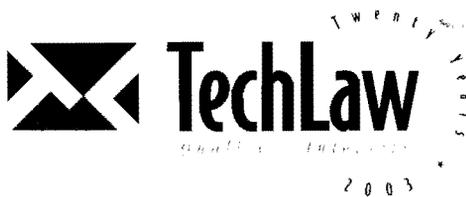


General



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ENTERED

October 3, 2003

Mr. Carl Will
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303



Reference: Work Assignment No. 06110.150.0004; State of New Mexico Environment Department, Santa Fe, New Mexico; General Permit Support Contract; Research and Permitting Support for the Los Alamos National Laboratory; Characterization of the Radioactive Component of Mixed Waste under 40 CFR 264.13, partial Task 4 Deliverable

Dear Mr. Will:

Enclosed please find the deliverable for the above-referenced work assignment. The deliverable consists of a partial deliverable regarding research into the Characterization of the radioactive component of mixed waste under 40 CFR 264.13.

TechLaw has separated the two tasks addressed in Mr. Carl Will's technical directive (dated July 30, 2003), this constitutes the second part of the technical directive. Based on the limited literature research it appears that radioactive components of mixed waste can interact with organic materials present in the wastes.

This deliverable is formatted in Word. The deliverable was emailed to you and to Mr. David Cobrain, on September 19, 2003 at Carl_Will@nmenv.state.nm.us and David_Cobrain@nmenv.state.nm.us, respectively. A formalized hard (paper) copy of this deliverable will be sent via mail. If you have any questions, please call me at (303) 763-7188.

Sincerely,

June K Dreith
June K. Dreith
Program Manager

Enclosures

32465





cc: Mr. David Cobrain, NMED
Ms. Lee Winn, NMED
Denver Files

TASK 4 DELIVERABLE (PARTIAL)

**CHARACTERIZATION OF THE RADIOACTIVE COMPONENT OF
MIXED WASTE UNDER 40 CFR 264.13**

Submitted by:

**TechLaw, Inc.
560 Golden Ridge Road, Suite 130
Golden, CO 80401**

Submitted to:

**Mr. Carl Will
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505**

In response to:

Work Assignment No. 06110.150

October 2003

LaVerne (2001) reported the results of irradiation experiments with a number of polymers; in these experiments, the yields of hydrogen, carbon monoxide, carbon dioxide, methane and ethane were determined. Materials used in the experiments included low-density polyethylene, high-density polyethylene, polypropylene, polystyrene, poly(methyl methacrylate), polyisobutylene, poly(4-vinylpyridine), polyamides, and poly(dimmer acid-co-allyl polyamine). Radiation used in the experiments included gamma radiation, protons, helium ions, and carbon ions.

Thermal Effects

Increased temperatures produced by radioactive decay can affect the release of gases from mixed waste. Thermal effects on gas generation from CH and remote-handled (RH) waste have been accounted for during shipping by limiting the decay heat of radionuclides so the hydrogen concentration in any layer of confinement is not predicted to exceed 5% (DOE, 1998; DOE, 2002). These decay heat limits are likely to limit direct thermal effects on the release of gases from mixed waste. However, higher temperatures produced by radioactive decay can change the gaseous reaction products and the amounts of gases that are released during radiolysis of organic materials (Reed et al., 1998).

Summary

The radioactive components of mixed waste can interact with the organic materials present in the waste. The effects of the radioactive materials on the mixed waste are primarily caused by radiolysis reactions involving the organic components of the waste, such as plastics and other polymer materials. Hazardous gases produced by these radiolysis reactions include hydrogen, methane, carbon monoxide, hydrochloric acid, and VOCs. Increased temperatures caused by radioactive decay can also influence the nature of the gaseous radiolysis reaction products and the amounts of gases produced from the mixed waste.

References

- DOE. 1998. *Reference Material for CH-TRAMPAC*, Rev. 0, U.S. Department of Energy DOE/WIPP 01-3204, August.
- DOE. 2002. *Safety Analysis Report for the RH-TRU 72-B Waste Shipping Package*, Rev. 3, U.S. Department of Energy DOE/WIPP 90-045, November.
- LaVerne, J.A. 2001. *Hazardous Gas Production by Alpha Particles in Solid Organic Transuranic Waste Materials. Final Report*. Prepared by the University of Notre Dame for the U.S. Department of Energy, Project Number 59934.
- Reed, D.T., J. Hoh, J. Emery, S. Okajima, and T. Krause. 1998. *Gas Production Due to Alpha Particle Degradation of Polyethylene and Polyvinylchloride*. Argonne National Laboratory, ANL-97/7, Argonne, Illinois, July.