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Innovative Vitrification Technology for Waste Remediation

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Abstract

Vortec has successfully completed Phases 1 and 2 of a technology demonstration program for an "Innovative Vitrification Technology for Waste Remediation."¹

The principal objective of this program is to demonstrate the ability of a Vortec Cyclone Melting System™ (CMS™) to remediate DOE contaminated soils and other waste forms containing RCRA hazardous materials, low levels of radionuclides and TSCA (PCB) containing wastes. The demonstration program will verify the ability of this vitrification process to produce a chemically stable glass final waste form, which passes the TCLP quality control requirement, while meeting all federal and state emission control regulations. The demonstration system is designed to process 36 ton/day of as-received drummed or bulk wastes. The processing capacity equates to approximately 160 barrels/day of waste materials containing 30% moisture at an average weight of 450 lbs./barrel.

The Vortec CMS™ has demonstrated the ability to vitrify typical DOE site solids, spiked with surrogate radionuclides, heavy metals, and PCB's. The glass final waste form has consistently passed the TCLP tests for the leachability in pilot plant operations. The Vortec CMS™ has successfully processed over 35,000 pounds of surrogate materials representative of contaminated soils found at the DOE-Hanford and DOE-Paducah sites. The samples taken during the tests confirmed that virtually all of the radionuclide surrogates in the vitrified product were retained and did not leach to the environment. RCRA metals that were in the vitrified product were retained and did not leach to the environment as confirmed by the TCLP testing.

DOE has completed an environmental assessment (EA) for the Paducah demonstration and is in final negotiation with the state of Kentucky for an RCRA RD&D permit to conduct the test. Plant assembly will be initiated once DOE issues of a finding of no significant environmental impact.

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Vortec has also made progress in the application of the CMS™ technology to other DOE/DOD and industrial wastes. Examples of other applications include:

- a) The CMS™ technology, which is currently being used to remediate hazardous waste for the aluminum industry. Spent pot liner (K088) is being processed at a 50 TPD plant owned by Ormet Aluminum. The CMS™ technology is currently classified as BDAT by the U.S. EPA and will be used as a basis for establishing new EPA land disposal requirements to K088.
- b) Vortec completed a major Demonstration Test of the CMS™ technology in December 1998 at its U-PARC test facility for DOE Fernald. In this test Silo 1 and Silo 2 slurry stimulants were processed into glass frit during an uninterrupted 72-hour period. An average processing rate of approximately 6000 pounds per day was maintained for each of the three days of the test's duration. The glass produced passed all of the quality parameters specified by DOE Fernald.
- c) Vortec has also recently completed a preliminary study for the US Army at Edgewood Arsenal to use the CMS™ technology in chemical demilitarization applications. Of particular interest was the processing of contaminated carbon from HEPA filters and the destruction of contaminated personnel protection equipment.

All of these applications discussed in this poster session are a direct result of the support that DOE has provided to Vortec during the development of the CMS™ technology.

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