



# THE H. C. NUTTING COMPANY

EMPLOYEE OWNED

GEOTECHNICAL, ENVIRONMENTAL AND TESTING ENGINEERS  
SINCE 1921

CORPORATE CENTER  
4120 AIRPORT ROAD  
CINCINNATI, OHIO 45226  
(513) 321-5816

July 1, 1991

United States Nuclear  
Regulatory Commission  
Region II  
101 Marrietta Street NW  
Suite 2900  
Atlanta, Georgia 30323

Attn: Sandra Waldron  
Radiation Specialist

Re: Accident Involving Troxler  
Model 3411B, Moisture  
Density Meter Serial #8224  
Owner: The H. C. Nutting Company  
Cincinnati, Ohio

Dear Ms. Waldron:

In accordance with our Licenses No. 34-1882-001, we are reporting an accident involving the above referenced moisture density gauge.

Enclosed you will find a report concerning how the accident occurred as prepared by our field services manager, from Charleston, West Virginia, Mr. Glen R. Savage who responded to the accident on Friday, June 7, 1991. Please note a copy of the memo which was sent to all technicians by the writer on June 10, 1991. You will also find a follow-up memo dated Friday, June 28, 1991 concerning the accident. We trust the information in this report is complete. Included with this report are photos of the scene and the damaged meter. As instructed by the Radiation Protection Officer for Troxler Electronics, we have shipped the damaged meter back to Troxler for disposal.

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PDR ADDCK 03017304  
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Should you have any questions concerning this report please do not hesitate to contact us. Mr. Glen R. Savage (304) 344-0821 or Mr. W. W. Becker, Radiation Protection Officer, Jerry L. Lindsey, Field Services Manager, Vice President (513) 321-5816.

Respectfully submitted,

THE H. C. NUTTING COMPANY

*W. W. Becker*

W. W. Becker,  
H. C. Nutting Company  
Radiation Protection Officer

*Jerry L. Lindsey*  
Jerry L. Lindsey,  
Field Services Manager, V.P.

cc: US Nuclear Regulation Commission

June 26, 1991

REPORT OF DAMAGED NUCLEAR GAUGE

Manufacturer: Troxler Laboratories  
Cornwallis Road at Alexander Drive  
Research Triangle Park, NC 27709

Model Number: 3411-B  
Serial Number: 8224/Source Serial #40-5439 - Serial #47-4566  
Age: 10 years  
Date of Last Leak Test: 3/26/91  
The H. C. Nutting Company NRC License Number: 34-18882-01  
Expiration Date: 5/31/95  
Radiation Protection Officer: Walter W. Becker

10:45 a.m., Friday, June 7, 1991:

Soil technician James Cupp telephoned supervisor Glenn Savage for routine check in. Nuclear gauge was left on the project site (Blackshere Elementary School - Blackshere, WV) in the safe position and locked while Mr. Cupp called his supervisor. The nuclear gauge was located 250' from the work area, adjacent to survey stakes. An employee of the contractor notified Mr. Cupp the gauge had been damaged. I informed Mr. Cupp to confirm the damage, if any, and to call me back. Approximately 10 minutes later, Mr. Cupp called back to confirm the damage. Mr. Cupp informed the contractor to keep a 400' clear area around the gauge until further notice. At this time, I kept Mr. Cupp on hold while I attempted to contact the radiation safety officer, William Becker, and Field Services Manager, Mr. Jerry Lindsey. Mr. Becker was not available at the time.

Mr. Cupp informed me that the gauge was locked in the safe position and that in an attempt to park a scraper/pan, the operator ran over the nuclear gauge. It appeared that the tires pushed the source rod down into the ground, snapped it off and also significant damage was done to the casing of the gauge.

Mr. Lindsey informed me to tell Mr. Cupp that a 15' radius needs to be roped off and an attempt should be made to invert a 55 gallon drum, or something similar over top of the damaged gauge.

Mr. Cupp relayed a message that the contractor would like to continue to work in an area approximately 250' away, Mr. Lindsey agreed. Mr. Lindsey instructed me to obtain a Geiger counter and travel to the project site and investigate further. Mr. Cupp was instructed to remain on-site until I arrived. From 12:00 to 1:00 p.m. attempts were made to locate a Geiger counter. At 1:00, one was located and I departed for the project. Upon arrival in Fairmont, WV at 3:30 p.m. I noticed that the Geiger counter was not accurate enough to survey the damage. At approximately 4:00 p.m. I located a fire station, but their units were locked and unattainable. They referred me to Mr. Jeff Morris of Marion County Communications. Mr. Morris allowed me to use one of theirs, Model CDV 700, serial #14738, calibrated 4/2/91. I arrived at the project site at 5:00 and contacted Mr. Jerry Lindsey. With me was a copy of Troxler 3400-B series instruction manual containing radiation dose rates, page 43, figure 17.

Mr. Lindsey instructed me to survey the amount of radiation in comparison with the Troxler's dose rates. No readings were greater than those found in the tables. The source rod was in fact no longer attached to the main unit. Approximately 4" of the lower portion was attached. A portion (approximately 12") of the 55 gallon barrel was overturned onto the broken source rod. Mr. Lindsey instructed us to place the remaining portions of the gauge in to the shipping container/transport case, with the exception of the source rod.

Also under Mr. Lindsey's direction, the 55 gallon barrel was half filled with soil (6") then the source rod end was shoveled into the barrel and covered with 6" of soil to help shield the source. This was then placed into The H. C. Nutting Company pick-up truck and transported to The H. C. Nutting Company's Charleston, WV laboratory's nuclear gauge storage room for storage. Mr. Lindsey requested photographs be taken and further discussion on Monday, June 10, 1991.

The area of the accident was surveyed and showed no sign of radiation after the removal of rod and gauge. Barracades were removed. Mr. Cupp was instructed to prepare a report describing the accident (a copy is attached).

June 10, 1991, Monday morning - Mr. Jerry Lindsey informed me that we do not need to telephone the NRC but a written report must be submitted within 30 days.

He also stated that if we can possibly place the source rod end back into the shielded portion of the gauge, we can ship conventional methods, otherwise a special arrangement must be made.

June 26, 1991 - The nuclear gauge was rephotographed and inspected to determine whether the source rod could be inserted into the manufacturer's shielded container. This was accomplished and the unit was placed in the manufacturer's shipping container. Following this, the container was then measured and found acceptable dosages of radiation.

The unit will be shipped to the Troxler Company for disposal.

Glenn R. Savage, Manager  
Field and Laboratory Services  
The H. C. Nutting Company  
912 Morris Street  
Charleston, WV 25301

DATE: June 10, 1991 ks

INTRAOFFICE MEMORANDUM

TO: ALL NUCLEAR GAUGE TECHNICIANS

FROM: JERRY LINDSEY

On Friday, June 7, 1991, a nuclear guage was destroyed on a job site in West Virginia.

The H. C. Nutting Company bought their first nuclear guages in 1970, and over the past 21 years, they have increased the number of guages to 42. There is no doubt that the rate of incidents is directly proportional to the number of guages you have, but the first accident that we experienced with a nuclear guage was in 1988. Since that time, there have been 2 other accidents with the guage and one where the guage was stolen.

Of course, our biggest concern on any of these jobs is with the safety of the nuclear guage operators. As you are all aware from your Troxler training and your in-house training, the technician is not to leave the guage unattended. The accidents that have occurred have been basically due to leaving the guages unattended. It appears that it doesn't take but just a few seconds for these accidents to occur.

As you are all aware, our livelihood depends on being able to perform density testing in the field with the use of this type meter. Therefore, it behooves everyone of us to follow every precaution necessary to prevent this type of accident from reoccurring.

The guage is never to be left unattended. It would probably be best that during the period when the guage is not actually being used that it should be put back in the transportation box and left in the technician's vehicle.

June 28, 1991 ks

INTRA-OFFICE MEMORANDUM

TO: ALL NUCLEAR GAUGE TECHNICIANS Regarding Safety on Job Sites  
Concerning Nuclear Meters

We have reviewed the information from our investigation of the destruction of a nuclear guage on a job site in West Virginia. The information received indicates that the accident was strictly negligence on the part of the technician.

As a follow up to my memo of June 10, 1991, whenever the guage is not actually in use, it must be placed back in the shipping container, and the shipping container must be in the technician's vehicle. Violations of this safety procedure could result in suspension or discharge of the person or persons in violation of this procedure. All of you have completed the "in house" or Troxler Training Course; which emphasizes the "technician" will be fully responsible for assuring the full compliance for safety and operation of the guage.

As we have noted in previous memos, the livelihood of approximately 260 people depends on the ability of The H. C. Nutting Company to be competitive and perform field placement and compaction inspection using nuclear guages. Far beyond this, though, lies a possibility of loss of life, not necessarily as direct result of the loss of the nuclear guage, but of the same type carelessness when as technicians we are careless around heavy construction equipment.

It is imperative that we all perform our duties as technicians understanding that there are many other people besides ourselves whose livelihood depends on job site safety, and safe use of nuclear guages.

Jerry L. Lindsey  
Vice President

Mailed -  
12/2/93

**InterOffice Memo**

**To:** All Dept. 2 Field Services Personnel  
**From:** Jerry L. Lindsey  
**Date:** November 30, 1993  
**Subject:** Nuclear Gauges

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In light of the recent accident in which a nuclear density gauge was damaged by a piece of track equipment backing over it, it is necessary that we review proper use and safety associated with nuclear gauges.

The gauge operator was in eyesight of the gauge; however, he was not close enough to it to avert the accident.

**PROPER USE OF THE GAUGE**

1. When the gauge is in the field, the authorized user must maintain control over the gauge at all times. The gauge must never be left unattended or out of eye contact.
2. When not making measurements, the gauge should be placed in the transportation case and returned to its storage area of the car or truck as soon as possible. The gauge is to be used *only* for its intended purpose. By doing so, any radiation exposure will be as low as reasonably attainable.

We will be distributing flags which are to be attached to the meter at all times the meter is out of the transportation case and in use in the field.

Please review the following and returned the attached signature page with your signature and date indicating that you have read this memo

**CC:**





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## SITE AUDIT REPORT

Date: \_\_\_\_\_ Time: \_\_\_\_\_  
Technician: \_\_\_\_\_ Project: \_\_\_\_\_

### Nuclear Meter Activity

#### Testing in Progress

Procedure - Satisfactory: \_\_\_\_\_ Unsatisfactory\*: \_\_\_\_\_

\*Explanation: \_\_\_\_\_  
\_\_\_\_\_

#### Control of Gauge (during testing cycle)

Arm's Length: \_\_\_\_\_ Other\*: \_\_\_\_\_

\*Explanation: \_\_\_\_\_  
\_\_\_\_\_

Position of Film Badge: \_\_\_\_\_

Current Month: Yes: \_\_\_\_\_ No\*: \_\_\_\_\_

\*Explanation: \_\_\_\_\_  
\_\_\_\_\_

Safety Flag Proper Position: \_\_\_\_\_ Other\*: \_\_\_\_\_ Current Month's\*: \_\_\_\_\_

\*Explanation: \_\_\_\_\_  
\_\_\_\_\_

### Testing Not in Progress

#### Gauge Control

Within Arm's Length: \_\_\_\_\_ Other\*: \_\_\_\_\_

\*Explanation: \_\_\_\_\_  
\_\_\_\_\_

Storage: Where \_\_\_\_\_

Properly Secured: Yes: \_\_\_\_\_ No\*: \_\_\_\_\_

\*Explanation: \_\_\_\_\_  
\_\_\_\_\_

#### Shipping Paper

Position: \_\_\_\_\_ Leak Tested Date: \_\_\_\_\_

#### HCN Nuclear Control Manual

Does Technician Have a Copy?  
Yes: \_\_\_\_\_ No\*: \_\_\_\_\_

\*Explanation: \_\_\_\_\_  
\_\_\_\_\_

Audit Summary: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Technician's Signature: \_\_\_\_\_

Auditor's Signature: \_\_\_\_\_

1. EMERGENCY PROCEDURES:

1. In case of accident or gauge loss, the field or laboratory personnel shall notify the following:
  - a) Company Radiological Protection Officer
  - b) Nuclear Regulator Commission Regional Office
  - c) State Health Department
  - d) Local Authorities - Fire Department-Sheriff-Police
  - e) Troxler Electronic Laboratories.
  
2. In the event of physical damage to the gauge(s) a ten (10) foot radius exclusion area will be maintained until the extent of damage to the gauge or source is determined.

3. If a vehicle is involved; it will be stopped and remained stopped until the extent of damage to the gauge(s) and contamination hazard is determined.
  - a) If visual examination of the gauge indicates damage to the source rod tip including fracture of the tip or weld, we will notify all parties listed above and keep all personnel clear of the instrument.
  - b) The gauge(s) will be removed from the site to a remote area keeping as much space and matter between the individuals and gauge(s) as possible, and placed in a container such as a metal drum.
  - c) Provision will be made to have the site surveyed after removal of the gauge.
  - d) Disposition by the factory will be arranged after a leak test has been performed to determine integrity of the source before transporting back to the factory.
  - e) Within 30 days after loss or theft a written report will be filed giving detailed descriptions of possible radiation exposure or hazards, action taken to recover the source and procedures which will be implemented to prevent a recurrence of loss or theft.

## II. SAFETY MEASURES WHEN TRANSPORTING THE GAUGE(S)

1. The gauge(s) will be transported in its shipping container, under the "Yellow II" label without placarding the vehicle as required by 49 CFR 177.823
2. The source rod lock shall be locked in place and the shipping container secured in the vehicle.
3. The container will not be stored less than 30 centimeters from passengers per 49CFR 174.586.

### III. PROCEDURES FOR PREVENTING UNAUTHORIZED USE OR REMOVAL OF THE GAUGE(S) FROM JOB SITE(S)

1. When temporary job site trailers or buildings are not available, the instrument will be transported daily to and from the job site by the user and secured as noted under No. 6 above.
2. The gauges will be locked and secured at one of the Company's storage facilities. If out-of-town, the gauge will be secured in the technician's out-of-town residence.
3. Storage on the job site will be only in a locked trailer or temporary building, and if possible, the gauge(s) will be further secured by lock and chain.
4. If the user leaves the job site for lunch the gauge(s) will be secured, or transported as noted above.

### IV. IN-HOUSE STORAGE FACILITIES

All nuclear moisture density/survey gauges will be stored in a locked vault located at the main office and the branch offices.

### V. TRAINING AND EXPERIENCE

1. Previous training programs have been conducted by Troxler Corporation. A list of technicians, who have successfully completed the Troxler Electronics Inc.'s approved training program is maintained by the Field Service Supervisor.

#### 2. New Employees:

Upon completion of the Licensee's Approved Training Program, the technician's ability will be certified by the Field Services Supervisor and the Radiation Protection Officer. After such certification, he/she will be permitted to use the Nuclear Testing Devices without the direct supervision of others.

## VI. TRAINING

### 1. Scope

The purpose and scope of this training program is to provide the technician with the knowledge and understanding of the effects of radiation, safe handling of radioactive materials and devices, the proper use of the designated nuclear testing equipment and the importance of following the guidelines set forth in the NRC Rules and Regulations and The H. C. Nutting Company's License and Operating Manual.

The technicians will be provided with a copy of The H. C. Nutting Company's manual and the manufacturer's equipment instruction manual. The technicians will be allowed to study these materials in conjunction with the classroom phase of the training program.

### 2. Responsibility

The Company's Radiation Protection Officer, the Vice President in charge of Field Services and the Supervisor of Field Services will be responsible for conducting all training classes.

### 3. Training Course Outline

The training course shall include but not limited the following subject material:

#### 4. Fundamentals of Radiation Safety

- a. Characteristics of Gamma Radiation
- b. Permissible Dose
- c. Hazards and affects of excessive exposure to radiation
- d. Levels of radiation from licensed materials
- e. Shield Effects:
  - 1) Time
  - 2) Distances
- f. Type of Sources

VII. Personnel Monitoring Equipment

1. Film Badges

VIII. Equipment - Familiarization

1. General Familiarization of Nuclear Equipment
2. Use of Reference Standards
3. Operation Procedures & Functions
4. Equipment Calibration
5. Field Measurements
6. Periodic Maintenance
  - a) Battery Charging
  - b) Cleaning and Lubrication
  - c) Front Panel Removal
  - d) Internal Condensation
  - e) Leak Test Procedures
  - f) Source Rod Removal
7. Allowable Servicing Procedures

IX. Licensing

General review of current NRC License

X. Transport and Shipping

General review of NRC and Federal Regulations on Transporting or Shipping a License Source or Gauge by Private Motor Vehicle and/or Common Carrier.

XI. Technician's Evaluation

The technician's evaluation will be handled by means of demonstration and a final written quiz. During the training program, the technicians will be required to demonstrate their ability to handle the nuclear gauge and to perform normal maintenance on the equipment. In addition, the technician will be required to pass a twenty (20) question quiz with a passing grade of 75% or better. A sample of the written quiz is included in the attached.

XII. Training Personnel

- 1) Jerry L. Lindsey - Vice President  
& Laboratory Services
- 2) J. Michael Harding - Field Services Supervisor
- 3) Walter W. Becker - Radiation Protection Officer

I have read all the information contained in the Memo dated November 30, 1993, concerning the proper use and safety associated with nuclear gauges.

SIGNED: \_\_\_\_\_

DATE: \_\_\_\_\_