



2006 Excellence in Technology Transfer Award

Borated Phosphate Cements-Based Nuclear Shields and Casks

Argonne National Laboratory

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Argonne National Laboratory's Chemically Bonded Phosphate Ceramic Technology (also known as "phosphate cement") was initially developed between 1992 and 2001 as a stabilization method for radioactive and hazardous waste. Between 2001 and 2006, the phosphate cement technology was refined and expanded upon to allow the addition of isotopic boron. Because isotopic boron has a large neutron cross-section, it is an ideal material for neutron shielding. Gamma shielding can be provided by the addition of iron oxides (hematite and magnetite) to the phosphate cement. Currently used materials are effective against only one or the other form of radiation. Since both boron and iron oxides can be added to the phosphate cement technology in combination, the resulting material can be used to construct shields and storage casks effective against both neutrons and gamma rays. Eagle Picher, LLC (EP) is producing borated phosphate cement storage units for a DOE contractor under the trade name BoroBond™. Storage units for fissile materials are also in use at the Y-12 plant at Oak Ridge National Laboratory.

Product development and staff training was conducted under a CRADA with Argonne National Laboratory. Argonne provided the base technology, material compositions, technical support and training and project management. EP contributed in-kind support and in-house testing.