Form FHWA 121 (Rev. 5-73)

UNITED STATES GOVERNMENT

Memorandum

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

DATE: November 18, 1980

In reply refer to: HMC-09

SUBJECT: Hazardous Material Incident
Radioactive Contamination

FROM: Regional Administrator
San Francisco, California

TO: Mr. Kenneth L. Pierson
HMC-10 Director, Bureau of Motor Carrier Safety
Washington, D. C.

1. Involved Parties

a. General Electric Company (GE)
Vallecitos Nuclear Center
P.O. Box 460
Pleasanton, California 94566

b. Tri State Motor Transit Company, Inc.
P.O. Box 113
Joplin, Missouri 64801

c. University of California
Nuclear Engineering Laboratory
Los Angeles, California 90024

d. Exxon Nuclear Company, Inc.
Idaho Falls (Scoville), Idaho

2. Summary

On June 26, 1980, Tri State arrived at GE to return an empty RAM cask and survey of the vehicle, cask, and driver revealed radioactive contamination. On July 3, 1980, Mr. Warren Olney, KNBC, Burbank, California, inquired about this incident and was referred to MTB as this office had no information to offer. A summary of a conversation between Mr. Olney and Mr. A. I. Roberts of MTB is in Attachment 1.

3. Facts Developed

Subsequent investigation by John W. Spivey, Regional Hazardous Materials Specialist, revealed the following:

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a. Tri State's spokesperson, Mr. Earl Rutenkruger (800-641-7580) reported the trip sequence as follows:

June 19, 1980 - Tri State vehicle departed GE at 12:30 p.m. after having been loaded with a RAM cask.

June 20, 1980 - Vehicle arrives at UCLA at 11 a.m. Semitrailer and cask left at facility.

June 21, 1980 - Irradiated nuclear fuel elements loaded into cask from an intermediate cask (water vat). Mr. Rutenkruger reported some water may have dripped onto trailer during transfer from vat to cask. Vehicle departed UCLA about 9:30 a.m.

June 22, 1980 - Departed Las Vegas, Nevada, after having a problem with a brake airline.

June 23, 1980 - Shipment arrives at Exxon Nuclear Co., Scoville, Idaho, at 7:30 p.m.

June 24, 1980 - Shipment unloaded, vehicle departs.

June 26, 1980 - Vehicle arrives at GE. Contamination discovered.

Mr. Rutenkruger also stated he had searched the dispatch records for the trailer back through July 1979, and no record of RAM transportation was noted.

b. Mr. Gene Cunningham of GE, Vallecitos Nuclear Center (415-862-2211), stated UCLA had leased from GE a RAM cask (700 Series, specifications in Attachment 2).

On June 19, 1980, Tri State arrived and a clean, empty cask was loaded on the trailer with a 4x8 foot plywood sheet under the cask. No surveys of driver, vehicle, or cask were made as all were presumed to be free from contamination.

On June 26, 1980, the cask was returned. Wipe tests and thin end window GM tube tests revealed contamination ranging from less than 100 cpm to 100,000 cpm on direct reading (see Attachment 3). The driver's gloves, tractor cab, and the tie down chains were contaminated as well as the inner fire shield. The highest area of contamination was limited to an area of about 2x2 feet on the left side of the floor of the trailer (100K direct, 10K smearable) while another approximately equal area under the plywood sheet tested at 2,500 cpm direct, 500 cpm smearable.

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Analysis of the removable contamination by full multichannel spectrographic analysis revealed the contaminant to be Cobalt 60 (0.667MEV) with no traces of Cesium 137 or mixed fission products.

spectrometer

Mr. Cunningham also stated the driver had assisted another Tri State driver in securing a load of LSA radioactive waste material upon return. This assistance involved walking on the trailer and possibly moving some drums. It is believed this occurred after the inbound survey was conducted.

c. Mr. Jack Hornor, UCLA Health Physicist (213-825-2825), reports the vehicle and cask were surveyed in on June 20, 1980 and out on June 21, 1980 by thin end window GM and swipe tests. Attachment 4 is a report of their activities and procedures. The surveys showed expected normal amounts of Cesium 137 inside the cask and nonremovable contamination on the outside.

Mr. Hornor stated the shipment consisted of approximately 700 grams of irradiated MTR type fuel elements composed of 93 percent enriched Uranium 235 and 7 percent Uranium 238 with possible traces of mixed fission products in the 1-megawatt range. The fuel was contained in 4 bundles of 11 plates each, 1 bundle of 8 plates with 3 dummy plates, and 3 loose [illegible]. The entire shipment was uranium aluminum eutectic clad [illegible]ed with pure aluminum. There were no stainless steel components likely to produce Cobalt 60 as a corrosion byproduct.

The loading was conducted without removal of the cask. Only the shields and lids were removed. Water drippings were wiped and surveyed negative. Water in the vat was fresh tap water which was surveyed negative after use.

Driver's gloves were surveyed out negative by GM tube but subsequent gamma spectrum analysis of UCLA worker's gloves indicated one pair to have Cesium 137 and Cobalt 60 contamination in the 3×10^{-4} microcurie range.

d. Mr. Wayne Olson, Exxon Nuclear (FTS 583-3161), reported the driver, vehicle, and cask were surveyed in by wipe and GM tube. All were normal. It was surveyed out twice against a background of 0.1 M/R and determined normal by GM tube and wipes.

Inspection of the cask prior to unloading revealed the cask to be newly painted and moist on the outside bottom. The fuel elements were unloaded from the cask (without removal from the trailer) into a water basin. The cask was then cleaned, vacuumed, and dried. No water dripped onto the trailer.

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4. Discussion

The reported facts appear to disassociate this shipment from the contaminant discovered. GE reports the contaminant to have been Cobalt 60 with no traces of other radioactive elements. The uranium aluminum shipment made by UCLA would have produced contamination by Cesium 137 at about a 20:1 ratio to mixed fission products including Strontium 90 and possibly traces of Cobalt 60.

There appears to be no basis for consideration of the possibility of the Tri State driver having transferred the contamination from the other Tri State truck loaded with LSA material. His gloves were surveyed at 500 cpm with much higher readings found on the vehicle, including areas (the inner fire shield) not accessible to the driver.

The second highest level of contamination, 2,500 cpm, was found under the plywood sheet which had not been removed between the time GE loaded the empty cask on June 19, 1980 and the inbound survey on June 26, 1980. There was no report of contamination of the top side of the plywood sheet. This argues against a transfer of contamination by water, either rain or drippings from the water vats, at either UCLA or Exxon Nuclear had a source for contamination been present.

UCLA reports no unsealed Cobalt 60 source but the subsequent gamma spectrum analysis of worker's gloves revealed Cesium 137 and Cobalt 60 contamination approximately equal to that found on the Tri State driver's gloves. Cesium 137 would have been expected but, lacking a Cobalt 60 source, this appears to indicate a transferance from the vehicle, the cask, or both.

GE reports the cask had not been in Cobalt 60 service, yet, contamination of less than 200 cpm smears was found on the inner fire shield when tested 2 or 3 days after initial discovery. It is unlikely the driver could have transferred this contamination, but GE workers could have.

Tri State reported no Cobalt 60 source or other RAM transported by this trailer within the past year. Assuming a prior contamination the 5.5 year halflife would not have allowed for significant lowering of the direct reading but such time would have affected the amount of removable contamination.

5. Conclusions

No satisfactory conclusion can be reached. It would appear that this shipment could not have caused or produced Cobalt 60 contamination. Both UCLA and Exxon deny exposure to a source during loading

or unloading. The possibility of prior contamination of the trailer remains, but there is no evidence supportive of this theory as there is no record of prior transportation, and two surveys at UCLA and three at Exxon Nuclear failed to detect the contamination.

6. Recommendations

The surveys at UCLA and Exxon were conducted against measurable background radiation with the cask on the trailer. This probably resulted in the failure to detect the contamination. It is recommended, where possible, that surveys be conducted where background is not present.

The presumption by GE that both cask and vehicle were clean on initial loading was ill advised. Both an inbound and outbound survey should be required rather than after use.

An after use survey (49 CFR 173.397(c)) should be prescribed by MTB, copy furnished to the motor carrier, and a retention period established.

H. E. Welch for

Michael D. Sullivan
Associate Regional Administrator
for Motor Carrier Safety

Enclosures