

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 030-17325/92001(DRSS)

Docket No. 030-17325

License No. 34-18894-01

Priority 4

Category E(1)

Licensee: BBC&M Engineering Inc.  
6190 Enterprise Court  
Dublin, Ohio 43017

Onsite Inspection Conducted: October 21, 1992 with subsequent telephone interviews conducted on October 26 and December 18, 1992 and February 9-10, 1993

Inspectors:

*[Signature]*  
Toye L. Simmons  
Radiation Specialist

*2/12/93*  
Date

*[Signature]*  
Michelle Barry  
Radiation Specialist

*2/12/93*  
Date

Reviewed By:

*[Signature]*  
B. J. Holt, Chief  
Nuclear Materials Inspection  
Section 1

*2/12/93*  
Date

Inspection Summary

Inspection on October 21, 1992 (Report No. 030-17325/92001(DRSS))

Areas Inspected: This special inspection was conducted primarily to review the circumstances surrounding reported damage to a nuclear device at a temporary jobsite on September 10, 1992. Two other incidents reported to the Region III office by the licensee in letters dated November 7, 1991 and December 20, 1991 were also reviewed. The inspection included a review of records and interviews with personnel.

Results: Of the areas inspected, four apparent violations of NRC requirements were identified: (1) failure to lock or otherwise secure a gauge when not in use - Section 3; (2) failure of an authorized user to maintain licensed material under constant surveillance and immediate control - Section 4; (3) failure to store a gauge in its authorized storage facility - Section 4; and (4) failure to provide complete information on shipping papers - Section 5.

## DETAILS

### 1. Persons Contacted

\*Trevor Craig, Vice President  
\*Waldon Meeks, Jr., Radiation Protection Officer  
Robert Thompson, Project Engineer  
Ronald Tope, Senior Engineering Technician  
Jeff Thompson, Gauge User  
Todd Bungardner, Gauge User  
Larry Holley, Gauge User  
Bob Hiles, Gauge User  
Robert Fethers, Gauge User  
Dana Shaggs, Gauge User

\*Indicates those present at the exit meeting held on October 21, 1992.

### 2. Licensed Program and Inspection History

The licensee is authorized to possess and use americium-241 and cesium-137 in gauging devices to measure moisture and/or density of construction materials. Licensed material may be used at temporary job sites anywhere in the United States where the U. S. Nuclear Regulatory Commission maintains jurisdiction. The licensee currently possesses 13 gauges containing byproduct material and 23 individuals have been designated by the Radiation Protection Officer as authorized users.

License No. 34-18894-01 was last inspected in August 1989. No violations of NRC requirements were identified.

### 3. September 10, 1992 Incident Summary and Inspection Findings

Incident Summary - On September 10, 1992, a licensee representative began performing a series of compaction tests at an excavation site in Columbus, Ohio using a Troxler Model No. 3401B moisture density gauge containing licensed material. A construction crew was in the process of refilling a 35 foot deep cavity with special fill material. After each fill operation compaction tests were performed. At noon, the gauge operator along with other members of the construction crew took a lunch break. The gauge was placed on an earthen ledge inside the hole approximately 40 feet away from where the operator ate his lunch. This allowed the operator to maintain direct visual contact with the gauge. Approximately twenty minutes later, the crew began using a bulldozer in the hole below the ledge on which the gauge had been placed. At 1:15 p.m. while preparing to perform another compaction test, the operator noticed that the gauge's index rod was bent. The bulldozer operator denied striking or otherwise damaging the device. The gauge user terminated operations and returned the device to the BBC&M office where a leak test was performed. The Radiation Protection Officer (RPO) was notified of the incident.

Inspection Findings - The inspectors discussed this incident with the involved licensee representatives. The facts as presented in the licensee's letter dated September 11, 1992, remained the same (Attachment 1). The RPO speculated that the dozer may have nicked the device during the course of its operation. It is also possible that dozer operations may have kicked up debris which struck the index rod and caused the damage (Attachment 2). The gauge user stated that he was in visual contact with the device from noon until 1:15 pm, but acknowledged that he wasn't watching it every second during that time. He also indicated that he had placed the device in a safe location above the area where the backfill operations were taking place. The user indicated that the source rod was in the safe position but was not locked. License Condition 19 requires the licensee to conduct its program in accordance with statements, representations and procedures contained in certain referenced letters and applications. Item No. 3 of the referenced letter dated March 19, 1980, entitled "Protection of Gauges at Temporary Job Locations" requires, in part, that the source rod be locked in the safe position when the technician is not attending the gauge with the intention of making a series of tests at a temporary job location. The failure of the gauge user, on September 10, 1992, to lock the source rod in the safe position as required is an apparent violation of License Condition No. 19.

10 CFR 20.207(b) requires that licensed material in an unrestricted area and not in storage be under constant surveillance and immediate control of the licensee. An unrestricted area is defined in 10 CFR 20.3 as any area in which access is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials. During the September 10, 1992 incident described above, a representative of the licensee left a density gauge containing licensed material in an unrestricted area. The gauge was not in storage and it was not under constant surveillance and immediate control of authorized individuals. As a result the device was damaged by heavy machinery. The failure to keep licensed material in an unrestricted area and not in storage under constant surveillance and immediate control of the licensee is an apparent violation of 10 CFR 20.207(b).

The inspectors confirmed through a review of records that the individual involved had received appropriate training in radiation safety and gauge operations and had received an affidavit of instruction on November 6, 1991. In addition, the RPO officially designated him as an authorized user as required by License Condition No. 11. Since receiving authorization, the user has regularly operated the gauges at temporary job sites.

The inspectors reviewed the record of the leak test performed following the incident and found the results to be within regulatory limits. Replacement of the index rod was performed by persons specifically licensed by the Commission to perform such services. Neither the source rod nor the electronics was damaged during this incident.

Through interviews with several designated users, the inspectors learned that the RPO conducts periodic training and/or safety meetings to review gauge use operations and company procedures. The users indicated that the RPO had discussed the subject incident and reviewed operating

procedures with them during a September 22, 1992 safety meeting. The RPO has instituted the use of bright orange cones to be placed near the gauging devices in use at jobsites to alert machinery operators in the area.

Two apparent violations of NRC requirements were identified.

4. Review of November 1991 Gauge Theft Incident

In a letter dated December 20, 1991, (Attachment 3) the licensee reported that a nuclear gauge containing a nominal 8 millicuries of cesium-137 and 40 millicuries of americium-241 had been stolen from an employee vehicle. Between 7:25 pm on November 21, 1991 and 6:00 am on November 22, 1991, a Troxler Model No. 3401B moisture density gauge was stolen from an employee's truck which was parked in front of his home. The letter indicated that the device had been locked in its shipping container which was tethered to the covered bed of a locked vehicle. Efforts to find the device included neighborhood searches by employees and the posting of notices in the general area of the theft. The licensee also contacted the local newspaper which ran a news article about the incident. The inspectors discussed the theft with the employee involved who confirmed that the information submitted in the December letter was accurate. No additional information was obtained. Despite the licensee's endeavors to locate the gauge, it has not been found.

License Condition No. 19 requires the licensee to conduct its program in accordance with the statements, representations and procedures contained in certain referenced letters and applications. Item No. 3 of the referenced letter dated March 19, 1980, states, in part, that if the technician is commuting to and from the job, the gauge is locked and stored in the licensee's laboratory overnight. The operator was working at a local jobsite and was commuting to and from the site on a daily basis. On the evening of November 21, 1991, the operator stored the gauge in his vehicle instead of returning it to the licensee's laboratory as required. The failure to return the gauge to the licensee's laboratory is an apparent violation of License Condition No. 19.

All operators have been instructed by the RPO to return the gauging devices to the laboratory when working at a local jobsite.

One apparent violation of NRC requirements was identified.

5. Review of October 1991 Damaged Gauge Incident

In a letter dated November 7, 1991, (Attachment 4) the licensee reported that a Troxler Model 3401B gauge containing a nominal 8 millicuries of cesium-137 and 40 millicuries of americium-241 was run over by a bulldozer on October 25, 1991. The incident occurred while the gauge was being used at a temporary job site located at the Mid-America Waste site in Canal Winchester, Ohio. The individuals involved in the incident were interviewed by Ms. B. J. Holt on February 9-10, 1993. The interviews were conducted by telephone. All three individuals confirmed the information provided in the licensee's report.

The gauge user stated that he had moved approximately 10 feet away from the gauge while performing a density test when he noticed a bulldozer traveling in the path of the gauge. He attempted to get the attention of the bulldozer's operator but failed to do so before the gauge was destroyed. The licensee's procedures require gauge users to move at least two feet away from the gauge and to keep visitors away at a distance of at least 5 feet when the source is plunged into the "use" position. The gauge user indicated that he routinely stands at a distance of 10 feet from the device when it is operating so that radiation exposure will be negligible. The gauge appeared to have been under the constant surveillance and immediate control of the authorized gauge user, however, instead of moving the gauge from the bulldozer's path, the gauge user attempted to stop the bulldozer. The gauge user has operated gauges containing licensed material since 1978. He appeared to be knowledgeable of radiation safety requirements and emergency procedures. The gauge user implemented appropriate emergency procedures after notifying the Manager of Field Services. The sealed sources were tested for leakage and none was found. According to the gauge user, safety meetings were held shortly after the incident by the Radiation Protection Officer to remind employees of the necessity to maintain the safety of nuclear gauges.

No apparent violations of NRC requirements were identified.

6. Transportation

10 CFR 71.5(a) requires each licensee who transports licensed material outside the confines of its plant or other place of use, to comply with applicable requirements of the regulations appropriate to the mode of transport of DOT in 49 CFR Parts 170 through 189.

Pursuant to 49 CFR 172.101, radioactive material is classified as hazardous material.

49 CFR 177.817(a) requires that a carrier not transport a hazardous material unless it is accompanied by a shipping paper prepared in accordance with 49 CFR 172.200 through 172.203.

49 CFR 172.201(d) requires that a shipping paper contain an emergency response telephone number, as prescribed in Subpart G of 49 CFR Part 172.

49 CFR 172.203(c) requires that the letters "RQ" be entered on the shipping paper either before or after the basic description required for each hazardous substance.

49 CFR 172.203(d) requires, in part, that the description for a shipment of radioactive material include: (1) the name of each radionuclide, (2) the physical and chemical form of the material, (3) the activity contained in each package of the shipment in the terms of curies, millicuries, or microcuries.



The inspectors reviewed the shipping papers used by the licensee to transport devices containing a nominal 8 millicuries of cesium-137 and 40 millicuries of americium-241. They observed that the papers did not (a) list an emergency telephone number; (b) specify the letters "RQ" which are required because of the presence of reportable quantities of americium-241 in the device; or (c) include any reference to the americium-241 source. On numerous occasions since 1990, licensed material was transported outside of the confines of the licensee's place of use and the shipping papers were not prepared in accordance with 49 CFR 172.200 through 172.203. The failure of the licensee to list an emergency telephone number, the letters "RQ" and incorporate information pertaining to the americium-241 source on shipping papers is an apparent violation of 10 CFR 71.5(a).

One apparent violation of NRC requirements was identified.

7. Exit Meeting

An exit meeting was held with Messrs. Craig and Meeks at the conclusion of the onsite inspection on October 21, 1992 to review the scope and tentative inspection findings. The gauge user involved in the September 1992 incident was interviewed by telephone on October 26, 1992. Mr. Meeks was contacted by telephone on December 18, 1992, to discuss and clarify the violations identified. Mr. Craig was contacted by telephone on February 10, 1993 to inform him of the tentative inspection findings regarding the October 1991 incident.

Attachments:

1. Licensee letter dated 9/11/92
2. Drawing showing index rod
3. Licensee letter dated 12/20/91
4. Licensee letter dated 11/7/91



September 11, 1992

N.R.C. - Region 3  
799 Roosevelt Road  
Glen Ellyn, Illinois 60137

Attention: Mr. Bill Reichhold

Re: Accident Report  
Troxler 3401B Gauge, Serial No. 18722

Gentlemen:

For your records, BBC&M Engineering, Inc. has prepared a report which summarizes the events surrounding an incident which resulted in minor damage to a nuclear density gauge on September 10, 1992 at the site of a proposed Bill Knapp's Restaurant located at 2199 Riverside Drive in Columbus, Ohio.

At 12:00 noon on September 10, 1992, Mr. Jeff Thompson, a Technician for BBC&M Engineering, Inc. performed a density test on compacted granular 46D backfill material. After performing this test, the gauge was placed approximately four feet above the area of fill placement on the excavation sideslope. At precisely 1:15 PM, while preparing to run another density test, it was noted by Mr. Jeff Thompson the nuclear gauge handle assembly was bent. Mr. Jeff Thompson approached the bulldozer operator and asked him if he was aware of hitting the gauge. The operator stated he had no idea what could have happened to the gauge. At this time, Mr. Jeff Thompson transported the gauge back to the office of BBC&M Engineering, Inc. and informed Mr. Waldon W. Meeks, Jr., Field Supervisor, and Mr. Robert Thompson, Manager of Field Services, of the incident. The gauge was inspected by Mr. Meeks and it was concluded that the gauge had most likely been hit by the bulldozer. Damage to the gauge was considered to be minor, and the cost of repair is not expected to exceed \$1,000.00. It was, however, the decision of this office to submit this accident report for your records, in the event the repair cost does exceed \$1,000.00.

ATTACHMENT 1

SEP 14 1992

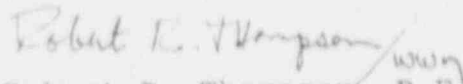
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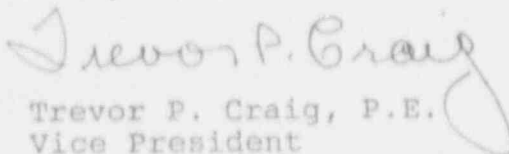
At approximately 3:00 PM on September 10, 1992, the gauge was transported to a licensed service facility in Circleville, Ohio. As a precautionary measure, a wipe test was conducted, the results of which indicated no radioactive leakage. Upon inspection of the gauge at the service facility, it was conveyed to this office that the gauge suffered no source damage and the source holder was intact. Repairs to be made include replacing the handle assembly and index rod. This gauge will be out of service until the proper repairs are complete.

We regret this incident and continue to emphasize the importance of the safety of the nuclear devices to our personnel. It is our sincere hope that incidents such as this can be avoided in the future.

Very truly yours,

BBC&M ENGINEERING, INC.

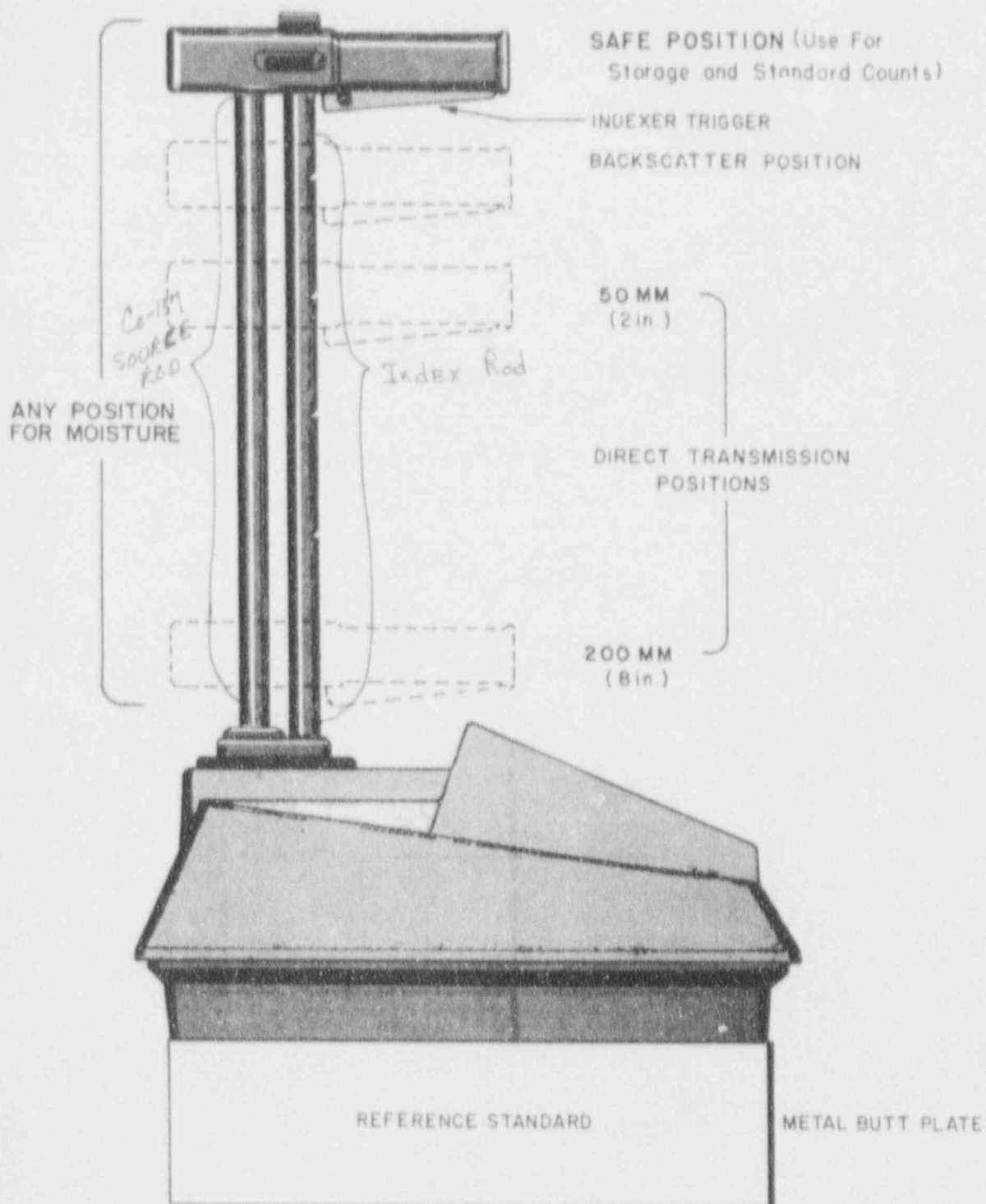
  
Robert R. Thompson, P.E.  
Manager of Field Services

  
Trevor P. Craig, P.E.  
Vice President

TEH/sf

Submitted: 2 copies





Reference Standard Orientation  
Figure 2-2

ATTACHMENT 2

TROXLER

TROXLER

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DCD/DCB

December 20, 1991

LICENSE FILE 34-18894-01

N.R.C. - Region 3  
799 Roosevelt Road  
Glen Ellyn, Illinois 60137

Attention: Mr. William Schultz  
Material Inspection - Section Chief

Re: Report of Stolen Gauge  
Troxler 3401B Model

Gentlemen:

On November 22, 1991, this office reported by telephone that a Troxler 3401B nuclear density gauge had been stolen the previous night from one of our employees. We were instructed to provide a report of the incident, which is submitted herewith.

An account of the incident, as reported by our employee is attached as Enclosure A. In addition to efforts made by the employee to recover the gauge, as described in his statement, additional personnel from this office were sent to search the area in the event the gauge might have been abandoned locally. Also, a notice was prepared and displayed on utility poles and in conspicuous places in the general neighborhood. A copy of the notice is submitted as Enclosure B.

As a third attempt at recovery, an item was placed in the local newspaper, The Columbus Dispatch. Enclosure C is a copy of the Dispatch file copy of the news item which was included in the November 28, 1991 edition.

Attachment 3

DEC 23 1991

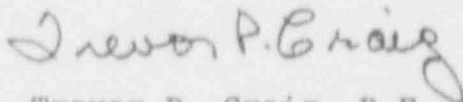
9201020336 9/15/20  
REGS LIC30  
34-18894-01 CF

IX 30

We have continued to search and make inquiries but the gauge has not been recovered to date. The incident is regretted, and it is our sincere hope that this situation might yet be resolved.

Very truly yours,

BBC&M ENGINEERING, INC.



Trevor P. Craig, P.E.  
Vice President



Robert R. Thompson, P.E.  
Manager of Field Services

TPC/slf

Submitted: 2 copies

Enclosures: A. On-scene Report  
B. Information Poster  
C. Newspaper Item

The following information pertains to the theft of a Troxler Nuclear Gauge Model 3401-B.

On November 21, 1991, [REDACTED] returned from a soils job located in Springfield, Ohio at approximately 7:00 pm. I arrived at my home located at [REDACTED]. After securing the cab of my truck, I proceeded to secure the gauge in the bed of my truck. The gauge was turned off and a four-inch master lock was placed in the locked position on the handle of the gauge, then the gauge was placed in its transport case, closed and a 1/4-inch steel cable secured to the inside of the truck was run through the front of the gauge's case and a two-inch master lock locked the cable to the box. After these measures, the camper top was closed and locked with a key. At this time it was approximately 7:25 pm. The next morning of the 22nd at approximately 6:00 am, I discovered the back of the truck open and the gauge missing. After a foot search of the area around my residence, I called my supervisor and told him of the situation. I called the police and filed a report. The officer found the case and calibration block approximately 1 mile from my vehicle and returned it to me. He also made note of the steel cable and broken lock left in the vehicle. I returned the following items to my office, drive plate, drive pin, extractor, two chargers and the calibration block. The gauge is still missing at this time.

I certify this to be an accurate account of what transpired on the 21st and 22nd of November, 1991.

[REDACTED]  
[REDACTED]  
RLH/lt

THIS UNIT CONTAINS RADIOACTIVE

MATERIAL . IF FOUND , PLEASE

CALL BBC&M ENGINEERING , INC .

294 - 3745 OR 274 - 0433



B



64 Docs

Pg 2 of 2

cd91

COMPANY WARNS STOLEN NUCLEAR GAUGE IS HARMFUL  
THE COLUMBUS DISPATCH  
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11/28/91

DATE: Thursday, November 28, 1991  
PAGE: 050  
SECTION: NEWS LOCAL & NATIONAL

TAG: 9111280052  
EDITION: Home Final  
LENGTH: Short : 28 lines

#### COMPANY WARNS STOLEN NUCLEAR GAUGE IS HARMFUL

A bright orange nuclear density gauge stolen from a truck last week contains two radioactive isotopes.

Robert Thompson, manager of field operations for BBC and M Engineering, said anyone finding the \$4,300 instrument should contact him at 195 Chittenden Ave. The company will pick up the gauge, no questions asked.

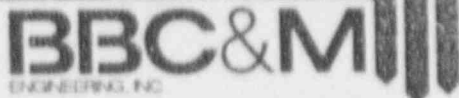
Wayne Slawinski, a health physicist with the Nuclear Regulatory Commission, said the gauge, used to measure the weight of compacted soil at construction sites, contains small amounts of powdered cesium-137 and americium-241.

While the radioactive material is encapsulated in a hardened steel case, prolonged contact with the instrument can cause localized radiation exposure, Slawinski said.

Thompson said the instrument was stolen from a locked compartment of a truck parked outside [REDACTED] the night of Nov. 21.

The Troxler Gauge 3401B measures 9 by 13 by 8 inches and has a nuclear symbol on it, he said.

KEYWORDS: THEFT HAZARDOUS MATERIAL NUCLEAR REGULATORY COMMISSION  
BBC AND M ENGINEERING



November 7, 1991

N.R.C. - Region 3  
799 Roosevelt Road  
Glen Ellyn, Illinois 60137

Attention: Mr. Bill Reichhold

Re: Accident Report  
Troxler 3401B Gauge

Gentlemen:

In accordance with your request, BBC&M Engineering, Inc., has prepared a report which summarizes the sequence of events surrounding the destruction of a nuclear density gauge on October 25, 1991 at the Mid-America Waste site in Canal Winchester, Ohio. Submitted herewith is our report.

At precisely 2:40 PM on October 25, 1991, Mr. Ronald Tope, a Staff Engineering Technician for BBC&M Engineering, Inc., was performing a density test on compacted cohesive fill. In accordance with standard operating procedures, Mr. Tope moved approximately 10 feet away from the gauge while the gauge was operating. A bulldozer operator was driving a bulldozer pulling a sheepsfoot compactor in the direction of the gauge. Mr. Tope noticed the bulldozer and immediately began to yell and wave his arms at the operator in an attempt to stop the bulldozer from hitting the gauge. When Mr. Tope realized the operator did not hear him or acknowledge his motions, he began to throw small clods of soil at the bulldozer in order to get the operator to stop. Mr. Tope made every attempt, short of risking his life, to get the attention of the operator and to stop the bulldozer. Unfortunately his efforts were unsuccessful and the operator drove over the gauge, stopped and proceeded to drag the gauge backwards approximately 30 feet. Mr. Tope finally got the attention of the operator and had him stop the bulldozer. Mr. Tope explained to the operator that he had just run over the gauge, and that he should leave the bulldozer where it was while he called the office.

At 2:42 PM, Mr. Tope called Mr. Robert Thompson, Manager of Field Services at BBC&M Engineering, Inc., to report the accident. Mr. Thompson told Mr. Tope to rope off the area around the gauge immediately and then call him back. Mr. Tope roped off a 50-foot area around the gauge at 2:46 PM.

9111260242

ATTACHMENT 4

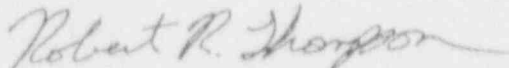
Mr. Thompson then contacted Mr. Bill Reichhold of N.R.C. at 2:48 PM to inform N.R.C. of the incident. Mr. Reichhold indicated that BBC&M had followed the appropriate safety guidelines and that he would contact Mr. Tim Walker of the Ohio Department of Health, Radiological Health Program. Mr. Reichhold asked Mr. Walker if they could run a wipe test on the gauge at the site. Mr. Thompson then called Mr. Walker to find out if and when Mr. Walker could get to the site. Mr. Walker told Mr. Thompson that they would be at the site by 4:00 PM that same day. Mr. Thompson called Mr. Tope at the site to tell him that representatives of ODOH would be at the site by 4:00 PM. At 3:58 PM, Mr. Walker and Mr. Kevin Driesbach of ODOH arrived at the site. Mr. Walker performed a wipe test, reported no radioactive leakage and released the gauge for transportation and disposal. The site was released for the resumption of construction activities by 5:15 PM. The gauge was shielded, returned to the carrying box and transported back to the laboratory of BBC&M by 6:00 PM.

On October 5, 1991, the gauge was sent by Federal Express back to Troxler Electronic Laboratories, Inc. in North Carolina for proper disposal. Enclosed is a copy of the paper provided by Troxler to confirm the disposal of the damaged gauge.

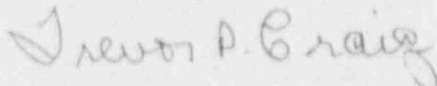
We sincerely regret this accident and have since held special safety meetings at our office in order to reemphasize the importance of the safety of the nuclear devices. Thank you for your cooperation and assistance in this matter.

Very truly yours,

BBC&M ENGINEERING, INC.



Robert R. Thompson, P.E.  
Manager of Field Services



Trevor P. Craig, P.E.  
Vice President

RRT/slf

Submitted: 2 copies

Enclosure



ular Electronic Laboratories, Inc. - Troxler International, Ltd.  
Post Office Box 12057 - Research Triangle Park, N.C. 27709 - U.S.A.  
Telephone: 919-549-8661 Telefax: 919-549-0761 Telex: 6844902 Cable: TROXELEC

COMPANY: BBC + M REF: 3401 19663 TOTAL  
ATTN: Bob Thompson DATE: 11-11-91 PAGES: 1  
FROM: John Kadwell FAX: 614-294-0241

November 11, 1991

Mr. Robert R. Thompson  
BBC and M Engineering Inc.  
195 Chittenden Avenue  
Columbus, Ohio 43201

Ref: Disposal of Troxler Model 3401 Serial Number 19663

Dear Mr. Thompson,

The above referenced gauge arrived at our North Carolina office in Research Triangle Park on November 11, 1991. The gauge is being processed for disposal. You will receive an official notification of disposal once our Radiation Safety Department has completed all the necessary paper work. If I can be of any further assistance please call me.

Sincerely,

*John E. Kadwell*

John E. Kadwell  
Customer Service Supervisor