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In-situ Vitrification

Purdue ECT Team
Purdue University, ectinfo@ecn.purdue.edu

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EMERGING CONSTRUCTION TECHNOLOGIES

Other Technologies – Soil Remediation

IN-SITU VITRIFICATION

THE NEED

While landfills are the predominant form of solid-waste disposal for municipalities in the U.S., people are objecting to the establishment of new landfills in their communities. Decreasing availability of land, worries about potential health problems and a growing concern for the environment have made the disposal of solid waste a challenge. In addition to this, many of the radioactive and hazardous waste sites around the U.S. are "closed" by a capping approach the waste is covered with a waterproof surface barrier to prevent leaching of contaminants to the ground and surface water. But this barrier must be monitored carefully and maintained for the indefinite future. An alternative method to this "cap strategy" is necessary due to the risk that these contaminated buried wastes represent.

THE TECHNOLOGY

The contaminated soil is melted to the desired depth and then the molten material is allowed to cool. High temperatures of about 1,500°C are reached by placing graphite electrodes into the ground. The depth and lateral extent of the melt are monitored by an array of temperature measuring devices which need to be buried at various depths and distances from the electrodes. The off-gases emitted from the molten material need to be correctly treated, cooled, scrubbed, and filtered, to remove any released materials before discharge. The final product is the transformation of an environmentally mobile substance to an environmentally enduring substance with a very small capability to leach.

THE BENEFITS

This technology represents a safety improvement. There is no need for contaminated soil transportation and handling. The need for disposal landfills disappears. Any type of radioactively contaminated buried waste unit, which because of its high activity represents significant risk for exhumation and redisposal, would be a potential application for ISV.

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STATUS

This methodology is on a fast track research and development program. Pilot scale-testing has been conducted by Oak Ridge Environmental Restoration Program and the Battelle Pacific Northwest Laboratory with radioactive sludge from old liquid waste seepage pits.

BARRIERS

The current ISV technology is not feasible at sites needing remediation to depths greater than 18 feet. Potential over-pressurization caused by contact of molten material with sealed volatiles and loosely packed combustibles prevents application of ISV to buried wastes.

POINT OF CONTACT

Gary Jacobs, Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, TN 37831-6036. Phone: (615) 576-0567, Fax: (615) 576-8543. E-mail: jacobsgk@ornl.gov
John Tixier, Battelle Pacific National Laboratories, P.O. Box 999, MS P7-41, Richland, WA 99352. Phone: (509) 376-8732, Fax: (509) 372-0867.

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REVIEWERS

Peer reviewed as an emerging construction technology

DISCLAIMER

Purdue University does not endorse this technology or represents that the information presented can be relied upon without further investigation.

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