

# RI - DNMS Licensee Event Report Disposition

Licensee: Schlumberger PTC - NJ  
 Event Description: Loss of Material  
 License No: 24-0103602 Docket No: 0301318 MLER-RI: 2006-050  
 Event Date: 11/22/06 Report Date: 11/22/06 HQ Ops Event #: 43007

**1. REPORTING REQUIREMENT**

<input type="checkbox"/>	10 CFR 20.1906 Package Contamination	<input type="checkbox"/>	10 CFR 30.50 Report
<input checked="" type="checkbox"/>	10 CFR 20.2201 Theft or Loss	<input type="checkbox"/>	10 CFR 35.3045 Medical Event
<input type="checkbox"/>	10 CFR 20.2203 30 Day Report	<input type="checkbox"/>	License Condition
<input type="checkbox"/>	Other _____		

**2. REGION I RESPONSE**

<input type="checkbox"/>	Immediate Site Inspection	Inspector/Date	
<input type="checkbox"/>	Special Inspection	Inspector/Date	
<input type="checkbox"/>	Telephone Inquiry	Inspector/Date	
<input type="checkbox"/>	Preliminary Notification/Report	<input type="checkbox"/>	Daily Report
<input checked="" type="checkbox"/>	Information Entered in RI Log	<input type="checkbox"/>	Review at Next Inspection
<input type="checkbox"/>	Report Referred To: _____		

**3. REPORT EVALUATION**

<input checked="" type="checkbox"/>	Description of Event	<input checked="" type="checkbox"/>	Corrective Actions
<input checked="" type="checkbox"/>	Levels of RAM Involved	<input checked="" type="checkbox"/>	Calculations Adequate
<input checked="" type="checkbox"/>	Cause of Event	<input type="checkbox"/>	Additional Information Requested from Licensee

**4. MANAGEMENT DIRECTIVE 8.3 EVALUATION**

<input type="checkbox"/>	Release w/Exposure > Limits	<input type="checkbox"/>	Deliberate Misuse w/Exposure > Limits
<input type="checkbox"/>	Repeated Inadequate Control	<input type="checkbox"/>	Pkgng Failure > 10 rads/hr or Contamination > 1000x Limits
<input type="checkbox"/>	Exposure 5x Limits	<input type="checkbox"/>	Large# Indivs w/Exp > Limits or Medical Deterministic Effects
<input type="checkbox"/>	Potential Fatality	<input type="checkbox"/>	Unique Circumstances or Safeguards Concerns
<input type="checkbox"/>	If any of the above are involved:		
<input type="checkbox"/>	Considered Need for IIT	<input type="checkbox"/>	Considered Need for AIT
	Decision/Made By/Date: _____		

**5. MANAGEMENT DIRECTIVE 8.10 EVALUATION (additional evaluation for medical events only)**

<input type="checkbox"/>	Timeliness - Inspection Meets Requirements (5 days for overdose / 10 days for underdose)
<input type="checkbox"/>	Medical Consultant Used-Name of Consultant/Date of Report: _____
<input type="checkbox"/>	Medical Consultant Determined Event Directly Contributed to Fatality
<input type="checkbox"/>	Device Failure with Possible Adverse Generic Implications
<input type="checkbox"/>	HQ or Contractor Support Required to Evaluate Consequences

**6. SPECIAL INSTRUCTIONS OR COMMENTS**  
Jackson following - will follow up with inspection if supplies

Non-Public      Inspector Signature: [Signature]      Date: 12/22/06  
 Public-SUNSI REVIEW COMPLETE      Branch Chief Initials: \_\_\_\_\_      Date: 12/22/06

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**Schlumberger**

December 21, 2006

Administrator  
U.S. Nuclear Regulatory Commission, Region 1  
475 Allendale Road  
King of Prussia, PA 19406

Subject: Event Notification of Lost Material #43007

This letter is in fulfillment of the requirements of 10CFR Part 20.2201 paragraph (b) to provide a written report following notification of the loss of licensed material under paragraph (a) of the same part.

### Event Summary

Schlumberger's Princeton Technology Center (PTC) purchases tritium gas from Ontario Hydro (via Atomic Energy of Canada Limited, AECL) for use at its Princeton Technology Center, License #29-08636-02, in the manufacturing of neutron generators. The gas is transported from AECL's Chalk River facility in small, 50ml, double valved, stainless steel shipping vials (pictured at right), and is stored at our Princeton NJ production facility under secure and monitored storage for use in our production process. The transportation process typically takes 1 to 2 days to complete.

During the normal course of transferring the contents of a recent shipment to one of our process station, we discovered that one of the vials shipped did not contain the normal shipping pressure of roughly 575 torr (720 torr is atmospheric pressure) and contained only trace amounts of tritium. The inability to account for the material, 100 curies of Tritium, was reported on November 22<sup>nd</sup> as a loss of licensed material.

We conclude that the vial shipped to PTC from the Chalk River facility was empty, and no radioactive material was released during transportation or storage of the shipping container. This report summarizes the findings of the investigation.

### Description of the Licensed Material

The material in question is described fully as 100 curies of Hydrogen-3 as a gas contained at sub-atmospheric pressure in an eight (8) inch, double-valved, stainless steel cylinder.

RECEIVED  
REGION 1  
2006 DEC 22 AM 10:38



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## **Circumstances of the Loss**

### **(Background Information) September 20, 2006 – Material Received at PTC**

A routine shipment of tritium was received from Ontario Hydro on Wednesday, September 20, 2006 at Schlumberger's Princeton Technology Center (PTC) in Princeton Junction NJ under license # 29-08636-02. The shipment was to have contained 400 curies, in 100 curie amounts, distributed among four (4) separate stainless steel shipping vials. These vials are identified as s.n. E1, E3, E4, and E5. The sealed Type-A shipping container (about the size of a small suitcase) was wipe tested and transferred to the secured and monitored radioactive materials storage room located in PTC's Process Building. The wipe test performed on the container was negative and showed no sign of contamination above the shipping limit on the package. The storage room where the transfer vials were stored is monitored 24 hours per day for tritium emissions with a Canberra TAM100 tritium air monitor. The vials were transferred to the monitored storage facility within a one-hour of receipt at PTC.

### **November 20, 2006 – Transfer Vial mounted on Process Station #4.**

A month later, on Monday, November 20, 2006, Aaron Stover and Tom Bracke moved shipping vial s.n. E1 from the recent shipment to process station #4 for the purpose of mounting and sealing the vial to the station. The Type-A container had been undisturbed from the time of shipment. The container was opened and the shipping vial s.n. E1 removed. The vial was sealed in two plastic bags and the interior of each bag was "sniffed" with an Overhoff Model 200SB portable tritium monitor as the bag was opened. There was no indication of any tritium gas in either bag. The vial, previously mounted to the station and now empty, was removed by a threaded connection on the lower manifold of the process station. The new vial (E1) was mounted on station 4 with a new copper seal and threaded coupling. The two in-line valves on the vial remained closed and sealed (wired together with a security seal); the mini valve on the lower manifold was opened to check the seal for air leaks and scan the manifold gas with an Residual Gas Analyzer (RGA) to detect any contaminating gases. No indication of a leak was found. The manifold was pumped-down overnight for the purpose of purifying the vacuum in the manifold.

### **November 21, 2006 – Initial Attempt to Transfer Tritium**

On the morning of November 21<sup>st</sup>, the internal pressure of the manifold was near pure vacuum. A RGA scan of the internal gas gave no indication of air leaks or the presence of H3 gas. This shows that the vial was tightly sealed to the process station and that the process station was in high vacuum, which is the normal sequence in preparation for transfer of the material to the station.

The seal and wire locking strap were removed from the by Aaron Stover. At 1015 hrs, Aaron Stover, Lorenzo Swain, and Thomas Bracke attempted to transfer Tritium gas from the shipping vial to the process station. All valves on the process station were closed, and the first in-line valve (V2) on the transfer vial was opened and closed to release gas into the tube space between

V2 and V1. If the vial was shipped at a pressure of 658 torr, the gas between the two valves should have been at equilibrium. The gas behind V1 was expanded into the lower manifold but only 22 milli torr lower manifold pressure was transferred with the valve (V2) fully opened. The gas was subsequently expanded to the whole system. A sample of the gas from the whole system was expanded into the RGA for analysis. The scans showed some tritium was present in the gas. The fact that only a few milli-torr of gas was recovered from the tube space between the two valves was unusual and prompted further investigation. The lower manifold was isolated and a release of gas directly past V1 and V2 was attempted. Only 22 milli-torr lower manifold pressure was expanded from the vial into to the manifold with the valves fully open. V1 and V2 were closed and the lower manifold expanded to the whole system, resulting in a whole system pressure of 4 milli-torr. The gas was again sampled and determined to contain only trace amounts of tritium. The vial was isolated and the system placed in high-vac overnight.

#### **November 22, 2006 – Determination that the Vial was empty.**

On Tuesday morning, the 22nd, we made our final determination whether a valve V2 on the transfer vial may have failed closed, locking tritium gas in the vial. Aaron Stover suggested that by introducing deuterium into the manifold, we could follow the system pressure and monitor valve function by expanding the gas beyond each valve progressively into the shipping vial. With the system in hi-vac and the transfer vial isolated by the mini-valve on the manifold and the two in-line valves on the vial closed, approximately 1 torr deuterium was introduced to the upper and lower manifold. As the volume was expanded beyond each valve in sequence, a corresponding pressure drop, proportional to the expanded volume, was observed. This demonstrated that each valve was functioning properly and we could “see” into the shipping vial.

#### **Statement of Disposition**

The initial shipment left Chalk River on September 19<sup>th</sup> and was received at PTC on September 20<sup>th</sup>. A wipe test was performed on the package upon receipt. The wipe test was negative. Had the contents of vial E1 escaped during transit, one would expect to see a significant amount of contamination on the shipping container.

Immediately upon receipt, the shipping container was moved to the secure and monitored storage area at PTC. The room emissions are recorded by a continuous tritium air monitor. Stack air concentrations are automatically recorded one every minute around the clock. A complete review of the stack release was performed for the months of September, October, and November. No unusual release was observed from the storage area, which also contains minitron tubes for disposal. Had the reported contents of the vial, 100 curies, escaped during storage, the release would have been obvious from these records. Even over the storage period of several months, a mass balance performed on the air sample records result in a calculated release several orders of magnitude less than 3 curies

Vial E1 was sealed inside two plastic bags inside the shipping containers. When the vial was installed onto the station on November 20<sup>th</sup>, a portable tritium monitor was used to “sniff” inside each bag as it was being opened. Again the results were negative. This would not have been the

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**Schlumberger**

case if the vial had leaked at any time during transport or storage. Wipe samples were additionally obtained inside the two plastic bags. These wipe samples were negative for tritium above the shipping standards.

We conclude that this shipping vial was empty upon receipt at PTC and that no radioactive material was released from the vial during shipment or storage.

### **Exposures to Radiation**

PTC concludes that there has been no release of radioactive material to the environment and therefore no exposure of individuals to ionizing radiation during transport or storage of the transfer vial shipped to PTC from Chalk River. There are no conclusions drawn with regard to the material security or individual exposures prior to transfer from the Chalk River facility. However, it is evident that the pressure inside the transfer vial was well below atmospheric and that such conditions could not be achieved through any hypothesized leakage path.

### **Recovery**

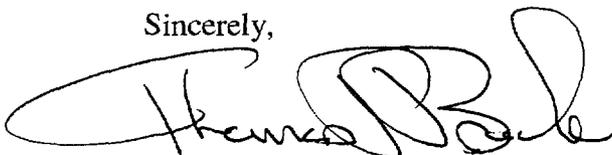
Schlumberger is in contact with Ontario Hydro regarding this missing shipment and has communicated our initial findings to them. We will jointly conduct further investigations on the basis of this report. However, we conclude that no material was lost during or after shipment of the material and that recovery does not apply to this incident.

### **Preventive Measures**

Inherent in PTC's manufacturing process is the delay between material receipt and verification of the contents of the shipping vial. Because the shipping vials are placed into storage upon receipt and utilization will depend on current inventory and manufacturing demand, it can be several months before the actual contents of the shipping vial is verified. Although the vials remain sealed and under secure and monitored storage, it is not possible to verify the contents of the shipment at time of receipt.

We hope this overview is helpful and provides you with a confidence that Schlumberger has acknowledged and understands the problem at hand and has a solution for preventing this type of incident from reoccurring.

Sincerely,



Thomas P. Bracke P.E.  
Radiation Safety Office  
cc: Ray Dickes, Matteo Loizzo

Other Nuclear Material	Event Number: 43007
Rep Org: SCHLUMBERGER PTC - NJ Licensee: SCHLUMBERGER PTC - NJ Region: 1 City: PRINCETON JUNCTION State: NJ County: License #: 29-08636-02 Agreement: N Docket: NRC Notified By: TOM BRACKE HQ OPS Officer: BILL HUFFMAN	Notification Date: 11/22/2006 Notification Time: 14:38 [ET] Event Date: 11/22/2006 Event Time: 09:00 [EST] Last Update Date: 11/22/2006
Emergency Class: NON EMERGENCY 10 CFR Section: 20.2201(a)(1)(i) - LOST/STOLEN LNM>1000X	Person (Organization): LAWRENCE DOERFLEIN (R1) MICHELE BURGESS (NMSS)

This material event contains a "Less than Cat 3" level of radioactive material.

### Event Text

#### TRITIUM LOST FROM STORAGE VIAL

The licensee reports that while attempting to extract tritium used in manufacturing minatron well-logging tools, it was determined that the tritium supply vial was empty. Four vials of tritium were shipped to the licensee's facility on 9/20/06 and placed in a storage vault until used. The tritium was receipt inspected with no abnormal observation and swiped with no finding of radiological contamination. The vials were also double sealed in plastic bags. The vials are shipped from Ontario Hydro (Canada) and each vial contains approximately 100 curies of tritium. When one of these vials was loaded into the manufacturing process line and the vial opened, no tritium gas was detected.

The licensee notes that the vials are shipped at a vacuum relative to atmospheric pressure and the vacuum was still intact in the vial making leakage an unlikely scenario. In addition, the inside of the plastic sealing bags had no evidence of tritium. The licensee is currently trying to contact Ontario Hydro to further its investigation into what happened to the tritium.

The licensee has also been in contact with NRC Region 1 (Jackson) concerning this event.

THIS MATERIAL EVENT CONTAINS A "LESS THAN CAT 3" LEVEL OF RADIOACTIVE MATERIAL

Sources that are "Less than IAEA Category 3 sources," are either sources that are very unlikely to cause permanent injury to individuals or contain a very small amount of radioactive material that would not cause any permanent injury. Some of these sources, such as moisture density gauges or thickness gauges that are Category 4, the amount of unshielded radioactive material, if not safely managed or securely protected, could possibly - although it is unlikely - temporarily injure someone who handled it or were otherwise in contact with it, or who were close to it for a period of many weeks.