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Material Degradation and Aging Management of Primary Components in LWR Plants

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Abstract – Materials research and plant aging management activities conducted by the Electric Power Research Institute will be discussed. These programs provide important information that can be used for the continued safe operation of light water reactor plants.

Degradation and aging of reactor coolant system passive components are major threats to the long-term economic viability of the existing fleet of LWR plants. Overcoming these threats requires concerted action in the areas of corrosion research, water chemistry, and plant operation and management. The research activities included in the LWR materials degradation and aging management program at the Electric Power Research Institute helps nuclear plant owners maximize useful plant life through inspection, degradation assessment, and repair or replacement. Long term research is pursued in developing technologies to model and predict materials degradation and aging. The program involves a comprehensive and integrated approach for addressing materials degradation issues in reactor pressure vessel, coolant system piping and vessel internals. This allows early corrosion identification, degradation diagnosis, cracking assessment, and maintenance of components throughout the reactor coolant system. Ultimately, much of the work performed in the program leads to the development of overarching operational guidelines that LWR plants are required to implement to ensure that both plant reliability and safety are maximized. This presentation focuses on research and aging management programs for reactor coolant system components in PWR plants to address stress corrosion cracking of Ni-base alloys such as Alloy 600 and Alloy 690, and also austenitic stainless steels.