

November 29, 2004

MEMORANDUM TO: James E. Dyer, Director
Office of Nuclear Reactor Regulation

Jack R. Strosnider, Director
Office of Nuclear Material Safety and Safeguards

Roy P. Zimmerman, Director
Office of Nuclear Security and Incident Response

FROM: Carl J. Paperiello, Director */RA/* John W. Craig for
Office of Nuclear Regulatory Research

SUBJECT: RESEARCH INFORMATION LETTER (RIL) 0402,
"KINETICS OF CLADDING OXIDATION IN AN AIR ENVIRONMENT"

The Office of Nuclear Regulatory Research conducted a series of air oxidation experiments with unirradiated specimens of the Zirconium-based alloys used as cladding in power reactors. The objectives of these experiments were to provide data regarding the kinetics of cladding oxidation, and to develop correlations for best estimate analysis of fuel and cladding heatup in an air environment. The results, summarized in the attached research information letter, provide best estimate correlations for air oxidation kinetics of Zirconium-based alloys in the temperature range of 300–900 EC (572–1,652 EF). These correlations can be used for cladding heatup calculations in air and steam/air environments under accident conditions resulting from a loss of coolant inventory in spent fuel pools or dry storage. The results indicate that the preexisting oxide layer, which forms during in-reactor operation, does not have a deleterious effect on further clad oxidation in an air environment. The results also show that preexisting hydrides do not have a discernible deleterious effect on air oxidation of cladding that has previously been oxidized in a steam environment during in-reactor operation. Finally, the results confirm that the correlations developed in this study agree well with those that the U.S. Nuclear Regulatory Commission has previously used for the spent fuel pool risk analysis.

Attachment: As stated

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