



AAR CARGO SYSTEMS

a division of AAR Manufacturing Group, Inc.

72-1015
72-1025

February 25, 2004

Mr. Stewart Brown
U.S. Nuclear Regulatory Commission
Mail Stop: 013D13
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Subject: Boral Test Reports and Other Documents

Dear Mr. Brown:

As we discussed by phone, I have looked through our files to find historical test reports on the performance of Boral™ under various conditions. These test reports go back to 1976, after AAR (Brooks & Perkins at that time) was in commercial production of Boral™ using its patented process of making Boral™ from mixing aluminum and boron carbide (B₄C) powders, packing the powder mix in an aluminum box (ingot), and hot rolling the ingot into sheets. First generation boral (the generic term used for Al-B₄C products), developed in the 1950's, was made by mixing B₄C particles in molten aluminum, casting an ingot, enclosing the ingot in pure aluminum cladding, and rolling the ingot.

The enclosed reports are primarily related to the performance of Boral™ in wet pools. The tests include long term gamma and neutron irradiation tests, strength tests (before and after irradiation), thermal tests, corrosion tests, gas generation tests, neutron transmission tests for various B₄C loadings and sheet thicknesses, comparison of Boral™ neutron absorption to an ideal B-10 absorber, the behavior of Boral™ encased in stainless steel, and evaluations of the effects of blisters which have occurred in some Boral™. Blisters occur in Boral™ used in spent fuel pools as a result of the buildup of hydrogen in the Boral™ core after water penetrated the core (which has a density of 90-95% of theoretical) and oxidized the aluminum in the core.

More recently, there have been several test programs to evaluate the performance of Boral™ under dry fuel storage conditions. Most of these reports were funded by outside organizations and are proprietary to those organizations. AAR will ask the sponsoring organizations to provide a copy of the studies to the NRC.

There are several other documents on my list to send you. I will forward the additional information in a separate transmittal.

If you have any questions, please give me a call at 734-466-8210 (office) or 404-229-1180 (cell).

Sincerely,

James S. Hobbs
Director, Nuclear Programs

enclosure

...systems, components & more

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LIST OF ENCLOSURES

Reports:

Report 685: TPRL 1254, Thermophysical Properties of Metal Composites, March 1993

Report 680: Corrosion Testing of Boral and Boral Raw Materials, March 16, 1993

Report 637: Effect of Gamma Radiation on the Neutron Attenuation Properties of Boral, February, 1985

Report 624: Boral™ Neutron Absorbing / Shielding Material, Product Performance Report, July 20, 1982

Proprietary report (no title, no date) regarding the occurrence of blisters on Boral used by CCM Sulzer and other incidents of blisters

Neutron Transmission Through Boral Shielding Material, Michigan Memorial Phoenix Project, The University of Michigan, January, 1978

Experimental Observation of Boral Plates Encased in Stainless Steel Under the Influence of Gamma and Neutron Fluxes, FNR – PML Report I-76, Michigan Memorial Phoenix Project, The University of Michigan, February, 1976

AAR Bulletins:

Bulletin 713.1, Dense Boral Test

Bulletin 691.2, The Positive Effect of Boron Oxide

Bulletin 696.1, Effect of Irradiation