

LIQUID SCINTILLATION COUNTING
RECENT APPLICATIONS AND DEVELOPMENT
VOLUME I. PHYSICAL ASPECTS

DISPOSAL OF LIQUID
SCINTILLATION WASTES

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During the early morning hours of May 14, 1979, a fire occurred in a truck. Ordinarily, today, a truck fire would hardly be newsworthy. However, the news of this truck fire very quickly reached all the way to the White House.

The fire was discovered by the driver while parked at the entrance to the radioactive waste disposal site near Beatty, Nevada. The truck was moved onto the site and the fire was extinguished, but the site was ordered closed.

During the subsequent investigation, several cardboard boxes of liquid-filled, small glass vials were reportedly discovered. Heat produced from a chemical reaction in other material included in the shipment apparently caused the cardboard boxes and/or the liquid scintillation waste from broken vials to ignite. The cause of the accident was really improper packaging and preparation for disposal. The Beatty site is not licensed to receive or dispose of liquid waste. Thus, any material shipped for disposal must be solidified or packaged in absorbent material. Further, the absorbent material must represent about twice the volume of the liquid.

In the past, there was probably other material which was improperly packaged but buried at the various land disposal sites. The material involved in the May incident was shipped from Southern California.

In July, the leakage was detected in a waste shipment from Michigan and the shipment was turned away from the Beatty site. At this time, the Governors of Nevada, Washington, and South Carolina demanded assurances from the Nuclear Regulatory Commission (NRC) and the Department of Transportation (DOT) that the existing regulations would be enforced. NRC and DOT

inspectors are now checking shipments; and if the applicable regulations are not followed, the shipments will supposedly be returned. It would appear that doing-it-right the first time will be the most economical method.

Although I am sure there are some exceptions, the liquid scintillation counting solutions after use represent hazardous waste. Disposal of hazardous waste is presently controlled in the State of California and will be controlled in the U.S. after promulgation of the Resource Conservation and Recovery Act or RCRA Regulations. These regulations provide what is referred to as cradle-to-grave regulations; and different sections of the regulations will control the producers of the waste or generators, the waste transporters, and the operators of the storage, treatment, and disposal facilities. I mention these regulations for two reasons. One, indiscriminate disposal of hazardous waste after promulgation of RCRA could result in significant fines; and two, the possibility of requested arrangements that would allow disposal as hazardous waste rather than radioactive waste might prove to be more economical.

In general, if radioactive license material is detectable in waste, the waste material must be buried as radioactive waste. But one could certainly speculate that if only environmental levels were present in the counting solution, then approval to dispose as hazardous waste might be granted. The advantage to hazardous waste disposal would be the availability of disposal sites. In California, there are eleven class one sites for hazardous waste; there are three operating radioactive waste sites in the United States.

In view of the previously mentioned events at Beatty; I would encourage anyone using scintillation counting material to review his present disposal method.

There appear to be two basic, accepted methods. One method utilizes a metal drum that is constructed with a plastic liner. The scintillation vials are emptied into the drum and the vials disposed of in a plastic bag. Cement and water are then added to the drum contents, mixed well, and solidified. The vials are packaged in a cardboard box. If cardboard boxes are not satisfactory, a drum of glass could be shipped and the glass would not have to be solidified.

A second drum method involves disposing of the entire vial in the drum, and the vials are surrounded by an absorbent material such as diatomaceous earth.

Incineration might also provide an alternative disposal method, if acceptable temperature and dwell times were achieved to destroy the hazardous waste, and if one could show air concentration did not exceed any applicable concentration guides or standards.

In summary, different types of users or generators, such as research laboratories, commercial laboratories or hospitals

may need different methods of disposal because of the volume, cost, and concentration of radioactive material; but shipment of liquid waste for disposal at a radioactive waste disposal site is not acceptable.

The development and fabrication of an incinerator for disposal might not be economical; but if the facility already has an approved incinerator, then development of a method which is acceptable to your licensing authority (Agreement State or NRC) might be considered.

If the material to be disposed does not contain radioactivity, then compliance with any existing State hazardous waste disposal requirements or the RCRA regulations after promulgation should be determined.