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INVESTIGATION OF INCREASED RADIATION LEVELS FROM UTILIZATION OF HYDROGEN WATER CHEMISTRY IN BWRS

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Objectives: To fully understand the impact of Hydrogen Water Chemistry (HWC) on radiation level buildup requires an in-depth investigation of corrosion product formation, transformation and transport. The present program is one phase of this investigation, which involved in-plant assessments and detailed analyses of the database from BWRs using HWC.

Comments: The primary coolant in boiling water reactors (BWR) is typically ultra pure water. However, because of the benefits in reducing the electrochemical potential for mitigating intergranular stress corrosion cracking, several plants are operating with hydrogen addition to the primary system, or hydrogen water chemistry (HWC). One negative impact is that the nitrogen-16 levels can greatly increase (depending on the hydrogen injection level) during operation. For the most part, those plants on hydrogen chemistry have been able to manage these increased dose rates.

Remarks: Another aspect of hydrogen chemistry has been the increased shutdown radiation levels being experienced in some of the plants. Radiation buildup in BWR is a complex phenomenon with many processes affecting the radiation levels from the out-of-core components. Since conversion to HWC affects each stage of corrosion product transport in BWR, all aspects are of importance. The increased radiation buildup rates observed with the HWC conversion could be due to adverse changes at any stage of the transport phenomenon.

References: Asay, R., and G. Galbraith, "BWR Hydrogen Water Chemistry Increased Radiation Level Investigation," Proceedings, EPRI Radiation Field Control and Chemical Decontamination Seminar, Tampa, Florida, November 1995, EPRI Distribution Center, P.O. Box 23205, Pleasant Hill, CA 94523.

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