February 26, 2001

EA-01-029

Dr. B. Don Russell, Deputy Director
Texas Engineering Experiment Station
1095 Nuclear Science Road
3575 TAMU
College Station, TX 77843-3575

SUBJECT: NRC SPECIAL INSPECTION REPORT NO. 50-128/2000-202, TEXAS A&M UNIVERSITY NUCLEAR SCIENCE CENTER REACTOR

Dear Dr. Russell:

A United States Nuclear Regulatory Commission (NRC) special inspection was conducted December 14-15, 2000, at your Nuclear Science Center (NSC) Reactor. This inspection examined the transportation of radioactive material from the NSC reactor as reported by Dr. Reese of your staff on December 8, 2000. The enclosed report represents the results of that inspection.

Based on the results of this inspection, two apparent violations were identified and are being considered for escalated enforcement action in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600. The current Enforcement Policy is included on the NRC's website at www.nrc.gov/OE. The apparent violations involved the transportation of radioactive bromine-82 from the NSC on December 4, 2000. The first violation relates to NSC shipping this licensed material in a DOT Type 7A container without securing the container's restraining "T" bar as required by applicable certification/packaging instructions. On December 8, the material was found on the top of the container in an unshielded condition with the potential of exposures to personnel in excess of 10 CFR Part 20 limits. The second violation involved the failure to train all Hazmat workers involved in this shipment. Since the NRC has not made a final determination in this matter, no Notice of Violation is being issued for these inspection findings at this time. In addition, please be advised that the number and characterization of apparent violations described in the enclosed inspection report may change as a result of further NRC review.

An open predecisional enforcement conference to discuss these apparent violations will be scheduled. In the near future, my staff will be in contact with your staff to establish a mutually agreeable date for this conference. The decision to hold a predecisional enforcement conference does not mean that the NRC has determined that a violation has occurred or that enforcement action will be taken. This conference is being held to obtain information to assist the NRC in making an enforcement decision. This may include information to determine whether a violation occurred, information to determine the significance of a violation, information related to the identification of a violation, and information related to any corrective actions taken or planned. The conference will provide an opportunity for you to provide your

perspective on these matters and any other information that you believe the NRC should take into consideration in making an enforcement decision.

You will be advised by separate correspondence of the results of our deliberations on this matter. No response regarding these apparent violations is required at this time.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) http://www.nrc.gov/NRC/ADAMS/index.html. If you have any questions, please contact Mr. Stephen Holmes at 301-415-8583.

Sincerely,

/RA/

David B. Matthews, Director
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-128
License No. R-83

Enclosure: NRC Inspection Report No. 50-128/2000-202

cc w/encl.: Please see next page

cc:

Texas A&M University System
ATTN: Dr. Warren D. Reece, Director
Nuclear Science Center
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Texas State Department of Health
Radiation Control Program Director
Bureau of Radiation Control
Dept. of Health
1100 West 49th Street
Austin, TX 78756-3189

Test, Research and Training
Reactor Newsletter
202 Nuclear Sciences Center
University of Florida
Gainesville, FL 32611

U.S. Customs Service
Safety Branch
Mr. Rick Whitman
6026 Lakeside Boulevard
Indianapolis, IN 46278

U.S. Department of Transportation
Mr. Raymond Lamagdelaine, Special
Investigations Chief
Office of Hazardous Materials Enforcement
DHR-40
400 7th Street, S.W.
Washington, DC 20590

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U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Docket No:	50-128
License No:	R-83
Report No:	50-128/2000-202
Licensee:	Texas A&M University
Facility:	Texas Engineering Experiment Station Nuclear Science Center
Location:	College Station, TX
Dates:	December 14-15, 2000
Inspector:	Stephen W. Holmes, Reactor Inspector
Approved by:	Ledyard B. Marsh, Chief Events Assessment, Generic Communications and Non-Power Reactors Branch Division of Regulatory Improvement Programs Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

This reactive, announced inspection included onsite review of selected aspects of the radioactive material transportation program. Two apparent violations of NRC requirements were identified.

Report Details

1. **EVENT BACKGROUND**

On December 8, 2000, a Tru-Tec Services, Inc. (Tru-Tec) representative contacted the NRC Operations Center to report an event in which three unshielded liquid bromine-82 (Br-82) capsules of approximately 1.8 GBq (50 millicuries) each arrived in St. Croix, the Virgin Islands. Tru-Tec is a company that uses radioactive materials for process diagnostics in refineries. One application involves the introduction of radioactive tracers (e.g., Br-82) into process lines.

Tru-Tec had contracted with Texas A&M University to produce Br-82 (half-life of 35 hours) labeled meta-dibromo-benzene in their reactor. On December 4, 2000, Tru-Tec shipped an empty Model TTC-7 Type A container from their facility in La Porte, Texas, to Texas A&M via Acme Trucking. The container was similar in shape and size to a small propane tank. It was lead filled and weighed between 700 and 750 pounds. It also had a 3-inch by 5-inch cavity and a lid with a T-bar to hold it in place. The T-bar (which slid through the container's collar) had holes through which a securing device was to be placed.

On December 4, 2000, Texas A&M's Nuclear Science Center (NSC) loaded the container with three glass ampules of Br-82 with a total activity of about 35.0 GBq (0.9 curies). By letter dated December 12, 2000, NSC management stated that the package left their facility without the T-bar being secured and with no tamper indicating device installed. Each ampule had been placed within its own aluminum Swagelok container with a screw-on cap. Each Swagelok container was then placed within the cavity of the shielded container. The Swagelok container is aluminum and was irradiated with the three glass ampules in the research reactor. The Swagelok containers had a total activity of approximately 1.6 GBq (40 millicuries) Cu-64 due to activation.

Acme Trucking transported the container from Texas A&M to Federal Express at Bush Intercontinental Airport in Houston, Texas, on December 4, 2000. Federal Express "shrink wrapped" the package at this point. The container arrived, "shrink wrapped" at the Federal Express hub in Memphis, Tennessee, on December 5, 2000, and remained there until December 7, 2000. On December 7, 2000, the shipment, no longer wrapped, left Memphis, Tennessee, via Federal Express. It arrived in San Juan, Puerto Rico on the morning of December 8, 2000. Subsequently, Federal Express said that readings of monitored Federal Express personnel likely to have been exposed to the package showed no abnormal exposures. It was then transported by Four Star Air Cargo to St. Croix in the Virgin Islands where Tru-Tec received the container between approximately 4:00 p.m. and 4:30 p.m. Eastern Standard Time on December 8, 2000.

Tru-Tec personnel discovered a problem when they received the package. The three aluminum "Swaglok" containers with the Br-82 ampules were resting on the top of the container between the lid and the collar of the container, instead of in the shielded position inside the container. The capsules were intact. Also, the lid of the container had become dislodged or had been removed during transport and had been replaced in an inverted position. The container's T-bar was also missing. Smear tests were performed using a G-M detector, and found no evidence of contamination. A dose rate of 60 millirems per hour was measured at a distance of 6 feet from the unshielded Br-82 capsules. After

Tru-Tec took possession of the Br-82 capsules, they were used for their intended purpose in the Virgin Islands. Tru-Tec contacted the carriers and attempted to discover who may have been exposed to the container. Tru-Tec's initial review of the event discovered that the T-bar used to secure the lid was found at the Memphis Federal Express facility.

Conference calls regarding this event were held on December 8, 2000, and December 9, 2000. The calls included representatives from Tru-Tec, Texas A&M, Texas Bureau of Radiological Control, U.S. Department of Transportation (DOT), U.S. Environmental Protection Agency (EPA), and the U.S. Customs Service. NRC representatives included the Operations Center, Office of Nuclear Material Safety and Safeguards (NMSS), Office of Nuclear Reactor Regulation (NRR), Region I, Region II and Region IV personnel. From the conference call on December 9, 2000, it was concluded that, in accordance with the July 2, 1979, memorandum of understanding between the NRC and DOT, DOT would be the Lead Federal Agency for this event and would review the actions of the carriers involved in the shipment of the package. NRR would, as documented in this inspection, review the actions of Texas A&M in the preparation of the package, while RI would maintain contact with Tru-Tec regarding their follow-up on the event.

2. PREPARATION OF PACKAGES FOR SHIPMENT

a. Inspection Scope (Inspection Procedure 86740)

The inspector reviewed selected aspects of:

- procedures
- shipment records
- package preparations

b. Observations and Findings

Although not formalized by written procedures, licensee personnel indicated that they routinely verify before each use that a package is intact and in a condition to be used as required by 49 CFR 173.475. On receipt of the Tru-Tec package prior to the December 4, 2000, shipment, the licensee staff did not note that the package had no securing mechanism.

Licensee operations staff and a responsible “certified shipping” individual (in house staff specifically trained and authorized to sign shipping documents) worked on the December 4, 2000, shipment. The involved licensee operations staff noted that the package had no securing device and discussed it with the truck driver. The driver of the truck stated that the truck would be secured and the involved licensee staff felt that was acceptable. The “certified shipping” individual did not examine the package and relied on the other licensee staff verification of the package. Therefore, the licensee failed to insure the package was closed as required by the manufacture’s certification, in that the container’s restraining “T” bar was not secured as described in the packaging instructions. This is an apparent violation (VIO 50-128/2000-202-001) of 10 CFR 71.5(a) requirements.

Upon notification of this incident by Tru-Tec, NSC immediately halted shipments. Prior to resuming shipping operations, NSC instituted an additional interim verification to enhance shipping controls. Specifically, a management staff member (the NSC Director, the NSC Deputy Director, or the Reactor Manager) was to verify that each package being delivered for transport was configured for shipment as required by 49 CFR and the manufacturer's certification and packaging instructions.

Nonexempt packages were labeled with the appropriate category of RADIOACTIVE label (White-I, Yellow-II & III). Labels were placed one each on two opposite sides of the package, with the required isotopic and activity information entered in the blank spaces thereon. Packages containing small amounts of corrosive radioactive material were properly shipped by the NSC without supplemental hazmat markings as they were exempt under 40 CFR 173.4 from the requirements of 49 CFR 172.402. However, the inspector could not verify that shipments of small volumes of compressed gasses and liquids were also exempt from such supplemental markings. The licensee stated that they would research this and implement any required corrective actions. This will be followed-up in a future inspection (IFI 50-128/2000-202-201). The inspector determined that other packages were marked with the applicable general and specific markings as required by 49 CFR.

Radiation monitoring was provided for and accomplished by the licensee to ensure that external radiation and removable surface contamination were within allowed 49 CFR limits. The licensee's radioactive material release checklist provided for checking that radiation monitoring was performed, package labeling was correct and attached as required, and that required accompanying documentation was properly prepared.

c. Conclusions

Except for the apparent violation noted above, the licensee prepared packages for shipment as required by NRC and DOT requirements and in accordance with licensee procedures.

3. HAZMAT TRAINING

a. Inspection Scope (Inspection Procedure 86740)

The inspector reviewed selected aspects of:

- procedures
- training records

b. Observations and Findings

The Code of Federal Regulations at 49 CFR 171.8 defines a hazmat employer and employee while 49 CFR 172.704 delineates the training and record keeping required for such training provided by the employer.

The NSC had an in-house training program for approving "certified shippers." These staff members received training, which met the requirements of 49 CFR 172.704. These staff members were the only ones allowed by the licensee to supervise shipping and sign off on shipping documentation.

The inspector verified by reviewing training records, lesson plans, self study materials, and exams, that the in-house training program fulfilled the general awareness, function specific, and safety training required by 49 CFR 172.704. At the time of the inspection no one had been in the training program long enough to require the biennial retraining. The licensee stated that they were aware of this recurring training requirement and would provide it when needed.

Other staff, notably operations staff, including reactor operators, routinely assisted in loading, unloading, and handling of radioactive materials shipments. In addition they prepared packages for and operated vehicles to transport such shipments. Thus, although they were under the supervision of a trained individual and they were not authorized by the licensee to ship radioactive materials, they did, as specified by 49 CFR 171.8, "in the course of their employment directly affect hazardous materials transportation safety." Accordingly they were hazmat employees and require 49 CFR 172.704 training applicable to the functions they performed. Contrary to 49 CFR 172.702, the licensee did not provide hazmat training for the reactor operations employees involved in the December 4, 2000, shipment. The employees loaded radioactive material into the shipping package and/or performed the final reinstallation of the shield lid and locking "T" bar. This is an apparent violation (VIO 50-128/2000-202-002).

c. Conclusions

With the exception of the above apparent violation, hazmat training met applicable regulatory requirements.

4. DELIVERY OF COMPLETED PACKAGES TO CARRIER

a. Inspection Scope (Inspection Procedure 86740)

The inspector reviewed selected aspects of:

- procedures
- shipment records
- package preparations

b. Observations and Findings

Shipping paper documentation required by 49 CFR must include the proper shipping name and hazard class, the words "Radioactive Material," the applicable identification number, and the name, physical/chemical form/description, and activity in SI units of each nuclide. Additionally the category of label applied to each package and the TI assigned to each Yellow-II or III package must be included. If tendered to a common carrier an appropriate

signed shipper's certificate is required and if by aircraft additional statements as to acceptability are also needed.

The inspector confirmed by review of records and observation that the licensee prepared the shipping paper documentation accurately to include the applicable required elements. Emergency response information and monitored telephone contacts were as required. The licensee's use of a radioactive material release checklist was notable.

When delivering RADIOACTIVE - Yellow-III labeled packages to a highway carrier the licensee provided and, applied to the vehicle, the required placards. The licensed stated that they were aware that as of October 2001, unless otherwise determined by DOT, "RADIOACTIVE" placards without the class 7 number at the bottom will no longer be authorized.

c. Conclusions

Shipping paper documentation and loading and placarding satisfied regulatory requirements.

5. RECEIPT OF PACKAGES

a. Inspection Scope (Inspection Procedure 86740)

The inspector reviewed selected aspects of:

- procedures
- shipment records

b. Observations and Findings

The Code of Federal Regulations at 10 CFR 20.1906 establishes the requirements for receiving and opening packages containing quantities of radioactive material in excess of Type A quantities. These requirements include arrangements for package receipt or pickup, monitoring of external surfaces and radiation levels, notifications when package limits are exceeded, and requirements for package-opening procedures.

Review of licensee procedures and receipt records showed that receipt/pickup and monitoring of incoming packages were performed as required. Additionally the licensee had established, maintained, and retained written procedures for safely opening packages in which radioactive materials were received. The inspector confirmed that staff opened such packages in accordance with licensee procedures.

c. Conclusions

Receipt of packages containing radioactive materials meet 10 CFR 20.1906 requirements.

6. RECORDS AND REPORTS

a. Inspection Scope (Inspection Procedure 86740)

The inspector reviewed selected aspects of:

- procedures
- shipment records

b. Observations and Findings

The Code of Federal Regulations at 49 CFR 173 requires that each shipper of a type 7A package maintain on file, a written document of the test and engineering evaluation or other data showing the package complies with the specification. Additionally if the shipper makes any changes to the packaging, a supplemental evaluation must be performed and documented addressing the change to demonstrate that it still meets the specifications.

Packages used at the NSC are normally purchased by the facility from a vendor or provided by the entity requesting the radioactive material produced. The manufacturers testing and evaluation documentation along with their packaging instructions were kept on file in the control room. They were well organized and readily accessible to staff for reference as needed. The inspector verified that the staff was aware that they could only ship radioactive material in a certified container in amounts no greater than noted in the manufactures packaging instruction.

The facility had procedures in place for reporting to DOT transportation incidents/events involving licensed material shipped by them. The inspector noted that the NSC contacted the NRC regarding the incident immediately after they had been apprized of it by Tru-Tec.

c. Conclusions

Record keeping and reporting procedures met regulatory requirements.

7. EXIT MEETING SUMMARY

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on December 15, 2000. The licensee acknowledged the findings presented and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

B. Asher	Operations Manager, NSC
C. Kim	Assistant Director, NSC
D. Reece	Director, NSC
L. Vasudevan	Radiation Safety Officer, NSC

INSPECTION PROCEDURE (IP) USED

IP 86740: INSPECTION OF TRANSPORTATION ACTIVITIES

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

VIO 50-128/2000-202-001	Failed to insure a package offered for shipment was secured in accordance with the manufacture's certification as required by 49 CFR 173.475
VIO 50-128/2000-202-002	Failed to provide training to a hazmat employee as required by 49 CFR 172.704
IFI 50-128/2000-202-201	The licensee to determine if shipments of small volumes of compressed gasses and liquids required supplemental markings delineated in 49 CFR 172.402

Closed

NONE

PARTIAL LIST OF ACRONYMS USED

DOT	Department of Transportation
NRC	Nuclear Regulatory Commission
NSC	Nuclear Science Center
Tru-Tec	Tru-Tec Services, Inc.
TS	Technical Specifications