

RESEARCH BULLETIN

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Tritium in Landfill Leachate?

ABSTRACT: A recently completed study of Pennsylvania (PA) landfills detected above background concentrations of tritium in leachate from some landfills. Because of limited data, EREF funded a study that will investigate the possible sources of the tritium in PA landfill leachate, perform a dose/risk assessment of tritium concentrations found, and provide recommendations for future monitoring requirements.

Last fall, the Pennsylvania Department of Environmental Protection (PADEP) completed a 2-year study at 49 landfills within the Commonwealth that tested for the presence of radioactive materials in leachate. The study detected naturally occurring radioactive materials (NORM) within background levels (e.g., uranium, thorium, and potassium) and above background concentrations of hydrogen-3 (tritium) in the leachate from some landfills.

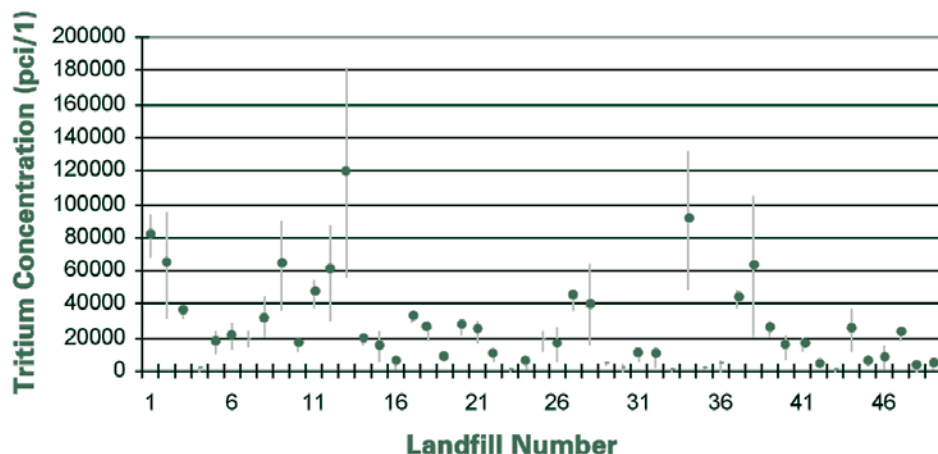
Tritium is a radioactive variation of hydrogen that emits very low energy beta radiation that cannot penetrate the human skin and therefore, is only dangerous if inhaled or ingested. As with all ionizing radiation, exposure to tritium increases the risk of developing cancer. However, because tritium emits very low energy and leaves the body relative-

ly quickly, ingested tritium is one of the least dangerous radionuclides.

While tritium is naturally occurring (i.e., cosmic rays in the upper atmosphere can convert a minor fraction of hydrogen to deuterium and tritium), it is normally present at background levels in the environment because of atmospheric testing of nuclear weapons in the 1960s. The source of the tritium was believed to be from the inadvertent disposal of self-illuminating exit signs that contained tritium that were co-disposed with construction and demolition debris.

Figure 1 presents the results of the tritium sampling at Pennsylvania landfills. The whisker plots in Figure 1 show the maximum and minimum concentrations of tritium (end

Figure 1. Tritium Results for PA Landfills



of whiskers) at each landfill, as well as the average tritium concentration for that landfill (point). The maximum measured tritium concentration was 182,000 pico-curies per liter (pCi/l) and the minimum was 0 pCi/l. The average tritium concentration was 24,400 pCi/l, which is slightly higher than the U.S. Environmental Protection Agency's drinking water standard of 20,000 pCi/l.

PADEP assessed the potential tritium exposure to on-site workers and the off-site public and determined that although tritium was detected in the leachate of most of the 49 permitted landfills, based upon a review of the study and other relevant information, there was not an immediate or long-term threat to the public's health and safety or the environment.

Because only 2 leachate samples were obtained at each of the 49 landfills in the original PADEP study, the Environmental Research and Education Foundation (EREF) has contracted with Civil and Environmental Consultants, Inc. (CEC), Pittsburgh, Pennsylvania, to further investigate the tritium issue. CEC was selected to perform the research after a competitive bid process. The

research is being done under a cooperative agreement between EREF, PADEP, and the private and public municipal solid waste disposal industry in Pennsylvania.

The aim of the research is to:

- Determine the possible sources of tritium in landfill leachate;
- Collect quarterly leachate samples for 2 years (8 quarterly samples) that will be analyzed for tritium concentrations;
- Perform a dose/risk assessment of tritium concentrations found; and
- Develop a final report that summarizes the findings and provides recommendations for future monitoring requirements.

For further information about this research, contact Dr. Edward W. Repa, Vice President, Environmental Programs at 703.299.5139 extension 11 or erepa@erefdn.org. ♦