

BPA OPERATING AND EMERGENCY PROCEDURES  
FOR USE OF THE NUCLEAR MOISTURE/DENSITY GAUGE

I. Certification, Use, and Personal Monitoring

- A. No employee shall use or allow the use by others of the Nuclear Moisture/Density Gauge until: (1) such person has received training and has received certification of such training from a source acceptable to the BPA Radiation Safety Officer (R.S.O.). Such training shall include instructions in subjects outlined in Appendix A of Part 34, Chapter 1 of the Code of Federal Regulations, Title 10 - Energy. (Refer to page 250); (2) such person has received copies of and instruction in the regulations contained in Part 34 and in the applicable sections of Parts 19 and 20; (3) such person has demonstrated competence to use the Nuclear Moisture/Density Gauge, radiation survey instruments and related tools.
- B. Each certified employee shall be issued a film badge to be worn whenever operating, transporting, or working in close proximity to the gauge. Film badges shall be returned to the R.S.O. for processing on a quarterly basis, i.e., January, April, July, and October of each year. Badges are to be sent to the R.S.O. not later than c.o.b. the first work day after receiving the new film badge for the following quarter. It is essential that film badges be stored away from the gauge when not in use. IN NO CASE IS A FILM BADGE TO BE WORN BY ANYONE OTHER THAN THE PERSON ASSIGNED.
- C. In addition to the film badge, it is required that each user wear a Pocket Dosimeter when working near or operating the gauge. The dosimeter shall be read and doses recorded each day the gauge is used. Should the pocket dosimeter discharge beyond its range the film badge shall immediately be sent to the R.S.O. for processing. As with film badges the pocket dosimeter shall be stored away from the nuclear gauge.

The daily log of dosimeter readings shall be submitted quarterly to the R.S.O. at the time film badges are sent.

A record of processed film badge reports and the dosimeter log will be maintained by the R.S.O. at the Ross Complex.

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## II. Transportation

- A. The nuclear moisture/density gauge must always be transported in the aluminum shipping case provided by manufacturer. The gauge should never be transported by vehicle, even for short distances, outside the shipping case to avoid unnecessary exposure and possible damage to the gauge.
- B. When transporting the nuclear gauge, the vehicle shall have a "Caution - Radioactive Material" sign placed so as to be visible from the rear. A 10" x 10" magnetic sign has been provided with each gauge which allows for placing on the particular vehicle in use. This sign should be removed when not actually transporting the gauge. A second sign of 4" x 4" dimension is provided and is to be placed on the dashboard.
- C. Whenever the nuclear gauge must be temporarily left in an unattended vehicle, the vehicle shall be locked and the shipping case containing the gauge locked and secured to prevent tampering or removal by unauthorized persons.

## III. Storage

- A. The nuclear gauge is provided with a lock which prevents accidental exposure of the source rod. Whenever the gauge is not under the direct surveillance of the authorized user, the source shall be retracted and the gauge locked.
- B. The nuclear gauge must be stored in its shipping case when not in use. The storage area must be a minimum of ten feet away from any area where other workers would normally work full time. The shipping case must also be locked and, if in an area accessible to persons other than the user and the R.S.O., be physically secured to prevent removal of the case and gauge by unauthorized persons.

#### IV. Field Operating and Safety Procedures

- A. The user must be thoroughly familiar with the General Operating and Maintenance Procedures provided in the manufacturer's manual. A copy of this manual has been provided with each gauge and is to remain in the shipping case when not in use. It is important that the gauge not be used to level the work site and that the gauge not be moved when the source shutter is open.
- B. It is important that the source rod NEVER be handled or be exposed unnecessarily at ANY time.
- C. When taking standard counts and performing actual tests, the user shall minimize exposure by "backing off" several feet from the gauge during those periods when his presence is not physically required. Remember, keep curious persons or observers from handling or close observation of the gauge, but do so as to not create undue alarm.
- D. Should observation of the source rod be necessary to align the rod with the hole for direct transmission readings, the user shall utilize the small handle on the front of the gauge.

Lift the gauge slightly with this handle and lower the source to a position midway between the 2" and 4" depth position. This will allow the source to be just visible under the front edge of the gauge. With the other hand on the guidetube of the gauge, move the gauge to a position so that the source may be viewed as it is slipped into the hole. This operation takes only a couple of seconds with arms at full length.

After inserting the source rod to the desired depth, ease the gauge back against the hole to remove any possible airgap between the rod and the hole.

- E. Some soil will adhere to the tip of the rod and eventually the source/shutter chamber will fill with soil and cause jamming. This requires cleaning.



To clean the shutter chamber, stand the gauge on its geiger tube end. Remove the six screws from the access plate and the cleanout ring. (Refer to figure #16 in the manufacturer's manual.) Move away from the gauge and clean off the block, ring, and the plate.

Standing "behind" the gauge, use a toothbrush or other brush to brush out the chamber. The source must be in the retracted or safe position during this cleaning.

- F. In no case is the source rod, shutter mechanism, or the bottom of the gauge to be cleaned by directly wiping with the hands.
- G. Should the source rod completely jam and become inoperative, the user shall contact the R.S.O. who will in turn notify the manufacturer for advice.
- H. At the conclusion of each day's use, the user shall monitor the gauge with the model V-700 radiological survey meter provided with each gauge to insure that the source rod has been returned to its retracted or fully shielded position before storing. (Refer to Part V.A.)

A record shall be made of this reading and shall be submitted to the R.S.O. on a quarterly basis with pocket dosimeter readings and film badges. This record shall show the gauge serial number, date used, name of user, and site or project where used.

#### V. Leak Tests and Calibration of Radiation Survey Instruments

- A. The R.S.O. will obtain smear specimens for leak testing in accordance with instructions provided in the leak test kit from the U.S. Testing Company. These tests shall normally be made during January and July unless the radiation survey instruments and/or film badge reports indicate the possibility of leakage.

In this event the user shall discontinue use of the gauge and immediately notify the R.S.O.

B. If the source capsule leaked, the leaking material would be collected by the shutter parts associated with the opening in the bottom of the case. It is not necessary to disassemble the gauge, NOR THE SOURCE ROD.

1. Up-end the gauge or lay it on its side on a table and stand behind it or to one side.
2. DO NOT OPEN THE SHUTTER.
3. Using the detergent moistened swab from your kit, swab in around the source hole.
4. IT IS NOT NECESSARY TO EXTEND THE SOURCE, any leakage will be present at the source cleaning wiper plate at the edge of the access hole.
5. Do not touch the swab. Replace in its protective container.
6. Prior to mailing the smears they shall be surveyed with the radiation survey meter to insure that radiation from the smears does not exceed 0.4 Mr/hour.

C. Each nuclear gauge shall be accompanied by at least one each model V-700 radiological survey meter. This instrument will be exchanged every six months by the R.S.O. for service and calibration through the BPA Instruments and Standards Laboratory Section.

## VI. Emergency Procedures

A. There are only limited actions that the operator should take when the nuclear gauge is involved in a field accident, fire, slide, etc., he should:

1. Attempt to prevent exposure to himself and to others during an emergency. He must take action to prevent the spread of contamination should a severe accident make this spread possible.
2. General action should be to ascertain the nature of the damage and either remove the damaged gauge to a safe storage place, or secure the area and call for help. He should NEVER attempt to pick up damaged gauge parts, bare sources, etc.

## Example #1

The gauge is damaged but not broken open, the source is retracted and the radiation level normal (Normal radiation reading 2' from a PORTAFROBE is approximately 0.5 Mr./hr.)

ACTION: Place the gauge in its aluminum shipping case and place it in its usual overnight storage area. Call the \*R.S.O. If the R.S.O. is not available, call the factory.

## Example #2

The gauge is damaged, the source is exposed, and gauge is not broken open.

ACTION: At arms length and touching only the upper gauge parts, lift or roll back the gauge to expose the end of the source rod for visual inspection. If the end of the source rod containing the radioactive source is not mechanically damaged, place the gauge in its case in the best way possible, and place in its usual overnight storage area. Immediately notify the \*R.S.O. or the factory if the R.S.O. is not available.

The source is now exposed and unshielded. Do not handle the source rod and keep personnel a minimum of ten feet from the gauge. The gauge may be moved from place to place by the operator with reasonable dispatch, keeping the gauge or shipping case as far from the body as is practical.

## Example #3

The gauge is broken open and the internal parts exposed, or, in the case of a source in the ground the gauge is severely damaged with the source pushed out of the gauge. (Major construction site accident, vehicle or building on fire, etc., resulting in major case damage or destruction.)

**ACTION:** The operator should "freeze" or secure the site, stopping the vehicle that damaged the machine, etc., and should send somebody to call the \*R.S.O. The gauge should not be moved until a survey meter has determined the extent of possible source damage. Personnel should not be allowed to walk through the damaged area in event of contamination.

The R.S.O. will notify others as required including the requirements of Code of Federal Regulations 10 Energy Part 20.403, Notifications of Incidents.

- B. Loss or theft: In the event of loss or theft of the Porta-probe Gauge, immediately after its occurrence becomes known:

Procedure #1

Report by telephone to the \*R.S.O. If the R.S.O. is not available, follow procedure #2.

Procedure #2

Report by telephone and telegraph to the Director of the appropriate Nuclear Regulatory Commission Director:

Idaho, Montana and Wyoming is Region IV, Office of Inspection and Enforcement, USNRC, 611 Ryan Plaza Drive, Suite 1000, Arlington, Texas 76011. Telephone - (817) 334-2841, FTS 334-2841.

Oregon and Washington is Region V, Office of Inspection and Enforcement, USNRC, 1990 N. California Boulevard, Suite 202, Walnut Creek Plaza, Walnut Creek, California 94596. Telephone - (415) 943-3700, FTS 463-3700.

**RADIATION SAFETY OFFICER TELEPHONE NUMBERS:**

James I. Sutton SI/Ross, Ross Complex, Safety Manager, P.O. Box 491, Vancouver, WA 98666. Telephone daytime - (206)690-2389, FTS 425-2389  
Nights or Holidays (503)224-3111.