



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

September 28, 2006

Docket No. 03011318

License No. 29-08636-02

Matteo Loizzo, Ph.D.
QHSE Manager
Princeton Technology Center
Division of Schlumberger Technology Corporation
20 Wallace Road
Princeton Junction, NJ 08550

SUBJECT: INSPECTION 03011318/2005001, PRINCETON TECHNOLOGY CENTER,
DIVISION OF SCHLUMBERGER TECHNOLOGY CORPORATION,
PRINCETON JUNCTION, NEW JERSEY

Dear Dr. Loizzo:

On August 19, 2005 and January 13, 2006, John Nicholson of this office conducted a safety inspection at the above address of activities authorized by your NRC license. The inspection was limited to a review of the loss of a minitron containing 1.3 curies of hydrogen-3 reported as missing to the NRC on August 18, 2005. Additional information provided by the Texas Department of State Health Services on June 9, 2006, and the telephone conversation on August 28, 2006, between Thomas Bracke of your organization and this office, were also examined as part of the inspection. The findings of the inspection were discussed with Mr. Bracke at the conclusion of the inspection on August 28, 2006. The enclosed report presents the results of this inspection.

Within the scope of this inspection, no violations were identified.

Current NRC regulations are included on the NRC's website at www.nrc.gov; select **Nuclear Materials; Medical, Academic, and Industrial Uses of Nuclear Material**; then **Toolkit Index Page**. The current NRC Enforcement Policy is included on the NRC's website at www.nrc.gov; select **What We Do, Enforcement**, then **Enforcement Policy**. Or you may obtain these documents by contacting the Government Printing Office (GPO) toll-free at 1-888-293-6498. The GPO is open from 7:00 a.m. to 8:00 p.m. EST, Monday through Friday (except Federal holidays).

No reply to this letter is required. Your cooperation with us is appreciated.

Sincerely,

Original signed by James P. Dwyer

James P. Dwyer, Chief
Commercial and R&D Branch
Division of Nuclear Materials Safety

M. Loizzo
Princeton Technology Center

2

Enclosure:
Inspection Report No. 03011318/2005001

cc:
Thomas P. Bracke, P.E., Radiation Safety Officer
State of New Jersey
State of Texas

M. Loizzo
Princeton Technology Center

3

DOCUMENT NAME: E:\Filenet\ML062720133.wpd

SUNSI Review Complete: JNicholson

After declaring this document "An Official Agency Record" it will be released to the Public.

To receive a copy of this document, indicate in the box: "C" = Copy w/o attach/encl "E" = Copy w/ attach/encl "N" = No copy

OFFICE	DNMS/RI	N	DNMS/RI	N	DNMS/RI			
NAME	Jnicholson/JPD f/		JDwyer/JPD					
DATE	09/28/2006		09/28/2006					

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

INSPECTION REPORT

Inspection No. 03011318/2005001
Docket No. 03011318
License No. 29-08636-02
Licensee: Princeton Technology Center
Location: 20 Wallace Road
Princeton, New Jersey 08550
Inspection Dates: August 19, 2005 and January 13, 2006
Additional Information Received: June 9 and August 28, 2006

Inspector: ***Original Signed by: James Dwyer f/*** ***September 29, 2006***

John Nicholson
Health Physicist
date

Approved By: ***Original signed by*** ***September 29, 2006***
James P. Dwyer

James P. Dwyer, Chief
Commercial and R&D Branch
Division of Nuclear Materials Safety
date

EXECUTIVE SUMMARY

Princeton Technology Center NRC Inspection Report No. 03011318/2005001

A special inspection was conducted at the licensee's facility located in Princeton Junction, New Jersey on August 19, 2005, to follow up on the reported loss of a electronic neutron generator (minitron) containing 1.3 curies of tritium. The minitron was lost during shipment July 11-15, 2005, from Webster, Texas to Princeton Junction, New Jersey via Federal Express Ground. The minitron, which was stuck inside a 10 foot long steel well logging tool, was being returned to Princeton Technology Center (PTC) for repair. The minitron had been used in well logging operations conducted under a State of Texas license issued to Schlumberger Technology Corporation (STC) and was shipped under that same license. PTC is a division of STC. The packaging, a 12 foot long piece of 2 inch diameter PVC pipe, was damaged during shipment and the unlabeled well logging tool was separated from the packaging. The packaging was received at the Federal Express Ground facility in Hightstown, New Jersey after passing through facilities in Houston and Dallas, Texas and Woodbridge, New Jersey. The well logging tool was likely lost at the Federal Express Ground facility in Houston or in Dallas since the package was reportedly not offloaded from the truck after it left the Dallas facility until it reached the Hightstown facility.

PTC personnel became aware the shipment was missing on July 25, 2005. State of Texas representatives were notified by STC staff on August 2, 2005, but PTC personnel did not immediately notify NRC because they did not believe the loss of the material would result in the exposure of persons in an unrestricted area. PTC personnel notified Region I and the NRC Operations Center on August 18, 2005, following notification that Federal Express Ground had closed their investigation and the shipment could not be located. PTC provided a written report, dated September 27, 2005, to NRC.

The State of Texas and the US Department of Transportation performed an inspection of the Federal Express Ground facility in Houston on November 9, 2005. A copy of the State of Texas report was provided to NRC on June 9, 2006. The State had no findings. NRC returned to the licensee's facilities in Princeton Junction, New Jersey on January 13, 2006, to check on the status of the missing shipment and observe a demonstration of the licensee's new Radioactive Materials Inventory System (RMIS).

The licensee was in compliance with the initial reporting requirements described in 10 CFR 20.2201(a); however, the inspector concluded that had the licensee notified the NRC sooner, the chances of recovering the lost minitron would likely have increased. The licensee did not provide a written report within 30 days following the verbal notification, as required by 10 CFR 20.2201(b)(1). The licensee's ten day delay in providing this report had no significance to this event.

Tritium is a relatively innocuous radioactive material. In this case the tritium was bound to a titanium-plated metal target. Release of the tritium from the target could result from exposure to heat. The tritium was further sealed inside of a ceramic and steel vacuum tube and was externally protected by two layers of steel. The only likely mode of radiation exposure would be if the steel well logging tool was recycled and melted down in a furnace. In this case the 1.3

curies of tritium would be released into the atmosphere but the resulting concentration of tritium in the air effluent would be very small and the distance from the stack to the exposed individual would further reduce the exposure.

REPORT DETAILS

I. Organization and Scope of the Program

a. Inspection Scope

The inspector toured facilities, interviewed staff and reviewed operational records.

b. Observations and Findings

Princeton Technology Center (PTC) of Princeton Junction, New Jersey, is a division of Schlumberger Technology Corporation. PTC is licensed by NRC to manufacture, distribute, and service electronic neutron generators (minitrons) that are used in the well logging industry. The minitron is a vacuum tube made of ceramic and metal approximately 1 inch in diameter and 5 inches long. The minitron contains hydrogen-3 (tritium) gas that is adsorbed onto a titanium-plated metal target. Within the minitron, ions are electronically accelerated into the tritium target matrix to create neutrons. The minitron is an integral component of a pulsed neutron generator (PNG). The minitron and associated electronics that constitute the PNG are housed within a 1.5 inch diameter by 30 inch long steel cylinder. For well logging, the PNG is placed within a slightly larger diameter steel well logging tool. PTC is also authorized to possess a variety of sealed sources used to test detectors at the facility.

c. Conclusions

No violations or safety concerns were identified.

II. Management Oversight of the Program

a. Inspection Scope

The inspector interviewed licensee personnel and reviewed the licensee's methods for keeping management apprised of the radiation safety program.

b. Observations and Findings

The licensee has a Radiation Safety Officer (RSO) who reports to the Manager, Quality, Health and Environment (QHE). Although not required by the NRC license or regulations, PTC has a Radiation Safety Committee that meets quarterly and reviews licensed activities. The Committee is composed of senior managers, authorized radiation workers, the RSO and administrative personnel.

c. Conclusions

The inspector concluded that management is knowledgeable of licensed activities. No violations or safety concerns were identified.

III. Material Receipt, Use, Transfer, and Control

a. Inspection Scope

The inspector reviewed the circumstances surrounding the loss of a minitron during shipment, via Federal Express Ground, from Webster, Texas to Hightstown (Trenton), New Jersey, between July 11 and July 15, 2005 (NRC Event No. 41929). The inspector interviewed Schlumberger Technology Corporation (STC), Princeton Technology Center (PTC) and Federal Express Ground staff; toured the PTC facility in Princeton Junction, New Jersey and visited the Federal Express Ground facility in Hightstown, New Jersey; and reviewed documentation associated with the shipment.

b. Observations and Findings

During well logging operations conducted under a State of Texas license in March 2005, STC personnel determined that a PNG, containing a minitron, was stuck inside of a 10 foot length of well logging tool. STC personnel attempted to remove the PNG from the well logging tool but eventually decided to ship the entire tool to PTC for repair. A wipe test of the tool was submitted to PTC for evaluation on June 22, 2005. PTC evaluated the wipe test and concluded that the minitron was not leaking. On June 29, 2005, PTC reported to STC that the tool could be shipped. STC stated that the 75 pound metal tool, approximately 10 feet long and slightly larger than 1.5 inches in diameter, was placed inside a 12 foot length of 2 inch diameter polyvinyl chloride (PVC) pipe, capped at each end, and was shipped as a Radioactive Instrument and Article (UN2911) in accordance with Department of Transportation requirements, on July 11, 2005, via Federal Express Ground from their facility located in Webster, Texas to Princeton Junction, New Jersey. The inspector noted that the quantity of tritium contained in the minitron, 1.3 curies, was well within the quantity limit allowed by DOT regulations for an excepted package. A notice of the shipment, including the Federal Express Ground tracking number, was sent by STC to PTC via electronic mail on July 12, 2005. The shipment was expected to arrive at PTC within 3 to 4 days.

The individual from STC who shipped the package neglected to follow up with PTC regarding the shipment in a timely fashion. The PTC RSO neglected to follow up with the shipper when the package did not arrive on the expected date. STC contacted PTC on July 25, 2005, to check on the status of the shipment. PTC informed STC that the shipment had not been received. STC checked the Federal Express Ground website and noted there was a delivery exception posted. STC contacted Federal Express Ground to explain the delivery exception. On August 1, 2005, Federal Express Ground reported that the shipment had been damaged at some point during transit and the packaging materials arrived without their contents at the Hightstown, New Jersey facility on July 15, 2006. On August 2, 2005, STC reported the missing shipment to the State of Texas and was told that, since the shipment was tracked outside of the State of Texas, NRC should be notified. STC decided to report the missing shipment to NRC in a written report being drafted to discuss another event involving Federal Express Ground where four minitrons were temporarily lost during shipment from a STC facility in Shreveport, Louisiana to PTC in New Jersey (NRC Event No. 41873). STC believed the loss of this source was not reportable under 10 CFR 20.2201(a)(1)(i) because the

potential to deliver a significant dose to persons in unrestricted areas from the release of this material was minimal.

10 CFR 20.2201(a)(1)(i) requires the licensee to notify the NRC by telephone, immediately after its occurrence becomes known, of any missing licensed material equal to or greater than 1,000 times the quantity specified in appendix C to part 20, under such circumstances that it appears to the licensee that an exposure could result to persons in unrestricted areas. The quantity of tritium specified in appendix C to part 20 is 1 millicurie so the quantity of tritium missing exceeded 1000 times the appendix C value by 30 percent. However, because: (1) the well logging tool had been checked for contamination prior to shipment and it was concluded that the minitron was not leaking; (2) the tritium within in the hermetically-sealed ceramic and steel minitron was bound to the titanium-plated metal target and required, by STC's estimation, a temperature increase of several hundred degrees Celsius to release the tritium; and (3) in addition to its own structural strength, the minitron was also protected by the steel cylinder that enclosed the PNG and the steel cylinder that defined the well logging tool, STC concluded that the potential to deliver a significant dose to persons in unrestricted areas from the release of the tritium was minimal. The inspector agrees with the licensee's determination that it was not likely that an exposure could result to persons in unrestricted areas.

On August 3, 2005, STC provided Federal Express Ground with pictures of the contents of the shipment to aid in its recovery. STC was notified by Federal Express Ground on August 17, 2005, that their investigation was closed and the shipment could not be found. PTC notified NRC Region 1 and the NRC Operations Center on August 18, 2005.

10 CFR 20.2201(a)(ii) requires the licensee to notify NRC by telephone within 30 days after the occurrence of any lost, stolen, or missing licensed material becomes known to the licensee, all licensed material in a quantity greater than 10 times the quantity specified in appendix C to part 20 that is still missing at that time. The inspector noted that the licensee became aware that the shipment was missing on July 25, 2005 and reported the missing shipment to NRC on August 18, 2005, a period of time not exceeding 30 days.

On August 19, 2005, NRC initiated a special inspection to follow up on the reported loss. An inspector with the State of New Jersey Department of Environmental Protection also participated. Inspectors learned from Federal Express Ground tracking system that the shipment left the Federal Express Ground facility in Houston, Texas at 11:00pm on July 11, 2005. Federal Express Ground stated that the package was not only scanned but was also weighed at this point, confirming that the well logging tool was present within the package when it left Houston. Federal Express Ground indicated that the package was scanned upon arrival in the Dallas facility on the morning of July 12 and again when it left the facility that same afternoon. Federal Express Ground reported that the package was trucked to Woodbridge, New Jersey and was scanned as it left that facility on the morning of July 15, 2005. The package was again scanned upon arrival later that same morning at the Federal Express Ground facility in Hightstown, New Jersey

and the delivery exception was posted on the Federal Express Ground tracking system at 10:54am on July 15, 2005.

NRC, State of New Jersey and PTC personnel attempted to tour the Federal Express Ground facility in Hightstown and interview staff on August 19, 2005; however Federal Express Ground stated the personnel involved with this shipment were not available and they did not allow the inspectors to tour the facility. Federal Express Ground management stated the personnel involved with the shipment would be available on Monday, August 22, 2005. However when PTC and State of New Jersey personnel returned to the Hightstown facility on Monday they were not allowed to tour the facility and the personnel were not available.

STC personnel stated that the outside of the package (12 foot length of 2 inch diameter PVC pipe) had a "Radioactive Materials Instruments and Articles (UN2911)" label, the Federal Express Ground shipping label, and a copy of STC's own "Radioactive Material Transfer" form. The well logging tool itself carried no labels or markings. State of New Jersey inspectors questioned Federal Express Ground staff from the Hightstown facility by telephone. The Federal Express Ground employee who was responsible for handling damaged packages at Hightstown stated that he could not recall seeing the package and therefore he could not comment on labeling or the degree of damage. Federal Express Ground stated that they disposed of the damaged packaging. STC requested access to the Federal Express Ground facilities in Houston and Dallas, Texas and the "over goods" facility in Utah where all undeliverable goods/packages were sent but was reportedly denied access. Federal Express Ground completed their own search of these facilities, as well as the Woodbridge and Hightstown facilities in New Jersey, and reported by letter dated September 9, 2005, that they were unable to locate the well logging tool. PTC provided their written report of the event on September 27, 2005.

10 CFR 20.2201(b)(1) requires the licensee to make a written report within thirty days of the telephone report. The telephone report was made on August 18, 2005. The licensee was 10 days late in making their written report. While this is an apparent violation of 10 CFR 20.2201(b)(1), the delay in providing the report had no significance to this event and the delay is understandable given the challenges presented STC/PTC by Hurricanes Katrina and Rita during this period of time. Except for timeliness, the inspector determined that the licensee's report met all of the requirements of 10 CFR 20.2201(b)(1).

STC/PTC stated that because of this and other recent events, they temporarily stopped using Federal Express Ground for radioactive material shipments pending implementation of a new in-house global tracking system. PTC stated that they will also be developing standard packaging for these sources by the end of the first quarter 2006 and they will add additional labels on the source and packaging including the Company name and contact telephone numbers.

Inspectors from the Texas Department of State Health Services and the United States Department of Transportation searched the Federal Express Ground facility in Houston

on November 9, 2005. NRC received copy of the State's report on June 9, 2006. The State had no findings.

On January 13, 2006, NRC returned to PTC to check on the status of the missing shipment and observe a demonstration of the licensee's new Radioactive Materials Inventory System (RMIS). Field offices must get a return authorization to transfer a source to the PTC facility. The PTC RSO must approve of all return authorizations. The person receiving the shipment must acknowledge receipt of the material within a preset period of time or the system will automatically notify the corporate RSO.

c. Conclusions

The licensee was in compliance with the initial reporting requirements described in 10 CFR 20.2201(a); however, had the licensee notified the NRC sooner, the chances of recovering the lost minitron would likely have increased. The licensee did not provide a written report within 30 days following the verbal notification, as required by 10 CFR 20.2201(b)(1). The licensee's ten day delay in providing this report had no significance.

One would expect that the well logging tool, separated from its package, would have been forwarded to the Federal Express Ground "over goods" facility in Utah; however, the unlabeled tool may have looked more like a piece of scrap steel than an item that was lost during shipment and was sent to a metal recycler. The fact that the tool itself was not marked or labeled likely contributed to the loss.

Tritium is a relatively innocuous radioactive material. In this case the tritium was bound to a titanium-plated metal target. As previously stated, release of the tritium from the target could result from exposure to heat. The tritium was further sealed inside of a ceramic and steel vacuum tube and was externally protected by two layers of steel. The only likely mode of radiation exposure would be if the steel well logging tool was recycled and melted down in a furnace. In this case the 1.3 curies of tritium would be released into the atmosphere through the furnace stack but the resulting concentration of tritium in the air effluent would be very small and the distance from the stack to the exposed individual would further reduce the exposure.

IV. Exit Meeting

The inspector conducted an exit meeting by telephone with the individuals identified in the attached list on August 28, 2006, to discuss the findings of the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Tom Bracke, Radiation Safety Officer, Princeton Technology Center
Mike O'Brien, Manager, Oilfield Services, Princeton Technology Center
Ray Dickes, Corporate Radiation Safety Officer, Schlumberger Technology Corporation
Lister Lumanog, Schlumberger Well Services, Sugarland, Texas
Mark Billodeaux, Schlumberger Well Services, Sugarland, Texas
Brian Flanagan, Manager FedEx Ground facility, Hightstown, NJ

An exit meeting was conducted by telephone with Tom Bracke, Radiation Safety Officer, Princeton Technology Center, on August 28, 2006.