

Radioactive Material Shipping Incident

“A VERY CLOSE CALL”

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**RAM SHIPPING INCIDENT
"A Very Close Call"**

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This is the story of a very unusual, potentially catastrophic, shipment of radioactive material that was "leaking" very high levels of radiation. The event involved a large shipment of iridium¹⁹² from a reactor in Sweden to Source Production and Equipment Co. Inc. (SPEC). It is possibly the most severe incident involving an international shipment of radioactive material in history.

The regulatory response to the event was complicated by the timing, which was three months after the 9/11 attack, and two months after the threat of a terrorist dirty bomb was highlighted by the news media. The event caused a complete disruption of shipments of industrial Ir-192 which used the package involved; this in turn halted virtually all shipments of industrial radiography sources world wide while the event and the integrity of the cask was investigated.

This presentation focuses on the immediate response and the follow-up investigation, including the collaboration between SPEC, the Swedish reactor and government agencies in the following days and weeks. The collaboration resulted in a quick and successful investigation to determine the cause of the accident.

There were no apparent injuries resulting from this incident, but it was definitely a "Close Call". THIS IS NOT A DRILL

BACKGROUND

Ir-192 is produced at a very small hand-full of reactors throughout the world. It is formed into tiny metal wafers about 0.1 inches in diameter, or approximately double the size of the head of a pin. A few hundred wafers are placed in two or three stainless steel capsules. The capsules are placed in a depleted uranium shielded container which is inside an overpack.

The Incident

The shipment contained approximately 10,000 curies of Ir-192. It left the reactor in Sweden on December 27th, 2001 via motor freight. On Dec 29th it arrived in Paris via air. From there it traveled via air to Memphis on Dec 30th. On Dec 31st it was shipped via truck to the FedEx terminal at the New Orleans airport where it stayed over the New Year holiday.

On Wednesday, January 2nd, 2002, SPEC's hot cell manager went to FedEx to pick up the package. A FedEx worker used a forklift to put the package in SPEC's pickup truck. SPEC's employee drove out of the terminal building and stopped in the parking lot at a guard shack to complete routine paperwork.

He conducted a radiation survey around the truck and his survey instrument went off scale, which meant that the dose rate exceeded 1,000 mR/hr. He moved out of the high radiation area and checked his personal dosimeter, which had recorded 160 mR in a matter of seconds. At that moment SPEC's employee had to make a very crucial decision. Should he run and call for help, or take immediate steps to try to mitigate the situation? What would you do?

He knew the beam of radiation was directed out of the right side of the truck and not towards the driver's seat. His dosimeter reading had not changed much since moving out of the primary beam of radiation. SPEC is located one mile away. The route is a non-residential highway. He drove the package to SPEC.

Upon arrival at SPEC a quick survey indicated 400 mR/hr at 75 feet. Workers at SPEC placed a one inch thick plate of lead on a forklift to shield the worker, and used the forklift to put the package inside the hotcell room.

They surveyed and posted the area, assigned surveillance personnel to stand guard, took a few photos, and notified the NRC and Louisiana DEQ. Shortly thereafter the NRC organized a conference call with SPEC and numerous State and Federal agencies, which included Louisiana DEQ and State Police, the NRC, DOT, FDA, DOE, FEMA, Customs, Coast Guard, FBI, Homeland Security and others. The federal agencies all were mainly interested in knowing if the incident could possibly be related to a terrorist attack.

Fortunately, one of the digital photos could be magnified to reveal that the tamper seal on the package was still intact. This greatly reduced the concern about terrorist involvement.

SPEC then built a tomb of concrete bricks to temporarily shield the package
"Chernobal West"

Investigation Preparations

At this point, the immediate hazard had been addressed. Now the focus shifted to the investigation of the cause of the “leak”.

Because SPEC is in Louisiana, and Louisiana is an Agreement State, all subsequent activities required authorization by Louisiana DEQ. The Swedish reactor proposed to transport the package to one of their branches in near Oak Ridge, Tennessee to conduct the investigation. The State of Tennessee determined that the licensee was not adequately equipped for that project. SPEC proposed to conduct the investigation at their facility. The plan consisted of a detailed design of a proposed shielded room, a step-by-step procedure to relocate and open the package, and a contingency plan to address unexpected events. There was intense collaboration between SPEC and DEQ during the development of their plan that reduced the approval period from many weeks to a few days.

The next few slides show the construction of a shielded room to be used to open the package and determine the cause of the The construction took only eight days.

A shielded enclosure was built inside the room to protect the workers while opening the package.

While the room was being built, other preparations were taking place.

SPEC built a lead shielded pipe to shield the package while it was being moved from the temporary tomb to the shielded room. A smaller shielded pipe was made to shield the inner container once it had been removed from the overpack.

The reactor provided an identical package to be used to set up and practice the opening of the damaged package.

Detailed plans and steps to open the package were developed and tested. Each step was practiced, perfected, and made a part of a very detailed written quality assurance procedure. Opening of the overpack.

Inner container being removed from the overpack.

Inner container being removed from the overpack. Note the smaller shielded pipe.

Inner container after the lid is removed. Note the double O-ring seals.

Shielding plug being removed from the inner container.

While this was taking place, other workers were practicing how to relocate the package from the temporary tomb to the shielded room.

An exact replica of the tomb cavity was built and the practice package placed inside.

The radiation beam from the actual package emits to the right side. The bricks represent the yellow posts and door openings.

Practice rotating the package to point the radiation beam to the rear of the tomb.

Practice cutting the metal strap with an acetylene torch.

Practice putting the package into the shielded pipe.

The investigation was scheduled to occur over two evenings. The first night, the package was to be relocated from the tomb to the shielded room. The second night, the package was to be opened. The dates for the operation were not disclosed to the media. There was concern about attracting terrorists.

While this was taking place, other workers were setting up a QA command station to control the operation step by step.

Also, a room was set up with monitors for witnesses to observe the operation.

The original dates were postponed because they coincided with the Superbowl which was held in New Orleans that year. The Secret Service was responsible for security. We don't know who ordered the delay, but we assume it might have been the Secret Service.

Security was provided by two armed guards, and the dates and time of the cask opening was not disclosed. The work was performed at night to avoid attracting unnecessary attention. Site boundaries were continuously monitored by LDEQ field personnel to assure adequate radiation protection for the public.

Relocating the Package

A number of people were present to witness the operation via live video. The witnesses included representatives of DEQ, NRC, DOT, Swedish government, Swedish reactor, Fedex, the package manufacturer, and several attorneys.

The next series of slides shows the relocation of the package from the tomb into the shielded room.

Removing bricks from the front of the tomb. Workers were rotated to limit individual dose.

Tomb side view and front view. Ready to remove front wall.

Removing front wall.

Remote survey performed by reactor personnel.

Rotating package.

Cutting pallet strap.

Pulling package into shielded pipe.

Positioning pipe upright.

Putting shielded lid on pipe.

Surveying pipe.

Moving to shielded room.

Happy government officials.

Setting up to open the package the next night.

Opening the Package

Witnesses.

Hot cell workers.

Removing the lid and spacer.

Top view of inner container.

Wipe testing inside package.

Relocating inner container to shielded pipe.

Removing lid of inner container.

Wipe testing outside and between O-rings.

Removing shielding plug and vacuuming loose contamination.

The Cause of the Problem

Two of three capsules unscrewed during transport. Some Ir-192 wafers migrated to the edge of the shielding plug and were completely unshielded.

Contributing Factor

(Slide 82-84) The Certificate of Competent Authority.
