

*Superconducting Open-Gradient
Magnetic Separation for the Pre-
treatment of Vitrification Feeds*

*Argonne National Laboratory,
Westinghouse Savannah River,
University of South Carolina, and
University of Texas*

EMSP Workshop - July 1998

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Research Objective

- To reduce the volume and cost of high-level waste glass by demonstrating that magnetic separation can separate crystalline, amorphous, and colloidal constituents in vitrification feed streams known to be deleterious to the production of borosilicate glass. Magnetic separation will add neither chemicals nor generate secondary waste.

Feed characterization of magnetic susceptibilities

- The project includes the systematic study of magnetic interactions of waste constituents under controlled physical and chemical conditions (e.g., hydration, oxidation, temperature) to identify mechanisms that control the magnetic properties.

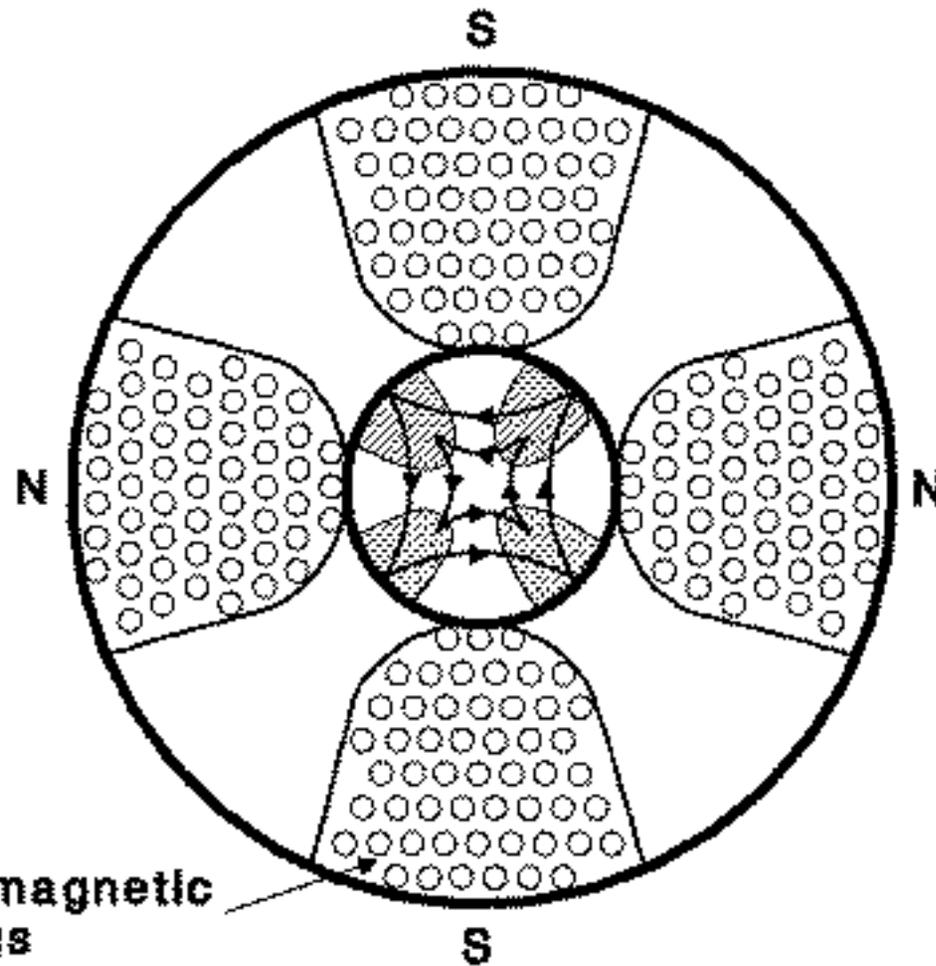
Partitioning studies for optimal separation

- Partitioning of radionuclides to determine their sorption mechanisms is also being studied. The identification of fundamental magnetic properties within the microscopic chemical environment in combination with hydrodynamic and electrodynamic models provides insights into the design of a system for optimal separation.

Experimental studies

- Experimental studies using superconducting open-gradient magnetic separation (OGMS) will be conducted to validate its effectiveness as a pretreatment technique.

Open-Gradient Magnetic Separation 61 T/m; 70cm



**Bore
Configuration
with
Separatrix
Blocked**

**Electromagnetic
Windings**

