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SRNL Bubbler Device Patented 1 of 1

News from the Savannah River National Laboratory

July 24, 2007 For immediate release

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PATENTED SRNL DEVICE ENHANCES GLASS MELTER OPERATIONS

AIKEN, S.C. – A newly patented invention from the U.S. Department of Energy's Savannah River National Laboratory has already proven itself highly valuable for enhancing operation of the Savannah River Site's facility for immobilizing high-level radioactive waste.

The Recirculation Bubbler for Glass Melter Apparatus was invented by Hector Guerrero of SRNL and Dennis Bickford, formerly of SRNL, in consultation with personnel at SRS' Defense Waste Processing Facility. At the DWPF, radioactive waste is mixed with a special glass formula in a melter, encapsulating the waste in glass at the molecular level, resulting in a stable glass form that isolates the radioactive contaminants from the environment. The Recirculation Bubbler, which enables more efficient melting of the waste and mixing with the glass, was installed in the DWPF in 2004 and has allowed the facility to increase by as much as 10 percent the rate at which it converts radioactive waste to a stable glass form for permanent disposal. SRNL personnel conducted an extensive computer modeling and experimental program in developing the bubbler.

The U.S. Department of Energy, which owns SRS and SRNL, was recently issued a patent on the device. Several sites across the DOE complex are either already using a vitrification (glass-making) process to stabilize various types of waste, or have plans to do so in the future. In addition, commercial firms use vitrification for a variety of purposes. The Recirculation Bubbler could potentially be useful in a number of these operations.

When waste is added to the molten glass in the melter, it tends to form a "cold cap" resting on top of the pool of glass. Key to efficient melter operation is the ability to melt that cap and mix it with the molten glass. That requires circulating the hot pool of glass, but the glass does not circulate very well naturally because it is highly viscous – about the consistency of molasses. The Recirculation Bubbler is essentially a lift pump, in which gas bubbles are injected inside a pipe open at both ends. This draws glass from the bottom of the melter and deposits it close to the cold cap, making for enhanced heat transfer.

Air bubblers in which air is bubbled at the end of a tube are currently used in commercial glass melters, but these generally mix only a local region of the pool, while the Recirculation Bubbler mobilizes the entire melt pool.

SRNL, operated for DOE by Washington Savannah River Company, is the applied research and development laboratory at DOE's Savannah River Site, putting science to work in the areas of energy security, national and homeland security, and environmental management.

WSRC-07-21

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