

**MICROSTRUCTURAL BANDING AND FRACTURE TOUGHNESS TESTS  
IN A LOW-ALLOY REACTOR PRESSURE VESSEL STEEL\***

**Randy K. Nanstad, Mikhail A. Sokolov, Philip J. Maziasz, and Larry R. Walker**

Metals and Ceramics Division  
**OAK RIDGE NATIONAL LABORATORY**  
Oak Ridge, Tennessee 37831-6151

**ABSTRACT**

Relatively low fracture toughness behavior was observed in some material characterization tests performed as part of a project to investigate the effects of constraint on the cleavage initiation toughness of reactor pressure vessel steel. The presence of varying degrees of dark bands in the microstructure prompted the use of various techniques, including electron microprobe analysis and analytical electron microscopy, to characterize the nature of the segregation and evaluate the potential effects of the segregation on the fracture toughness results.

---

\*Research sponsored by the Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, under Interagency Agreement DOE 1886-N011-9B with the U.S. Department of Energy under Contract No. DE-AC05-96OR22464 with Lockheed Martin Energy Research Corp.

The submitted manuscript has been authored by a contractor of the U.S. Government under contract No. DE-AC05-96OR22464. Accordingly, the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U.S. Government purposes.