United States Department of the Interior
GEOLOGICAL SURVEY
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DENVER, COLORADO 80225-0046

IN REPLY REFER TO:

November 29, 2001

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington DC 20555

Sirs:

Attached is a hard copy of the self-identified violation report that I notified our project manager (Alexander Adams, Non-Power Reactors Branch) about on November 21. Please contact me if you have any questions or need more information.

Sincerely,

Tim DeBey

Tim DeBey
USGS Reactor Supervisor

IE22

Violation: Licensed Material shipped as Excepted Package-Limited Quantity Instead of DOT 7A Yellow II

Notification:

IAW 10CFR71.5(a), "Each licensee who transports licensed material outside the site of usage, as specified in the NRC license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR parts 170 through 189 appropriate to the mode of transport." The primary DOT regulations concerning this report are found in 49CFR 172.403, 173.401-412 and 173.421-425. Contrary to the requirements stated above, a package of licensed material was delivered to a carrier for transport as an excepted package for limited quantities of Class 7 materials (49CFR 173.421) when it should have been delivered to the carrier as a Type A, Yellow-II package (49CFR 172.403).

Chronology of Event:

11/19/2001 Solid samples of plastic (lexan) slides were irradiated for McCrone & Associates Inc. by the US Geological Survey TRIGA Reactor staff. (Facility license R-113, docket 50-274) After irradiation, the samples were surveyed with a calibrated ion chamber and analyzed with a calibrated germanium detector for nuclide determination. The ion chamber had been successfully response checked that morning. The primary radioisotope in the package was found to be Na-24 with a half-life of 15 hours. The samples were packaged in a Type A shipping container (juice can) that was placed inside a cardboard box and sealed for shipment. Radiation surveys and contamination surveys were conducted on the package as required. All radiation/contamination surveys and isotope activities indicated an excepted package-limited quantity radioactive shipment. Therefore the package was marked and shipped as an excepted package-limited quantity package. The dose rates were consistent with prior sample irradiations performed for McCrone & Associates. The package, reading 0.45 mr/hr on the surface, was delivered to the USGS shipping department about 2:30 pm for shipment from Denver, CO to McCrone and Associates Inc (in a Chicago suburb) via FedEx overnight. The package was picked up by FEDEX at approximately 3 p.m. and left the Denver airport at 9:33 p.m.

11/20/2001 The package was delivered at 8:44 a.m. Shortly after receipt, McCrone's Radiation Safety Officer notified the USGS Reactor staff that the package containing the samples had been received and the surface of the box read 4 mr/hr with their Geiger-Mueller pancake detector. No contamination was found on the package. The package was opened only to remove the paperwork and then was placed behind lead shielding.

The calibration of the USGS meter that was used to survey the outgoing package was then checked and the meter was found to be defective by significantly under responding to a known gamma field. A good USGS ion chamber was sent via FedEx overnight to McCrone to get comparison readings.

11/21/2001 Radiation readings were taken on top of the Type A container (inner package) with McCrone's detector (3.0 mr/hr) and with USGS detector (1.8 mr/hr). Calculations were performed to estimate the radiation levels on the surface of the package and the transport index when it was shipped. These calculations were based on the half-life of Na-24, the predominant isotope, and the readings taken by McCrone & Associates approximately 19 hours after the package was shipped by USGS. These calculations indicate the package read approximately 5.8 mr/hr on the surface and had a transport index of 0.1 at the time of shipment. With a transport index of 0.1 and shipment time of 19 hours (allowing 5 hours for in-flight time) a person at one meter from the package for the total 14 hours would receive 1.4 mrem. We believe this calculation represents a very conservative maximum exposure received from the package by any one individual during the shipment.

FedEx was notified of the mislabeled package (Harold Brooks with the Dangerous Goods Department). Mr. Brooks stated that the package would have been handled in the same manner and by the same personnel if it had been labeled as a Yellow-II package versus the actual excepted package – limited quantity designation. The shipping department of the USGS at the Denver Federal Center was also notified of the incident.

Later Date: The State of Illinois was notified by personnel from McCrone and Associates. The NRC Region IV office was notified by the USGS RSO.

Conclusions:

No radioactivity was released from the package. The package was a certified Type A container, but was not properly labeled. A Dangerous Goods Declaration was not completed as required for a Type A shipment. Conservative estimates show that FedEx workers received less than 1.4 person-mrems during shipment of this package.

Follow-up:

Subsequent radiation measurements of the package contents showed that the radiation level is decreasing in a manner that is consistent with the decay of Na-24. The ion chamber instrument that was used in this event has been removed from service. This event would have been prevented by the performance of a quantitative source check of the ion chamber on the morning of November 19. The instrument should have read at least 250 mr/hr from the check source that is currently in use at the USGS facility. The daily radiation instrument checks will be revised to include a qualitative check of all ion chamber instruments in the reactor room. The peak reading of each of these instruments will be recorded in the health physics logbook. Any instrument that does not have a peak reading of at least 250 mr/hr will be removed from service and recalibrated.

Contacts:

Direct any questions to Tim DeBey or Darrell Liles, USGS, at 303-236-4726.

November 29, 2001

Routine Checks of Ion Chamber radiation instruments in the reactor room:

1. The staff member who performs the prestartup checks will perform a quantitative response check of each ion chamber radiation instrument in the reactor room.
2. The ~1 mCi radium check source that is normally kept in the reactor room will be used to check the ion chamber instruments to ensure that they all read at least 250 mr/h when the source is in contact with the instrument detector covering. This "on contact" reading will be recorded in the health physics log book as one of the entries for that day. If any ion chamber radiation instrument in the reactor room does not indicate at least 250 mr/hr, then that instrument will be removed from service and a notation will be made in the log book.

I have reviewed and understand the new requirements for routine checks of the Ion Chamber radiation instruments in the reactor room.

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