-
10 CFR 30, 32, 33
34, 35, 36, 39 and 40

APPLICATION FOR MATERIAL LICENSE

APPROVED BY OMB: NO. 3150-0120
EXPIRES 6-30-96

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 9 HOURS. SUBMITTAL OF THE APPLICATION IS NECESSARY TO DETERMINE THAT THE APPLICANT IS QUALIFIED AND THAT ADEQUATE PROCEDURES EXIST TO PROTECT THE PUBLIC HEALTH AND SAFETY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0120), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

LICENSING ASSISTANT SECTION
NUCLEAR MATERIALS SAFETY BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION II
101 MARIETTA STREET, NW, SUITE 2900
ATLANTA, GA 30323-0199

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
801 WARRENVILLE RD.
LISLE, IL 60532-4351

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-8064

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S.NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*

- [ ] A. NEW LICENSE
- [X] B. AMENDMENT TO LICENSE NUMBER 13-17732-01
- [ ] C. RENEWAL OF LICENSE NUMBER

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip code)*

ATC Associates Inc
7988 Centerpoint Dr Suite 100
Indianapolis, IN 46256

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Robert Ramsey

TELEPHONE NUMBER

317-579-4016

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL.
a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*

FEE CATEGORY | AMOUNT ENCLOSED $

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39 AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OFJUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER – TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE
Robert M. Ramsey Radiation Safety Officer	R M Ramsey	4-27-2006

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			$		
APPROVED BY				DATE	

PRINTED ON RECYCLED PAPER

Portable Nuclear Moisture/Density Gauge Training Course

Presented To:

U.S. Nuclear Regulatory Commission

(Per the request of ATC Associates, Inc. in Indianapolis, Indiana)

Date: April 21, 2006

Prepared By:

AMERICAN TECHNICAL INSTITUTE, LLP
5827 Noble Stand Street
Las Vegas, NV 89148
Ph: (702) 355-2466
Fx: (614) 635-1458

Confidential – Not for public use

INTRODUCTION

The purpose of this training session is to learn how to use nuclear gauges legally and safely. Nuclear gauges are used for the purpose of determining the moisture content and density of soils and the asphalt content and density of asphaltic concrete (asphalt roads, parking lots, etc.). The two standard ways to check for density of soils are by the use of a nuclear gauge and the sand cone method. Testing is typically performed with a nuclear gauge because it is much faster. This training course will cover the following topics:

- Basic Elements of Radiation
- Nuclear Gauge Safety
- NRC Regulations
- Using the Nuclear Gauge

You will be required to read each section of the training program and when completed click "continue" on the upper right hand side of the screen to go to the next *learning module*.

During each section if you need to reference a definition click on glossary to look up the words definition.

Once you have completed the training portion you will be required to pass a closed book test. The test is offered on-line and has a time limit of 20 minutes to ensure that the test is closed book. Once you have passed the test with a score of better than 70% the missed questions will be reviewed. Once the review is complete a certificate of training will be issued that you can print on your local printer. Prior to using a portable nuclear density gauge you will need to receive hands on training from your Radiation Safety Officer or other approved personnel.

RADIATION BASICS

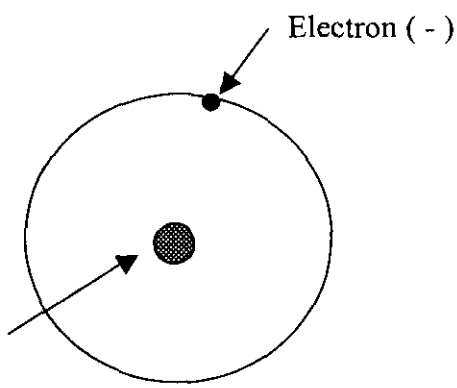
In this section we will discuss radiation basics. The items that you will need to be familiar with are elements, atoms, protons, radioactivity, half-life and ionization.

Elements

All materials are made up of elements, which possess exclusive chemical and physical characteristics and cannot be decomposed by regular chemical methods.

Atoms

An atom is the smallest particle of an element that can exist alone or in combination with other elements. It is made up of only a few basic subatomic particles: protons, neutrons, and electrons. Protons and neutrons are found in the nucleus, while the electrons orbit the nucleus.



Protons (+)
&
Neutrons (no charge)

Protons

Are positively charged with an atomic mass unit of 1.0073.

Neutrons

Have no charge and have an atomic mass unit of 1.0087.

Electrons

Are negatively charged and have essentially very little mass, an atomic mass unit of 0.0006.

Isotopes

Isotopes have the same number of protons but their number of neutrons varies.

Ionization

An ion is an electrically charged atom or molecule. Ionization occurs when one or more electrons are removed from or added to a previously neutral atom. The nucleus part of the atom is a positive ion, the removed electron is a negative ion, and together they form an ion pair.

Radioactivity

Radioactivity occurs when atoms of a certain composition spontaneously transform and release energy and/or pieces of the atom. Each release is called disintegration, or decay. This spontaneous emission by the nucleus is called "radioactivity". Radioactivity may be in the form of either a particulate or electromagnetic radiation. Alpha, beta, and neutron radiation are particulate; gamma radiation is electromagnetic.

TYPES OF RADIATION

The types of ionizing radiation that will be covered are alpha, beta, neutrons, and gamma rays.

Alpha particles:

Alpha particles (the nuclei of helium atoms) consist of a helium nucleus (two protons and two neutrons) and result from the decay of heavy nuclei with more than 82 neutrons. Americium-241 decays into neptunium-237 by emitting an alpha particle. A single sheet of ordinary paper or skin tissue can stop this particle.

Beta particles:

Beta particles are electrons traveling at speeds near that of the speed of light; a high-energy electron ejected from the nucleus of an atom. Cesium-137 decays into barium-137 by emitting a beta particle. This particle can be stopped by 1/16 inch of aluminum or an inch of wood.

Gamma rays (Photons):

Rays of electromagnetic energy similar to light rays, electrically neutral, of short wave length and extremely penetrating power caused by the decay of cesium-137. This particle can be stopped by several inches of lead or concrete.

Neutrons:

Neutrons are another form of particulate radiation with no electrical charge. They are extremely small, extremely dense and very penetrating. Neutrons may be produced by bombarding beryllium-9 with alpha particles produced by the natural decay of americium-241. It is slowed down by collision with hydrogen atoms. Once slowed, neutrons can be absorbed by a thin layer of cadmium, a material with high thermal absorption cross section.

RADIATION SOURCES & LOCATIONS

The two types of radioactive isotopes used in nuclear gauges are Cesium-137 (Cs-137) and Americium-241/Berillium (Am-241/Be). These will be covered in this section along with a discussion on half-life.

Density Testing - Cesium-137

Provides the gamma rays necessary for density measurements. Typically, the gamma source (Cs-137) is first fused with a ceramic to form a small bead. This bead is doubly encapsulated by fusion welding it inside two stainless steel capsules, which in turn are welded inside a stainless steel source rod. This source is located at the tip of the rod of the nuclear gauge. This source emits radiation that when deflected off of dense material returns to the gauge and is read by the Gieger-Mueller tube which measures the density for soils and asphaltic pavements.

Moisture Testing - Americium-241

Americium-241 provides alpha particles that bombard beryllium causing neutron emission for moisture measurements. The Am-241/Be mixture of the neutron source is first compressed into a pellet and then fusion welded into two consecutive stainless steel housings. This source is located within the center-bottom inside the gauge. This source emits radiation that when deflected off of hydrogen atoms returns to the gauge and is read by the Hellium-3 tube that measures the water content in the material being tested.

Half-life

Half-life is the time required for 50% of a radioactive isotope to decay. The half life for the sources shown here are listed below:

Isotope/Half-Life

Americium-241//Berillium - 432 years

Cesium-137 -30 years

The Cesium-137 isotope decays about 2 percent a year in strength.

RADIATION UNITS

Radiation is measured in several different units. Two of the units are the Rad and Roentgen, which has been replaced by the Rem. The different units for radiation and quality factors for different types of radiation are shown below:

Curie

The basic unit of activity, the *curie* (Ci), is defined as 3.7×10^{10} disintegrations per second (dps). The rate of decay or activity produced by the sources in nuclear gauges is measured in millicuries (mCi). 1 mCi is equal to (1/1000) Ci or 3.7×10^{7} dps.

Rad

A unit based on the amount of energy absorbed is the *radiation-absorbed dose* (rad), which is defined as 100 ergs/gm of any type of radiation.

Roentgen

One of the earliest units of radiation strength, the *roentgen* (R), is defined as the quantity of gamma radiation that produces one electrostatic unit of charge in one cubic centimeter (cm^3) of air; therefore, the roentgen is a measure of the ionizing effect of the radiation.

Rem

For practical purposes, one rad can be considered equal to one rem. In order to take into consideration the effect of various types of radiation on biological tissue, a quality factor (QF) must be introduced. The product of rad x QF is called the *roentgen equivalent man* (rem). For the nuclear gauge, the millirem (1/1000 of a rem) is more suitable to use.

Quality Factors for Various Radiation Types

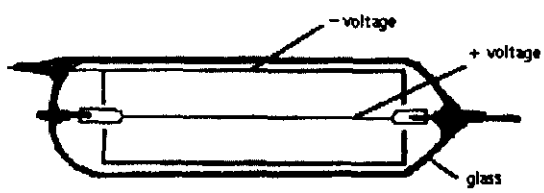
The Quality Factor (QF) is the energy dependent factor by which the absorbed dose (RAD) is multiplied to obtain the rem.

Type of Radiation	QF
X-ray, gamma, or beta radiation	1
High energy protons	10
Alpha particles	20

RADIATION MEASUREMENT

Geiger-Mueller Counter

A radiation detection and measuring instrument. It consists of a gas-filled tube containing electrodes, between which there is an electrical voltage, but no current, flowing. When ionizing radiation passes through the tube, a short, intense pulse of current passes from the negative electrode to the positive electrode and is measured or counted. The number of pulses per second measures the intensity of the radiation field. It was named for Hans Geiger and W. Mueller, who invented it in the 1920s. It is sometimes called simply a Geiger counter or a G-M counter and is the most commonly used portable radiation instrument.



A Geier Counter

Geiger-Mueller (G-M) *tube:*

The typical G-M tube consists of a gas-filled metal cylinder with a wire running down the center. The special gas filling enables a single ionizing event in the gas to produce an avalanche of electrons, resulting in an easily detectable electric pulse. The G-M tube counts radioactive emissions passing through the detector.

Hellium-3 (3He) tube:

Hellium-3 tubes are used as neutron detectors. Neutrons, being uncharged particles, do not directly produce ionization. Just as neutrons are produced by a nuclear reaction, they must also be detected by a nuclear reaction. When a thermal neutron strikes a hellium-3 nucleus, a proton is ejected and the product nucleus is hydrogen-3. The protons, being positively charged, can be detected. A neutron detector is a metal cylinder with a central wire, similar to the G-M tube, and a filling of high pressure hellium-3 gas.

EFFECTS OF RADIATION EXPOSURE

Although studies of the effects of radiation exposure on humans continue, researchers have established levels of equivalent doses producing measurable effects on health. People generally are exposed to 100-200 mrem's per year. This training should install in the trainee a general respect for the risks involved with radiation, but in no means install an unnecessary fear concerning the nuclear gauges.

Effects of radiation exposure on human health are divided into two broad classes:

Genetic Effects

This type of radiation exposure affects the offspring of the exposed individual.

Somatic Effects

This type of radiation causes health effects on the exposed individual; including such short-term effects such as decreasing white blood cell counts, and long-term effects such as increased evidence of cancer. The effects also are seen directly in the individual person.

The effects of large amounts of radiation exposures are:

Radiation Sickness

An extreme overdose of penetrating external radiation produces radiation sickness. Symptoms of radiation sickness include nausea, vomiting, diarrhea, malaise, infection, hemorrhaging, and if acute, death.

Radiation Injury

Overdoses of less penetrating external radiation cause localized radiation injury. Radiation injury can cause skin lesions, burns, and loss of hair,

digits, hands, or feet. Genetic damage is also a form of radiation injury. *Radiation injury occurs most often to the hands.*

Internal Contamination (Radiation Poisoning)

Internal contamination is an illness resulting from large amounts of radioactive materials entering the body. Also called radiation poisoning, internal contamination causes diseases like anemia and cancer.

The biological effects of exposure at different acute doses (rem) are shown below:

Acute Dose (rem)	Likely Effects
0 – 50	No visible effects
50 – 150	Minor radiation sickness
150 – 400	Major radiation sickness
400 – 800	Severe Illness
800 +	Fatal

OCCUPATIONAL EXPOSURE LIMITS

This section details the doses of radiation allowed for different areas of the human body.

Annual dose limits for occupationally exposed adults (10 CFR 20.1201):
The licensee shall control the occupational dose to individual adults to the following dose limits:

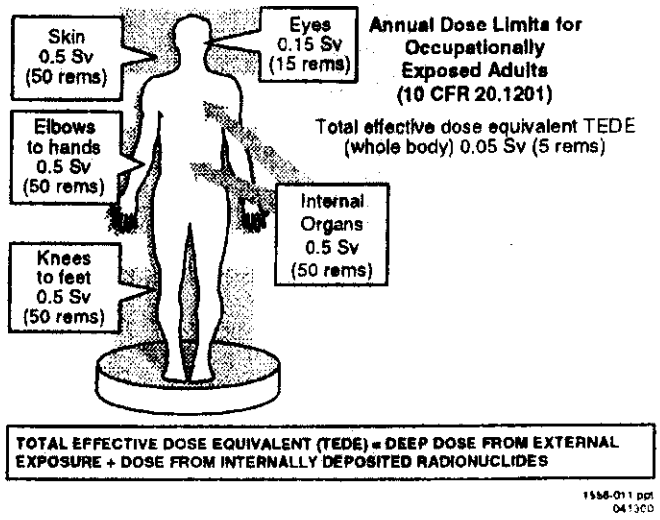
A. An annual limit, which is the more limiting of:

(1) The total effective dose equivalent being equal to 5,000 mrem (5 rem); or

(2) The sum of the deep-dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50,000 mrem (50 rem).

B. The annual limits to the lens of the eye, to the skin, and to the extremities, which are:

(1) A lens-dose equivalent of 15,000 mrem (15 rem); and a shallow-dose equivalent of 50,000 mrem (50 rem) to the skin or to any extremity.



Annual Dose Limits for Radiation Workers.

The deep-dose equivalent, lens-dose equivalent, and shallow-dose equivalent may be assessed from surveys or other *radiation* measurements for the purpose of demonstrating compliance with the occupational dose limits, if the individual monitoring device was not in the region of highest potential exposure or the results of individual monitoring are unavailable.

Occupational exposure to workers under the age of 18 is restricted to 10% of the annual dose limits specified for adult workers. A *declared pregnant woman* is allowed to receive only 500 mrem (0.5 rem) for the entire term of pregnancy.

When using the nuclear gauge the dose rate varies and is as follows:

- When carrying nuclear gauge at arms length (Cs-137) the dose rate is 0.5 mrem/hour
- When one foot from gauge with source rod in safe position (Cs-137) the dose rate is 0.5 mrem/hour
- When carrying nuclear gauge at arms length (Am-241/Be) the dose rate is 0.3 mrem/hr

METHODS TO MINIMIZE EXPOSURE

Due to the harmful effects on the human body of penetrating, ionizing radiation, keep radiation exposure as low as reasonably achievable (ALARA). Following are the three factors to consider when attempting to minimize radiation exposure:

Time

The easiest way to reduce exposure is to keep the time spent around a radioactive source to a minimum. The shorter the exposure time, the smaller the radiation; reducing the time spent around a radioactive source by one-half the radiation exposure is also reduced by one-half.

Distance

Distance is an effective means of limiting radiation exposure because radiation intensity decreases as distance increases. The effectiveness of increased distance can be calculated using the inverse square law, which states that the intensity of a point source of radiation is inversely proportional to the square of the distance from the source. This means that when the distance is doubled the dose rate will be reduced to one-fourth of the initial dose rate. It also means that reducing the initial distance by half will increase the dose rate four times. The formula for this is:

$I_A \times D_A^2 = I_B \times D_B^2$

I_A = Beginning Distance Intensity

D_A = Beginning Distance

I_B = Ending Distance Intensity

D_B = Ending Distance

Example:

At point "A", 1 foot from the source the dose rate is 40 mrem/hr. The distance is increased to 2 feet (Point "B"), the exposure at point "B" would be?

Answer:

At point "A":

I_A = 40 mrem/hr, and D_A = 1 foot

At point "B":

$I_B = I_A \times (D_A/D_B)2$, where D_B = 2 feet

$I_B = 40 \times (1/2)2$

I_B = 10 mrem/hr

Shielding

Shielding is any material used to reduce the radiation from a radioactive source. Design feature of nuclear gauges include shielding of radioactive sources and it is the user's responsibility to ensure that the shielding has not been tampered or removed, and that all moving parts are functioning correctly.

A few millimeters of shielding material like aluminum or glass will completely stop alpha and beta particles. Neutron shielding is best done with a material containing hydrogen such as water or polyethylene. Photon shielding is best done with dense material such as lead or tungsten.

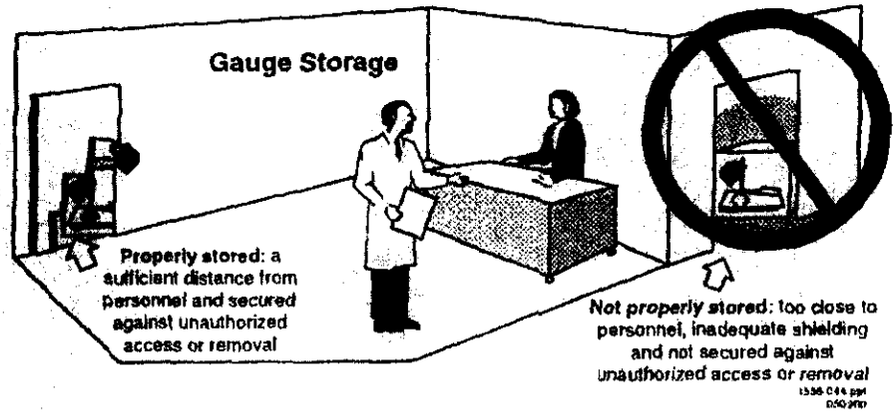
PERSONNEL MONITORING

The typical portable gauge user is required to wear a personnel-monitoring device (dosimetry) when using the gauge. In most accidents where a gauge has been run over and has been damaged, the shielding of the source remains intact. A gauge user should wear a dosimetry device when transporting, using, or in the general vicinity of a nuclear gauge.

When personnel monitoring is needed, either film badges or thermoluminiscent dosimeters (TLDs) supplied by an NVLAP approved processor are used. The exchange frequency for film badges is usually monthly because of technical concerns about film fading, while for TLD's is usually quarterly.

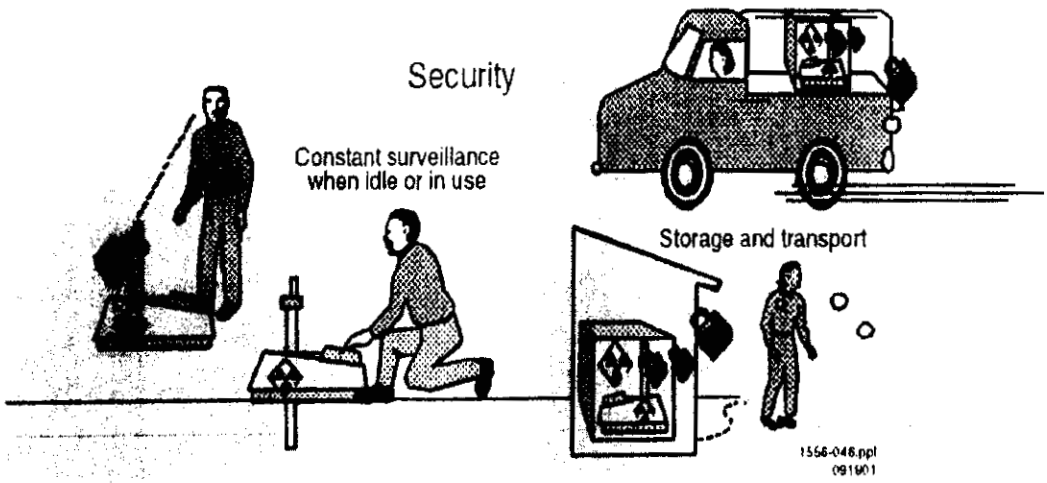
STORAGE & SECURITY

Gauges should be stored away from occupied areas and secured against unauthorized removal. In general, the gauge should be stored no closer than 15 feet from the nearest full-time workstation. A double lock system, building and storage area is also preferred. A radiation caution sign, available from the gauge manufacturer, must be posted. If gauges are not in storage, the authorized users must maintain constant surveillance to ensure that members of the public cannot get near the gauges or use them, and thus receive unneeded radiation exposure.



Storing Gauges. ***Gauges should be stored away from occupied areas and secured against unauthorized removal.***

Gauges must be kept under constant surveillance, or secured against unauthorized use or removal to avoid loss or gauges being stolen.



Security. *To avoid lost or stolen gauges, licensees must keep the gauges under constant surveillance, or secured against unauthorized use or removal.*

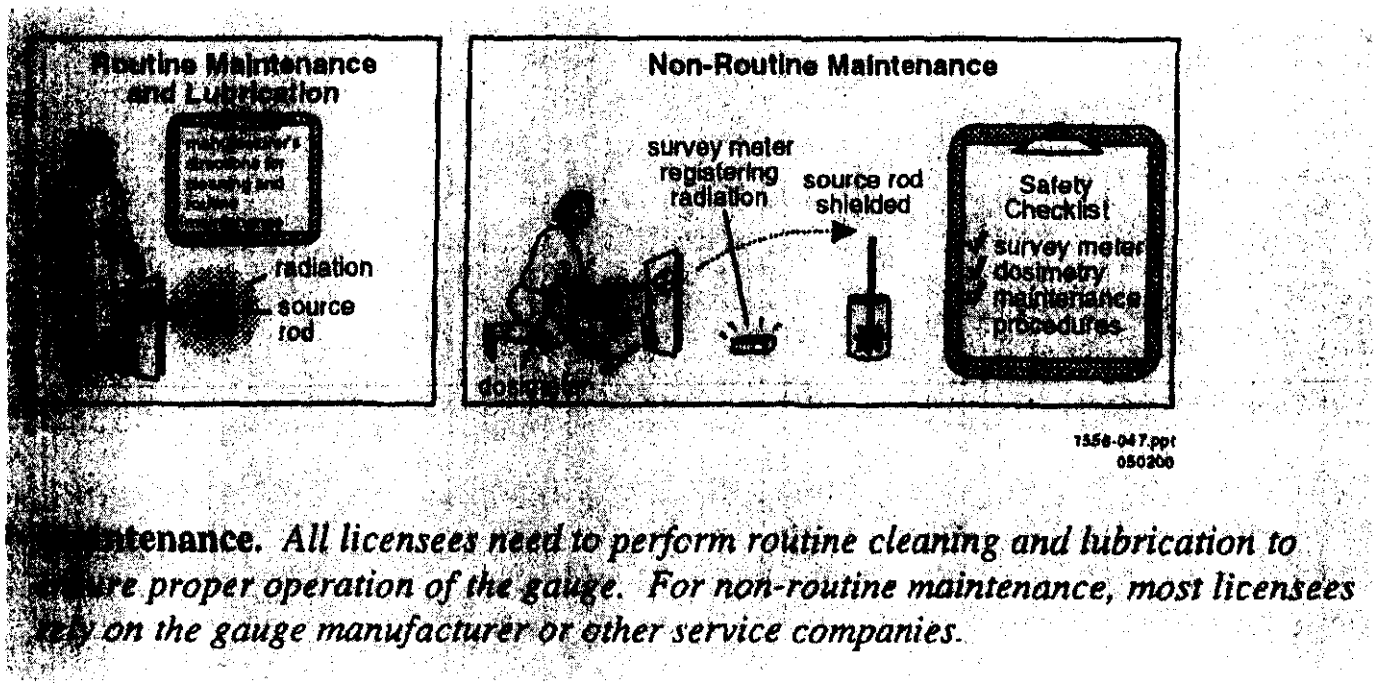
MAINTENANCE

Routine Maintenance

Gauges must be cleaned and maintained according to the manufacturer's recommendations and instructions. Radiation safety procedures for routine cleaning and lubrication of the source rod and shutter mechanism must consider the possibility of receiving exposures to the whole body, as well as to the hands, from handling the source rod. Take note to keep such exposures ALARA and ensure that gauge functions as designed and source integrity is not compromised.

Non-routine maintenance

Maintenance or repair beyond routine cleaning and lubrication that involves detaching the source rod from the device, and any other activities during which exposure limits may be exceeded, must be performed by the gauge manufacturer or a person specifically authorized by the NRC, Commission or State Regulatory Agency.



***tenance.** All licensees need to perform routine cleaning and lubrication to re proper operation of the gauge. For non-routine maintenance, most licensees on the gauge manufacturer or other service companies.*

DISPOSAL & TRANSFER

Nuclear gauges must be disposed of in accordance with the Nuclear Regulaory Commission or State Regulatory Agency requirements only by transfer to an authorized recipient as per 10 CFR 20.2001 and 10 CFR 30.41. Authorized recipients are the original manufacturer of the device, a commercial firm licensed by NRC to accept radioactive waste from other persons, or another specific licensee authorized to possess the licensed material. Records of the transfer must be maintained as required by 10 CFR 30.51.

LEAK TESTING

The NRC or State Regulatory Agency requires testing to determine whether there is any radioactive leakage from the sources of nuclear gauges. As per the license condition, the leak test is to be performed at intervals not to exceed 6 months. Collection of leak test samples must be done in accordance with the manufacturer's instructions. The measurement of the leak test sample is a quantitative analysis requiring that instrumentation used to analyze the sample is capable of detecting 0.005 microcurie (185 Bq) of radioactivity.

When a gauge is in storage the requirements for leak testing vary depending upon the agreement state. To verify the requirements, the licensee should contact their regulatory agency.

No sealed source shall be stored for a period of more than 24 months without being tested for leakage and/or contamination. After that time it must be disposed of as unwanted/waste. Records of test results must be maintained.

INCIDENTS

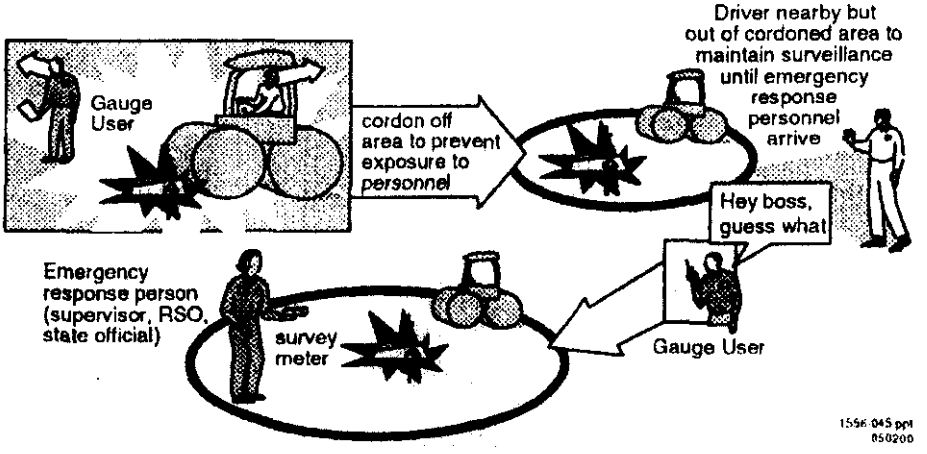
An incident may be defined as an event where the gauge is lost, stolen, or physically damaged to the extent that the source shielding is or could be compromised.

If the gauge is lost or stolen, the following steps are recommended:

(1) Notify your RSO as soon as possible, and he will immediately notify the NRC, Commission or State Regulatory Agency and the gauge manufacturer.

(2) The NRC, Commission or State Regulatory Agency will provide direction to the RSO as to additional agencies that must be notified.

Proper Handling of Incidents



Proper Handling. ***Gauges are often damaged by heavy equipment at job sites and emergency procedures need to minimize radiation safety risk.***

In the event of damage at a job site:

(1) Locate the source(s).

(2) Don't move or touch the gauge.

(3) Cordon off the area (including the path the vehicle took if it moved after the incident) to prevent exposure to personnel. A minimum of 15 feet from the source(s) should be maintained.

(4) The gauge operator should perform a visual inspection to determine whether the source housing and or shielding was damaged.

(5) If a vehicle is involved, keep it at the site until it can be verified that it has not been contaminated. Keep the driver nearby but out of cordoned area to maintain surveillance until emergency response personnel arrive.

(6) Stay with the gauge, but notify your RSO as soon as you can. The RSO will notify the NRC, Commission or State Regulatory Agency, if necessary.

(7) Supply the RSO with the following information:

   a. Location and condition of the gauge and source
   b. Time and date of the accident
   c. Gauge model and serial number
   d. The details of the accident

(8) The RSO or the NRC, Commission or State Regulatory Agency then will determine if the gauge can be safely transported. The gauge manufacturer or the NRC can offer further advice or assistance in making arrangements for safe shipment and disposal once the gauge is cleared for transport.

TRANSPORTATION

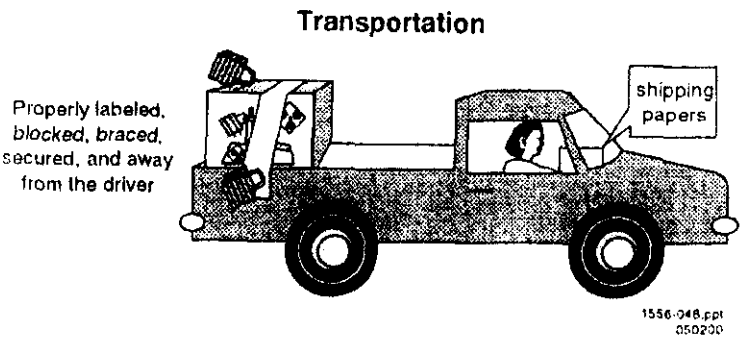
Transportation of Radioactive Material requires conformance with U.S. Department of Transportation (USDOT) and International Atomic Energy Agency (IAEA) regulations. The rule of 49 CFR applies and includes transportation of nuclear gauge by motor vehicle on a public highway (i.e. transportation of nuclear gauge(s) to and from job sites).

Transportation of the nuclear gauge must be secured so that unauthorized removal of the gauge can't occur. The gauge must be blocked and braced to prevent movement. Typically a pick-up truck is used in transporting the nuclear gauge. In this case the gauge must be secured to the bed of the truck by a chain, wire cable, or other secure device.

When the portable nuclear gauge is not under the control and constant surveillance of the licensee's authorized user, two independent physical controls to secure the gauge from unauthorized removal must be used. Some examples of the two independent physical controls are as follows:

- Storing the gauge in a locked vehicle with the gauge case chained and pad locked or otherwise secured to the vehicle to prevent removal.
- Storing the gauge in a fenced-off area with a locked access gate that surrounds a padlocked shed or building where the gauge is stored.
- Storing the gauge in a lockable separate secured area inside a shop or garage with the gauge inside locked in a cabinet.

Individuals who are not authorized to use the gauge should not drive vehicles carrying gauges.



Transportation. *Licensees often transport their gauges to and from job sites and must ensure compliance with Department of Transportation regulations.*

When transporting a nuclear gauge the following information must be with the gauge:

Shipping Papers

49 CFR 172, Subpart C specifies the requirements for the "Bill of Lading". The bill of lading must accompany the driver of the vehicle during the transportation of the gauge upon a public highway. The document must be placed on the dashboard of the vehicle to be clearly visible in the event of an incident. This document must contain the following information:

(1) Name of shipper

(2) Description of the shipment (proper DOT shipping name, material identification number, hazard class, type of package, name and activity of each nuclide, category of labeling, and transport index;

(3) Emergency response telephone number;

(4) Shipper's certification per 49 CFR 172.204 (a), (1) or (2) as shown below:

(1) "This is to certify that the above named 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."

NOTE: In line one of the certification the words "herein-named" may be substituted for the words "*above-named*".

(2) "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."

(5) Document must be signed by shipper as per 49 CFR 172.204(d). NOTE: One exception is that except for a hazardous waste, no certification is required for a hazardous material offered for transportation by motor vehicle and transported: (i) In a cargo tank supplied by the carrier, or (ii) By the shipper as a private carrier except for a hazardous material that is to be reshipped or transferred from one carrier to another.

(6) If the gauge contains Americium-241 the Reportable Quantity (RQ) must be noted on the shipping papers.

(7) When transporting by air the following requirements should be followed per 49 CFR 172.204 (c):

i. Certification containing the following language may be used in place of the certification required by paragraph (a) of this section: "I hereby certify that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packaged, marked and labeled, and in proper condition for carriage by air according to applicable national governmental regulations."

ii. Certificate in duplicate - Each person who offers a hazardous material to an aircraft operator for transportation by air shall provide two copies of the certification required in this section. (See § 175.30 of this subchapter.)

iii. Passenger and cargo aircraft – Each person who offers for transportation by air a hazardous material authorized for air transportation shall add to the certification required in this section the following statement: "This shipment is within the limitations prescribed for passenger aircraft/cargo aircraft only (delete nonapplicable)."

iv. Radioactive material - Each person who offers any radioactive material for transportation aboard a passenger-carrying aircraft shall sign (mechanically or manually) a printed certificate stating that the shipment contains radioactive material intended for use in, or incident to, research, or medical diagnosis or treatment.

The DOT requires the shipper to keep a copy of the bill of lading for 375 days following the completion of transportation. Because the radioactive materials are the same for each shipment, the same shipping paper may be used and a use log must be maintained documenting the following information:

1) Who the shipment was made to.
2) The shipping name (Proper shipping name).
3) Identification Number (UN Number).
4) Quantity transported (activity in the shipment).
5) Date of shipment.

Package Markings and Labeling

Nuclear gauge transport cases are labeled with two "Yellow II" radiation labels, which must also denote the contents, activity, and the Transport Index of the package. In addition, one "USDOT 7A Type A" package label, with the Reportable Quantity (RQ) designation must also be affixed if the gauge contains Americium-241.

Placarding of Vehicles

Placards are required only for vehicles containing package(s) with labels RADIOACTIVE Yellow-III and higher.

Emergency Response Information

49 CFR 172, Subpart G requires that emergency response information accompany the shipment of a nuclear gauge. This document must be in the transport vehicle and immediately accessible to the driver when in transit.

Emergency Response Telephone Number

49 CFR 172, Subpart G also requires that a 24-hour emergency response telephone number be provided on a shipping paper. This number must be manned continuously, while the gauge is in transportation, by personnel who are "knowledgeable of the hazards and characteristics of the hazardous material being shipped, have comprehensive emergency response and accident mitigation information for that material, or have immediate access to a person who possesses such knowledge and information".

Training

49 CFR 172, Subpart H requires that every hazmat employer train, test, certify, and maintain records for each hazmat employee. Hazmat employer/employee applies to anyone who transports or prepares for transport radioactive materials. To remain in compliance, this training must be repeated at intervals not to exceed three years.

HOMELAND SECURITY

Issues regarding homeland security and the use of radioactive materials for criminal intent are at the forefront of all of our minds. Fortunately, the sources in nuclear gauges are sealed in stainless steel capsules that are difficult to penetrate. Also, the amount of contained radioactive material is relatively small and would not be a major risk if distributed over a sizeable area.

In the period January 1996 through October 2000, US Nuclear Regulatory Commission (NRC) and Agreement State licensees reported a total 156 thefts of portable gauges. Fifty-one occurred in the States of Texas and Florida. Most of the thefts occurred when gauges were stored in vehicles parked in areas vulnerable to theft. Only 40 percent of gauges reported stolen have been recovered. Two of the 156 events involved attempts to sell the stolen gauges. In both of these cases the gauge was returned to the owner. In another two events, gauges were found in scrap metal when radiation monitors alarmed. In one event, only the source rod was found. In the other, the gauge was recovered intact.

In 83 percent of the thefts from vehicles, the vehicles were parked at locations other than the licensees' facilities or job sites. Of these cases, gauges were most frequently stolen from vehicles parked at private residences (37 percent). In most of the cases involving the theft of gauges from vehicles, the gauges were locked and secured, but frequently the gauges were locked in an open truck bed, visible to passers-by.

Thefts involving portable gauges appear to be occurring most frequently when gauges are stored in vehicles parked in a non-work area. In addition to considering deterrents to thefts such as locks, security considerations for portable gauges containing radioactive material should extend to ways to minimize the threat of theft. Some ideas for minimizing the possibility of theft are listed below:

- Don't leave vehicles used to transport gauges in areas that are susceptible to stealing. For example, don't leave a nuclear gauge chained in the bed of a truck while parked overnight at a apartment complex.

- Don't leave the nuclear gauge in visible sight to the general public. When at all possible lock the gauge in a non-visible area. Some examples are in a toolbox, in a secured vehicle, etc. At the very least, even covering the bright yellow or orange carrying case with a blanket or tarp will reduce individuals being drawn to the gauge.

- Perform random field audits of the gauge users in the field to make certain that proper safety regulations are being followed.

- Make sure that the gauge is under constant visual supervision at all times.

The importance of nuclear gauge safety can't be stressed enough. Currently, all gauge thefts are being reported to the FBI due to the concern with homeland security. Hopefully, by using common sense and heightened individual awareness to the possibility of theft you will not be responsible for the loss/theft of a gauge.

RECORD KEEPING

The following documents must be maintained, kept current, and made available for review for the governing entity:

Radioactive Materials License

A valid license must be on file. It should be reviewed periodically to ensure that all of the conditions are current.

Training Certificates

A certificate of attendance and successful completion of a nuclear gauge-training course is required for each user.

Hazmat Training

Maintain records of current training for each employee who transports radioactive material per 49 CFR 172, Subpart H.

Regulations

Maintain a copy of applicable regulations furnished by NRC.

Leak Test *Report*

A copy of each leak test report for each gauge in your inventory must be on file and available for inspection.

Dosimetry report

A copy of each personnel dosimetry report must be maintained, complete and up-to-date.

Inventory

When a gauge is initially received, it must be placed on an inventory. If transferred or disposed of, the list should reflect the action, even if the transfer is to another location within your company. License conditions typically require a six-month physical inventory of all gauges in the

licensee's possession. All licensees are required to know the location of each gauge at all times.

Certificate of Competent Authority (Special Form Source Certificate)

A current copy of this certificate must be on file. Note that it does expire and must be periodically replaced.

Results of Type A Package Testing

49 CFR 173.415(a) requires that each shipper of a Type A package "must maintain on file for at least one year after the latest shipment," the testing methods and results for the Type A package. A "shipper" includes any NRC licensee transporting licensed material on public highways.

Emergency Response Sheet

49 CFR 172, Subpart G requires that an Emergency Response Sheet accompany the shipment of a nuclear gauge. The driver of the vehicle must keep this document at all times during the transport of the nuclear gauge on public highways.

Notice to Employees Poster

A copy of this notice should be on file and posted in your facility as well as any temporary gauge storage location or job site so that individuals entering the area can see it.

Bill of Lading

A properly completed shipping document must accompany the gauge when it is transported.

LICENSING & INSPECTION

Refer to NUREG-1556, Vol. 1, Rev. 1, "Consolidated Guidance About Material Licenses, Program-Specific Guidance About Portable Gauge Licenses, dated November 2001 ", 1 0 CFR 30.32 "Application for Specific Licenses", and 10 CFR 30.33 "General Requirements for Issuance of Specific Licenses". These references are intended to facilitate the process of license application, review of applications, renewal and amendment of licenses, and inspection of licenses.

RECIPROCITY

The regulations for reciprocity in different states is documented in NRC Regulation 10 CFR 150.20, Recognition of Agreement State licenses and is summarized below

Reciprocity may be granted for up to 180 days (30 days in the state of New York) in a calendar year. If this limit is exceeded, a new Radioactive Materials License for that particular governing entity is required. Requirements to obtain reciprocity may include:

1. Three-day written notification of intent to transport and use gauge(s).
2. Copy of current Radioactive Materials License.
3. Copy of latest leak test for the gauge(s).
4. Temporary address of use/storage area.

COMPLETENESS AND ACCURACY OF INFORMATION - 10 CFR 30.9

The information below is taken directly from 10 CFR 30.9 for your review.

(a) Information provided to the Commission by an applicant for a license or by a licensee or information required by statute or by the Commission's regulations, orders, or license conditions to be maintained by the applicant or the licensee shall be complete and accurate in all material respects.

(b) Each applicant or licensee shall notify the Commission of information identified by the applicant or licensee as having for the regulated activity a significant implication for public health and safety or common defense and security. An applicant or licensee violates this paragraph only if the applicant or licensee fails to notify the Commission of information that the applicant or licensee has identified as having a significant implication for public health and safety or common defense and security. Notification shall be provided to the Administrator of the appropriate Regional Office within two working days of identifying the information. This requirement is not applicable to Information which is already required to be provided to the Commission by other reporting or updating requirements [52 FR 49371, Dec. 31, 1987].

EMPLOYEE PROTECTION - 10 CFR 30.7

The information below is taken directly from 10 CFR 30.7 for your review.

(a) Discrimination by a Commission licensee, an applicant for a Commission license, or a contractor or subcontractor of a Commission licensee or applicant against an employee for engaging in certain protected activities is prohibited. Discrimination includes discharge and other actions that relate to compensation, terms, conditions, or privileges of employment. The protected activities are established in section 211 of the Energy Reorganization Act of 1974, as amended, and in general are related to the administration or enforcement of a requirement imposed under the Atomic Energy Act or the Energy Reorganization Act.

(1) The protected activities include but are not limited to:

(i) Providing the Commission or his or her employer information about alleged violations of either of the statutes named in paragraph (a) introductory text of this section or possible violations of requirements imposed under either of those statutes;

(ii) Refusing to engage in any practice made unlawful under either of the statutes named in paragraph (a) introductory text or under these requirements if the employee has identified the alleged illegality to the employer;

(iii) Requesting the Commission to institute action against his or her employer for the administration or enforcement of these requirements;

(iv) Testifying in any Commission proceeding, or before Congress, or at any Federal or State proceeding regarding any provision (or proposed provision) of either of the statutes named in paragraph (a) introductory text.

(v) Assisting or participating in, or is about to assist or participate in, these activities.

(2) These activities are protected even if no formal proceeding is actually initiated as a result of the employee assistance or participation.

(3) This section has no application to any employee alleging discrimination prohibited by this section who, acting without direction from his or her employer (or the employer's agent) deliberately causes a violation of any requirement of the Energy Reorganization Act of 1974, as amended, or the Atomic Energy Act of 1954, as amended.

(b) Any employee who believes that he or she has been discharged or otherwise discriminated against by any person for engaging in protected activities specified in paragraph (a)(I) of this section may seek a remedy for the discharge or discrimination through an administrative proceeding in the Department of Labor. The administrative proceeding must be initiated within 180 days after an alleged violation occurs. The employee may do this by filing a complaint alleging the violation with the Department of Labor, Employment Standards Administration, Wage and Hour Division. The Department of Labor may order reinstatement, back pay, and compensatory damages.

(c) A violation of paragraphs (a), (e), or (f) of this section by a Commission licensee, an applicant for a Commission license, or a contractor or subcontractor of a Commission licensee or applicant .may be grounds for:

(1) Denial, revocation, or suspension of the license.

(2) Imposition of a civil penalty on the licensee or applicant.

(3) Other enforcement action.

(d) Actions taken by an employer, or others, which adversely affect an employee may be predicated upon nondiscriminatory grounds. The prohibition applies when the adverse action occurs because the employee has engaged in protected activities. An employee's engagement in protected activities does not automatically render him or her immune from discharge or discipline for legitimate reasons or from adverse action dictated by nonprohibited considerations.

(e) (I) Each specific licensee, each applicant for a specific license, and each general licensee subject to part 19 shall prominently post the

revision of NRC Form 3, "Notice to Employees," referenced in 10 CFR 19.11(c).

(2) The posting of NRC Form 3 must be at locations sufficient to permit employees protected by this section to observe a copy on the way to or from their place of work. Premises must be posted not later than 30 days after an application is docketed and remain posted while the application is pending before the Commission, during the term of the license, and for 30 days following license termination.

(3) Copies of NRC Form 3 may be obtained by writing to the Regional Administrator of the appropriate U.S. Nuclear Regulatory Commission Regional Office listed in Appendix D to Part 20 of this chapter or by calling the NRC Information and Records Management Branch at (301) 415 - 7230.

(f) No agreement affecting the compensation, terms, conditions, or privileges of employment, including an agreement to settle a complaint filed by an employee with the Department of Labor pursuant to section 211 of the Energy Reorganization Act of 1974, as amended, may contain any provision which would prohibit, restrict, or otherwise discourage an employee from participating in protected activity as defined in paragraph (a)(l) of this section including, but not limited to, providing information to the NRC or to his or her employer on potential violations or other matters within NRC's regulatory responsibilities.

[58 FR 52408, Oct. 8, 1993, as amended at 60 FR 24551, May 9, 1995; 61 FR 6764, Feb. 22, 1996]

DELIBERATE MISCONDUCT - 10 CFR 30.10

The information below is taken directly from 10 CFR 30.10 for your review.

(a) Any licensee, certificate of registration holder, applicant for a license or certificate of registration, employee of a licensee, certificate of registration holder or applicant; or any contractor (including a supplier or consultant), subcontractor, employee of a contractor or subcontractor of any licensee or certificate of registration holder or applicant for a license or certificate of registration, who knowingly provides to any licensee, applicant, certificate holder, contractor, or subcontractor, any components, equipment, materials, or other goods or services that relate to a licensee's, certificate holder's or applicant's activities in this part, may not:

(1) Engage in deliberate misconduct that causes or would have caused, if not detected, a licensee, certificate of registration holder, or applicant to be in violation of any rule, regulation, or order; or any term, condition, or limitation of any license issued by the Commission; or

(2) Deliberately submit to the NRC, a licensee, certificate of registration holder, an applicant, or a licensee's, certificate holder's or applicant's, contractor or subcontractor, information that the person submitting the information knows to be incomplete or inaccurate in some respect material to the NRC.

(b) A person who violates paragraph (a)(l) or (a)(2) of this section may be subject to enforcement action in accordance with the procedures in 10 CFR part 2, subpart B.

(c) For the purposes of paragraph (a)(l) of this section, deliberate misconduct by a person means an intentional act or omission that the person knows:

(1) Would cause a licensee, certificate of registration holder or applicant to be in violation of any rule, regulation, or order; or any term, condition, or limitation, of any license issued by the Commission; or

(2) Constitutes a violation of a requirement, procedure, instruction, contract, purchase order, or policy of a licensee, certificate of registration holder, applicant, contractor, or subcontractor.

[56 FR 40689, Aug. 15, 1991]

SHIPPING

Currently, the following documents are required (in addition to the items shown in the transportation section) for transportation of nuclear gauges that are shipped as Type A quantities:

Certificate of Competent Authority (Special Form Source Certificate)

49 CFR 173.476(a) requires that a shipper keep a copy of the IAEA Certificate of Competent Authority for each source in a gauge on file "for at least one year" after the latest shipment. Take note that this certification expires and a current copy must be in possession before a gauge can be legally shipped.

Results of Type A Package Testing

49 CFR 173.415 (a) requires that 'each shipper of a Type A package "must maintain on file for at least one year after the latest shipment" testing methods and results for the Type A package.

Locking or Sealing of Package

49 CFR 173.412 requires for Type A packages that "the outside of the packaging incorporate a feature, such as seal, that is not readily breakable, and that, while intact, is evidence that the package has not been opened". This requirement can be satisfied by the use of a padlock.

Inspection of Package Prior to Shipment

49 CFR 173.475 requires the shipper to inspect each package before shipment to ensure that the package is physically sound and that each closure device (hinge, hasp, latch, etc.) "Is properly installed, secured, and free of defects".

Under current DOT regulations, the gauge is considered under transport during loading of the vehicle, movement of the vehicle on public roads,

unloading of the vehicle, and during temporary storage of the gauge away from the approved storage area.

For international shipments or shipping by air, a common carrier must be contacted for further assistance.

Nuclear Gauge Incidents

- The following sections detail several different actual incidents that have occurred with nuclear density gauges. Each of these incidents has been included to help you recognize potential safety issues that may arise when transporting, storing and using nuclear density gauges. Please read each incident in its entirety.
- When an incident occurs regarding a nuclear gauge the licensee holder is required to issue a press release regarding the incident.

Environment Officials Seek Stolen Nuclear Gauge

Device Contains Small Amounts Of Radioactive Material

, *Staff Writer*
WABL Channel, Baltimore, Md.
POSTED: 6:00 p.m. EDT April 22, 2003

BETHESDA, Md. -- Maryland environment officials are searching for a nuclear gauge that was apparently stolen in Bethesda Tuesday.

Maryland Department of the Environment officials said they are searching for a moisture density gauge that was apparently stolen early Tuesday from a trailer on a construction site located in the 7300 block of River Road in Bethesda.

Officials said the device contains small amounts of radioactive material and is used to measure moisture and compaction in soils, concrete, asphalt and other aggregate materials. The gauge is a CPN International model MC1DR, and, according to MDE officials, it contains 10 millicuries of Cesium-137 and 50 millicuries of Americium-241.

Officials said this is not a threat to public health and safety as long as the source remains locked. (company name removed), owns the device and said that it was locked to prevent exposure to radioactive sources.

The gauge was stored in a transport case that measures 17 inches by 30 inches by 14 inches and weighs about 40 pounds, according to the MDE. A label on the case has a radiation symbol and reads "Caution: Radioactive Material."

WABL Channel, Baltimore, Md.

NUCLEAR GAUGE REPORTED STOLEN IN VIRGINIA; RECOVERY OF DEVICE IS SOUGHT

NRC NEWS, U.S. NUCLEAR REGULATORY COMMISSION
No. I-04-050 October 28, 2004

A Virginia company has notified the Nuclear Regulatory Commission that a portable moisture-density gauge containing sealed sources of radioactive material has been stolen.

(Company name omitted), reported to the NRC on Oct. 25 that one of its employees acknowledged the loss of a Troxler Model 3430 nuclear gauge that had been checked out for use at a Norfolk, Va., work site. The individual reported stopping at a Wal-Mart store in Norfolk on the morning on Oct. 18. After shopping, the worker returned to his company pick-up truck to discover the gauge was missing.

A review of a security videotape showed two individuals taking the device and driving off in a blue car at about 10 a.m. that day. Norfolk police were subsequently contacted and a police report was filed on the theft.

The gauge was in its yellow transportation container at the time it was removed. According to the company, the container was not locked nor was it secured to the vehicle, as required by NRC regulations. The NRC will review the loss of the gauge and determine whether enforcement action is warranted.

The device contains approximately 8 millicuries of cesium-137 and 40 millicuries of americium-241. The gauge makes its measurements by projecting the radiation from the two radioactive sources into the ground and then displaying the reflected radiation on a dial on its top. The device consists of a shielding container with a plunger-type handle protruding from the top. The handle is used to extend and then retract the radioactive sources from the shielded position. When not in use, the handle is normally locked, with the sources in the retracted, safely shielded position. The rectangular base of the gauge is yellow.

As long as the sources are in the shielded position, the gauge would present no hazard to the public. However, any attempt to tamper with the radioactive sources in the device could subject the person to radiation exposure. Handling of the unshielded sources outside their container would carry a risk of potentially dangerous radiation exposure.

A typical carrying case for a moisture-density gauge A typical moisture-density gauge in use

The gauge's serial number is 29129. It is listed on a metal plate on top of the device. Anyone seeing the gauge should leave it alone and report its location to the NRC's Operations Center at (301) 816-5100. The center is staffed 24 hours a day and accepts collect calls.

NOTE TO EDITORS: A pawn shop owner in Virginia Beach notified the NRC Operations Center on Friday, October 29, 2004, that the gauge was at the shop. The shop owner told the NRC he recognized the gauge from a newscast asking the public for assistance in recovering the gauge. Foundation Engineering Science, Inc. retrieved the gauge on Friday afternoon.

CALIFORNIA AGREEMENT STATE REPORT - DAMAGED MOISTURE DENSITY GAUGE

NRC NEWS
U.S. NUCLEAR REGULATORY COMMISSION
Office of Public Affairs, Region I
475 Allendale Road, King of Prussia, Pa. 19406

The following information was obtained from California Department of Health Services, Radiation Health Branch - Berkeley / Region 3 via facsimile:

"A CPN Model MC-1DRR-P moisture density gauge was run over at a construction site at Valencia Street between 14th and 15th Street in San Francisco, CA approximately at 9:30 am. The gamma source rod was in the extended position at the time of the incident. The source tip rod containing 10 [milliCuries of] Cs-137 was intact but was slightly bent and could not be retracted into the safe position. The 50 [milliCurie] Am-241/Be source was intact as designed. Mr. [DELETED] from CPN was at the site after the incident. A screen leak test performed by Mr. [DELETED] did not indicate any contamination. Gauge was picked up by CPN at the site and held for disposal."

TROXLER MOISTURE DENSITY GAUGE STOLEN FROM BED OF PICKUP TRUCK

NRC NEWS
U.S. NUCLEAR REGULATORY COMMISSION
Office of Public Affairs, Region I
475 Allendale Road, King of Prussia, Pa. 19406

Sometime between the late afternoon on Friday, 2/11, and Sunday at 0600 HST, 2/13, a Troxler Moisture Density Gauge Model 3440, S/N 25490, and its case were stolen from the bed of the company pickup while parked in the Kalihi area of Honolulu, HI. Both the chain and cable securing the case were cut. The Model 3440 contains two (2) radioactive sources; 8 millicuries Cs-137 and 40 millicures Am-241/Be.

The licensee contacted the Honolulu Police Department and will offer a reward for its return.

CPN NUCLEAR GAUGE STOLEN FROM THE JOBSITE

NRC NEWS, U.S. NUCLEAR REGULATORY COMMISSION
Office of Public Affairs, Region I
475 Allendale Road, King of Prussia, Pa. 19406

An employee of the (company name withheld) was working at a jobsite on Highway PR837 in Guaynabo, Puerto Rico with a CPN nuclear gauge. About 14:55 on 2/16/05 he had walked 40 feet away from the nuclear gauge and when he returned to the area he noticed the gauge missing. The gauge contain two sources, 50 millicuries Am-241and 10 millicuries of Cs-137. A police report was being taken and that information will be provided as a later update. No reward for the return of the gauge is being offered at this time.

* * * UPDATE ON 02/17/05 AT 0742 FROM DAVID RHOE TO GERRY WAIG * * *

The following information was received via facsimile from Mr. Rhoe:
RE: Stolen CPN Nuclear Gauge [Serial number] MD20801021

"On February 16, 2005 the above nuclear gauge was stolen from a vehicle. The nuclear gauge was located inside the carrying case and the case was secured by chains/padlock to the vehicle. The chain was cut and the nuclear gauge/case/chains were removed. (Name withheld) was inspecting the asphalt and the vehicle was temporarily out of sight due to the blind spots around the corner of the road. The handle of the nuclear gauge inside the case was not locked. The incident occurred between 3:30 to 4:00 pm on RP 837 in Guaynabo at the Barrio Camarones site. The police and NRC were immediately notified. The police report number is 05-7-132-02011.

"The following media stations were notified: Channel 2 WKAQ TV, Channel 4 WAPA TV, University of Puerto Rico TV. "Today the radio stations and newspaper will be notified. There will be a reward offered for the return of the gauge." Notified TAS DO, R1DO (Eugene Cobey), NMSS (Sandra Wastler)

AGREEMENT STATE REPORT PROVIDING INFORMATION ABOUT AN EVENT OF MEDIA INTEREST

NRC NEWS
U.S. NUCLEAR REGULATORY COMMISSION
Office of Public Affairs, Region I
475 Allendale Road, King of Prussia, Pa. 19406

The Florida Bureau of Radiation Control provided the following report via e-mail to the NRC:

"[The] West Palm Beach Fire Department received a call about an electrical fire at [a West Palm Beach business] location. There was not an active fire [when the Fire Department reached the incident site] but an electrical smell [was] in the air. While in the [incident] building location, the FPD radiation dosimeters [worn by the Fire Department responders] indicated a [radioactive] source in a storage locker. [Based on the detected radiation], a one city block was evacuated and an area around the site of ten city blocks was sealed off. "

[The licensee was authorized to posses Troxler type gauges at the site for its business activities which were stored at the location where the Fire Department had responded.]

"Investigators [from the Florida Bureau of Radiation Control] arrived on scene and noted proper signage on the door [of the incident location] for a temporary work site [storing Troxler type gauges]. Licensee representatives opened [the] storage container [with the Troxler type gauges] to verify that the gauges were inside [and intact]. The emergency is in the process of being terminated. The [State] of Florida will continue its investigation."

There was never any actual fire or release of any radioactive material during the course of this event. Florida Report FL05-016

AGREEMENT STATE - FLORIDA BUREAU OF RADIATION CONTROL - DAMAGED TROXLER GAUGE

NRC NEWS
U.S. NUCLEAR REGULATORY COMMISSION
Office of Public Affairs, Region I
475 Allendale Road, King of Prussia, Pa. 19406

The Florida Bureau of Radiation Control employee called to report a damaged Troxler gauge, with a source strength of 8 mCi Cs-137 and 40 mCi Am-241, is being quarantined in a church parking lot by the St. Lucie police department. An employee of the licensee, (Name Withheld), had the gauge in his truck when he was involved in an accident at 1501 SW Floresta Dr. St Lucia, FL. The impact of the crash caused the Troxler instrument to be ejected from the truck causing damage to the handle. The employee was air lifted to the local hospital in critical condition.

Dave Ferguson requested the St Lucie police protect the public from the confiscated Troxler gauge by setting a protective boundary of 15 feet. Mr. Ferguson stated the proper authorities should be picking up the damaged gauge within a 2.5 hour period.

* * * UPDATE FROM THE FLORIDA BUREAU OF RADIATION CONTROL ON 1/13/05 VIA E-MAIL * * *

The licensee took possession of the gauge around 05:00 am on 1/13/05. The report from the State indicates that the gauge came out of its case but was undamaged.

The R1DO (Kinneman) and NMSS EO (Essig) has been informed.

AGREEMENT STATE REPORT INVOLVING STOLEN TROXLER GAUGE

NRC NEWS
U.S. NUCLEAR REGULATORY COMMISSION
Office of Public Affairs, Region I
475 Allendale Road, King of Prussia, Pa. 19406

During the time frame of 11:00 pm on January 11, 2005 and 5:30 a.m. on January 12, 2005, a Troxler Model 3430 portable gauge containing 9 mCi of Cs-137 and 44 mCi of Am-241/Be was reported stolen. The serial number on the Troxler gauge is not known at this time. The device was reported as fully locked, with all sources in the storage positions. The Nevada Health Division, Radiological Health Section, was notified by the licensee on January 12, 2005 at approximately 7:00 a.m.

The individual involved was instructed by corporate RSO to notify local police. No other information is known at this time. An investigation is being conducted.

Event Report ID No. NV-05-001

***** UPDATE AT 13:08 EST ON 1/19/05 FROM S. MARSHALL TO M. ABRAMOVITZ *****

The initial information incorrectly identified the gauge as Troxler, Model 3430. The correct Troxler Model is 3450, Serial # 000863. The Event Report ID No. NV-05-001 was incorrect, it should have read Event Report ID No. NV-05-002.

The gauge was found on Friday, 01/14/05, by a private citizen on the curb at a local supermarket. The citizen called the licensee to advise them of the location of the gauge. The licensee will leak test the gauge before returning it to service.

AGREEMENT STATE REPORT INVOLVING THEFT OF MOISTURE/DENSITY GAUGE

NRC NEWS, U.S. NUCLEAR REGULATORY COMMISSION
Office of Public Affairs, Region I
475 Allendale Road, King of Prussia, Pa. 19406

"The licensee reported the theft of a Campbell Pacific Nuclear moisture/density gauge (model MC-1DRP, serial number MD01005902). The gauge contained a 1.85 GBq (50 [millicuries]) Am-Be source and a 0.37 GBq (10 [millicuries]) Cs-137 source. An authorized user had been working at a temporary job site for two weeks. On Sunday, August 18 at 8:00 p.m. the authorized user parked his pick-up truck in the parking lot of a local motel in Centralia. The gauge was in back under the locked canopy, but visible. The gauge box was locked but not secured within the bed of the truck. When the authorized user went out to his truck at 6:00 a.m. on Monday the 19th the gauge was gone. The back window of the canopy had been forced open. Nothing else was missing from the truck (not much else of value was in the truck). The theft was reported to the Centralia police and to the licensee's RSO. The RSO notified the Department."

* * * * UPDATE FROM STATE (A. SCROGGS) VIA EMAIL 02/14/05 1800 EST * * * *

The following information was received from the State via email:

"On Friday February 4, 2005 an employee of another engineering firm noticed the gauge at a garage sale in Centralia, Washington. The employee noted the gauge ID specifics and had his RSO contact the gauge manufacturer for information. When informed by the manufacturer that it had been stolen, the employee was able to involve the police and secure the gauge. The individual responsible for the garage-sale was subsequently arrested. The owner, URS Corporation was notified and is presently having the gauge serviced and leak tested by a licensed technical service provider. They plan to retake ownership when this work is completed."

NRC Enforcement Actions

American Technical Institute, LLP

Enforcement Actions Issued to Materials Licensees

The following enforcement actions have been issued against the materials licensees. In most cases this is the company or municipality who holds the materials license. These actions detail the violation and the associated fine. All of these violations were taken from the NRC website and the names removed.

Failure to Block and Brace Moisture Density Gauge

On September 26, 2002, a Notice of Violation and Proposed Imposition of Civil Penalty in the amount of $3,000 was issued for a Severity Level III problem involving the failure to properly prepare (block and brace) a moisture density gauge (that included 8 millicuries of cesium-137 and 40 millicuries of americium-241/beryllium) for transport that resulted in the gauge being lost and the failure to immediately notify the NRC. Although the civil penalty would have been fully mitigated based on the normal civil penalty assessment process, a base civil penalty was assessed in accordance with Section VII.A.1.g of the Enforcement Policy to reflect the significance of maintaining the control of licensed material.

Deliberate Failure to Provide Complete and Accurate Information to the NRC

On April 27, 2004, a Notice of Violation and Proposed Imposition of Civil Penalty in the amount of $6,000 was issued for a Severity Level III problem involving the deliberate failure to provide complete and accurate information to the NRC concerning the location of certain gauges containing NRC-licensed material.

Individuals Using Nuclear Gauges Not Trained or Using Dosimetry Badges

On April 7, 2003, a Notice of Violation and Proposed Imposition of Civil Penalty in the amount of $3,000 was issued for a willful Severity Level III problem involving: (1) the failure to issue approved dosimetry to an individual who used licensed materials; and (2) the failure to ensure that individuals using licensed materials are either designated by the Radiation Safety Officer and properly trained, or are under required supervision of someone named on the license.

Failure to Maintain Constant Surveillance & Secure Gauge in Vehicle

On September 27, 2001, a Notice of Violation and Proposed Imposition of Civil Penalty in the amount of $3,000 was issued for a Severity Level III problem involving willfulness. The problem consisted of two violations involving the failure to secure and maintain constant surveillance over a gauge and failure to assure that gauges were routinely secured in vehicles according to procedures.

Failure to Control and Maintain Constant Surveillance of Licensed Material

On March 3, 2004, a Notice of Violation and Proposed Imposition of Civil Penalty in the amount of $3,000 was issued for a Severity Level III violation involving the failure to control and maintain constant surveillance of licensed material (11 millicuries of cesium-137 and 40 millicuries of americium-241 in a portable gauge) in a controlled or restricted area, resulting in the loss of the gauge during transport. Although the civil penalty would have been fully mitigated based on the normal civil penalty assessment process, a base civil penalty was assessed in accordance with Section VII.A.1.g of the Enforcement Policy to reflect the significance of maintaining control of licensed material.

Failure to Secure, Limit Access & Lock the Gauge or Transport Case During Transportation

On November 6, 2001, a Notice of Violation and Proposed Imposition of Civil Penalty in the amount of $3,000 was issued for a Severity Level III problem involving the failure to secure and limit access to a portable moisture density gauge and the failure to lock the gauge or transport case while the gauge was being transported. Although the civil penalty would have been fully mitigated based on the normal civil penalty assessment process, a base civil penalty was assessed in accordance with Section VII.A.1.g of the Enforcement Policy to reflect the significance of maintaining the control of licensed material.

Multiple Violations Regarding Portable Nuclear Gauge

On November 1, 2001, a Notice of Violation and Proposed Imposition of Civil Penalty in the amount of $3000 was issued for a Severity Level III problem involving (1) failure to maintain control of radioactive material that is in an unrestricted area and that is not in storage, (2) failure to transport a portable moisture density gauge in the required container, (3) failure to block and brace the gauge during transportation, and (4) failure to lock the gauge during transportation. Although the civil penalty would have been fully mitigated based on the normal civil penalty assessment process, a base civil penalty was assessed in accordance with Section VII.A.1.g of the Enforcement Policy to reflect the significance of maintaining the control of licensed material.

Nuclear Gauge Not Secured Nor Kept Under Constant Surveillance

The action was based on a violation where the licensee did not secure from unauthorized removal or limit access to a Campbell Pacific Nuclear moisture/density gauge containing NRC-licensed material (nominally 10 millicuries (370 Mbq) of cesium-137 and nominally 50 millicuries (1850 Mbq) of americium-241 in sealed sources) at a construction site in Detroit, Michigan, an unrestricted area, nor did the licensee control and maintain constant surveillance of this licensed material.

Individual Using Nuclear Density Gauge Without Training

On January 15, 2003, Notice of Violation and Proposed Imposition of Civil Penalty in the amount of $3,000 was issued for a Severity Level III violation involving the use of a moisture density gauge (NRC licensed materials) by an individual who had not been provided required radiation safety training and who did not work under the supervision and in the physical presence of individuals who had required radiation safety training.

Employee Discriminated Against For Reporting Safety Concerns

On October 6, 2004, a Notice of Violation and Proposed Imposition of Civil Penalty in the amount of $9,600 was issued for a Severity Level II violation for discrimination against an employee for engaging in certain protected activities (reporting safety concerns to his employer or to the NRC).

Enforcement Actions Issued to Individuals

The following enforcement actions have been issued against individuals. The following sections detail the violation and the associated fine. All of these violations were taken from the NRC website and the names removed.

Failed to Provide Complete and Accurate Information to the NRC

On April 27, 2004, a Notice of Violation was issued for a Severity Level III violation involving the individual's deliberate activities while employed at (Name Deleted). As the General Manager and Radiation Safety Officer, the individual deliberately failed to provide complete and accurate information to the NRC concerning the location of certain gauges containing NRC-licensed material.

Nuclear Density Gauge Without Obtaining a Materials License

On December 12, 2002, an immediately effective Order Prohibiting Involvement in NRC-Licensed Activities (for five years) was issued to the individual based on his deliberate actions in acquiring and possessing byproduct material (8 millicuries of cesium-137 and 40 millicuries of americium-241 in a moisture density gauge) without a license from the NRC or an Agreement State. As a technician formerly employed by [Name deleted] (an NRC licensee), the individual acquired and possessed the moisture density gauge without the licensee's knowledge.

Individual Prohibited From Involvement In NRC Licensed Activity For 5 Years

On December 30, 2004, an immediately effective Order Prohibiting Involvement in NRC-Licensed Activities (for five years) was issued based on the individual's deliberate misconduct while working at [Name deleted]. As the president, owner, and Radiation Safety Officer, the individual deliberately failed to: have sufficient number of qualified personnel present at temporary job sites; provide safety and dosimetry training to employees; conduct inspections and maintenance of industrial radiography equipment at specified intervals; maintain records of NRC required inspection and maintenance records; and provide complete and accurate information to the NRC.

Individual Purchased, Possessed and Used Nuclear Gauge Without A Materials License

On June 26, 2003, an Immediately Effective Order Prohibiting Involvement in NRC Licensed Activities (for three years) was issued to the individual because he deliberately purchased, possessed and used nuclear material (about 10 millicuries of cesium-137 and about 50 millicuries of americium-241 in two gauging devices), in violation of NRC requirements.

Standardizing The Nuclear Density Gauge

Prior to performing nuclear density tests to determine the compaction of different materials, the gauge must be standardized. Listed below are the general steps that must be taken to standardize a nuclear density gauge (for specific instructions please reference the nuclear gauge owners manual):

1. This activity is performed with the rod in the secured position
2. Place the standardizing block in the general location where you will perform testing
3. Make sure that area is clear of any equipment or vehicles
4. Place the gauge on the block with the rod opposite of the block stop. Making sure that there are no gaps between the gauge and the block (shown below)

5. Press or activate the standardizing function of the gauge
6. Wait for the gauge to standardize and then record the results

Nuclear Gauge Density Testing

Listed below are the general steps that must be taken to perform nuclear density gauge testing (*for specific instructions* please reference the nuclear gauge owners manual):

1. Find a flat and level spot where you want to test
2. Take the plate and clean off the test location with the edge of the plate to remove any loose rocks.
3. Use a small quantity of fine sand to level out test location
4. After placing the plate on the area, place the extruder rod on the drill rod, and then insert the drill rod into the plate
5. While standing on the plate use a six-pound sledgehammer to drive the rod slightly past the depth you wish to take the test.
6. Remove the drill rod with the extruder rod and then carefully remove the plate, so as not to damage the hole
7. Place the gauge over the area where the plate was and then while holding down the trigger slide the rod into the hole (shown below)

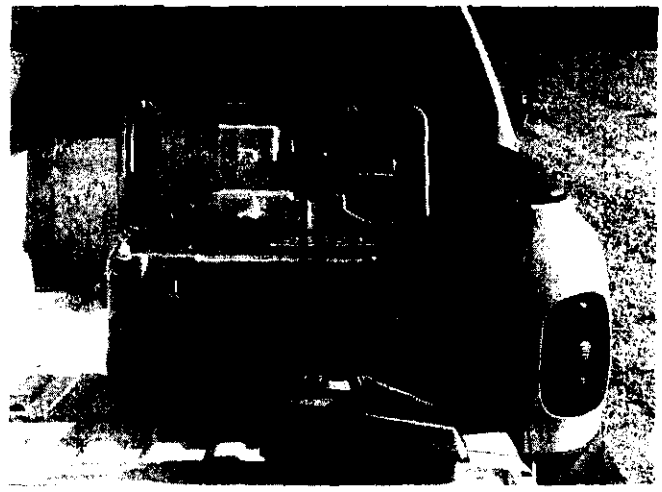
8. Set the depth of the gauge to the hole depth and start the test (shown below)

9. Retract the rod
10. Record the test data.

Nuclear Density Gauge Cleaning

Periodic and proper cleaning of the nuclear gauge must be performed to make sure that the gauge works properly. Keeping the gauge clean also will minimize repairs due to the rod sticking or not functioning properly. Listed below are the general steps that must be taken to perform nuclear density gauge cleaning (for specific instructions please reference your nuclear gauge owners manual):

1. Use an area to clean the gauge where there will be no one near the gauge or yourself



2. Place the gauge on the side and carefully remove the plate screws
3. Remove the plate and clean it
4. While shielding your body away from the radioactive source remove the tungsten block
5. Wipe off and clean the block
6. While shielding your body away from the radioactive source replace the tungsten block
7. Return the plate and then screw it back on, be careful not to over tighten the screws (Snug tight is optimal).
8. Return the gauge to the shipping container

Test Instructions

To pass the Nuclear Gauge Training course you must receive a score of 70% or better on the following closed book test. On the following page are thirty questions both multiple choice and true/false. Select the best answer for each of the questions. Each question is worth 10 points. Answer all of the questions then select continue on the right side of the page. You will be allowed 20 minutes to complete the test. The test will be immediately graded and your score shown. Questions that are missed will reappear so that you can review them. Once you pass the test a certificate can be printed off on your local printer to show completion of the course.

Click on continue on the right side of the page to start the quiz.

Which of the following has a positive electrical charge?

neutron
atom
protron
electron

The acronym ALARA stands for?

As Low As Recently Absorbed
As Low As Reasonably Accessible
As Low As Reasonably Achievable
None of the above

For a given amount of radioisotope to decay to half of its original activity, the time is called?

Half - Death
Half - Time
Half - Life
Half – Lead

The cause of radioactivity is?

Ionization
Bombarding electrons
Unstable nuclei
Unstable electrons

Who is to be notified immediately when an incident has occurred which has damaged the *nuclear gauge*?

USNRC
Your company RSO
The gauge manufacturer
All of the above
None of the above

Nuclear gauges should not be stored within how many feet of a full-time workstation?

5 Feet
10 Feet
15 Feet
25 Feet

When transporting a nuclear gauge which of the following documents must the gauge user have present?

Hazmat Certificate
Emergency Response Information
Bill of Lading
All of the above

When a change in unstable atoms occurs and the radioactive element gives off energy in what form?

Electrons
Stabilization
Ionization
Radiation

A radioactive material's half-life is the time for half of the atoms to?

Split in half
Decay to another isotope
Stabilize
Double in size

The nuclear gauge moisture determination is determined by what principle?

The soil absorbing the slow neutrons
The gauge counting the protons in the soil
The detector tube detecting fast neutrons
Neutron moderation

Which of the following materials produces the better shielding from the nuclear gauge?

Liquid
Dense Material
Non-Dense Material
None of the above

At what distance from the gauge is the nuclear gauge operator receiving the least amount of radiation?

Directly in contact with the gauge
10 Feet away
20 Feet away
2 miles away

Using the inverse square law, if at point "A", 5 foot from the source the dose rate is 30 mrem/hr. The distance is increased to 15 feet (Point "B"), the exposure at point "B" would be?

2 feet
3.3 feet
5 feet
9.9 feet

The acronym QF stands for?

Quality Fraction
Questionable Fraction
Questionable Factor
Quality Factor

The classes of radiation exposure are?

A. Somatic
B. Genetic
C. Particulate
D. A and B

True False Questions:

False – The nuclear gauge user may touch the unshielded source when cleaning the gauge.

True – For the entire term of her pregnancy the pregnant woman is only allowed to receive 500 mrem of radiation exposure dose.

True – When transporting and using the nuclear gauge the user typically should wear a personnel-monitoring device (dosimetry badge)

True – When storing the nuclear gauge two methods of locking the gauge and a radiation caution sign should be used.

False – When using the nuclear gauge at a project site it is acceptable to leave the gauge as long as it is in visible sight.

False – If an incident occurs where a work truck damages the nuclear gauge it is acceptable to allow the truck to leave the area.

True – If an incident occurs the area must be cordoned off and a minimum of 15 feet of distance from the source should be maintained.

False – Typically leak testing is to be performed on an annual basis.

True – To keep the nuclear gauge in good working condition it must be lubricated and cleaned periodically.

True - Gauges must be kept under constant surveillance, or secured against unauthorized use or removal to avoid loss or gauges being stolen.

False – It is acceptable to transfer the nuclear gauge in the back of a pick-up truck outside of the box if it is for a short distance on a project site.

True - Radiation poisoning is an illness resulting from large amounts of radioactive materials entering the body.

True - The nuclear gauge must be secured in or to the vehicle to keep it from being removed by unauthorized personnel (i.e. stolen)

False – The gauge does not need to be secured to prevent movement during transportation.

False – Nuclear gauges can be transported in any container that they can be fit into.

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