# First glass made at Hanford via bulk vitrification

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Scientists and engineers will soon be studying some of the first radioactive glass made by Hanford's bulk vitrification project — part of a larger effort by CH2M HILL Hanford Group to evaluate technologies that could be used to treat a portion of Hanford's low-activity tank waste.


**Rick Raymond of CH2M HILL Hanford Group points to the engineering-scale melter used to make test glass in the bulk vitrification project. CH2M HILL is evaluating three potential technologies to supplement Hanford's Waste Treatment Plant by processing some of the low-activity tank waste.**

The technology is one of three being considered to supplement the work of the Waste Treatment Plant by processing some of Hanford's low-activity tank waste. Bulk vitrification allows for glassification of the waste inside a container suitable for land disposal. The process would allow accelerated cleanup by reducing the mass of sodium requiring vitrification in the Waste Treatment Plant.

At Pacific Northwest National Laboratory's Radiochemical Processing facility in the 300 Area, personnel from the contractor team of AMEC Earth & Environmental conducted engineering-scale test melts for the Department of Energy Office of River Protection and CH2M HILL during March and April.

The glass in the engineering-scale melts was made by combining soil, small amounts of chemical additives and simulated tank waste in a container about the size of a desk. The mixture was heated to 1,300 degrees Celsius, a temperature hot enough to destroy hazardous chemicals and immobilize radioactive materials in the glass. About half a cubic foot of glass was made in the test melts.

The soil is a cost-effective source of needed glass-forming materials that are needed. One test also included a simulated waste material spiked with rhenium and technetium. Technetium is an important radionuclide in long-term risk analysis, and rhenium is a non-radioactive simulant for technetium.

"This is real glass, and thanks to the efforts of all of those involved, it has been a remarkably short period of time going from the contract award to the AMEC team in January to making glass," said Rick Raymond, supplemental-treatment strategic planner for CH2M HILL. "A key to accelerating cleanup is taking available technologies and investing the time and expense to evaluate how they could be used to safely and efficiently treat selected Hanford tank waste."

"Bulk vitrification differs from traditional waste vitrification in that the melt container also serves as the disposal container," said Leo Thompson of AMEC. "The main source of glass formers is soil, rather than expensive glass frit compositions. These factors make the bulk vitrification facility and operations less complex."

"These test melts were very successful," said Raymond. "Now the immediate focus will turn to examining the

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**This non-radioactive glass sample was made by combining soil, small amounts of chemical additives and simulated tank waste.**

engineering-scale test glass and confirming that the simulant characteristics mirror results of laboratory-scale tests being performed with real tank waste."

Plans are also being made for a large-scale test of the technology, conducting test melts using soil and simulated tank waste in large containers that are similiar in size to those used in containerized shipping.

## Other possible technologies

The bulk vitrification technology is one of three CH2M HILL is investigating for the ORP for use in treating low-level or mixed low-level tank waste for disposal either on or off the Hanford Site. Containerized grout and steam reforming are the other two technologies the company is evaluating.

These technologies are called supplemental because they would be used to supplement Hanford's Waste Treatment Plant, which is currently under construction. An estimated 30 to 70 percent of Hanford's 42 million gallons of low-activity tank waste may be suitable for treatment using one or more of the supplemental-treatment technologies under evaluation.

Working with CH2M HILL, the AMEC contract team is conducting lab-scale test melts with real and simulated tank waste. The team is also conducting engineering-scale and large-scale testing of the bulk vitrification technology using simulated waste, and doing the conceptual engineering for a production facility. After that first phase of work, assessments of all three supplemental treatment technologies will enable ORP to decide how to move forward on building and operating supplemental-treatment facilities.

Members of the AMEC contract team include, as major subcontractors, RWE NUKEM Corp.; Daniel, Mann, Johnson, Mendenhall, Holmes and Narver (DMJMH&N); and Pacific Northwest National Laboratory.

Full-scale bulk vitrification tests are scheduled for this month at a location near the HAMMER facility. ■