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EASY INEXPENSIVE HYDROGEN WATER CHEMISTRY PREDICTIVE METHODS

Keywords: COMPONENT RELIABILITY; HYDROGEN WATER CHEMISTRY; IGSCC; COST REDUCTION

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Objectives: This study investigated inexpensive and simple hydrogen water chemistry (HWC) predictive methods that eliminate the need for HWC minitests.

Comments: HWC is the addition of hydrogen to the feedwater of a boiling water reactor. The hydrogen reduces the concentration of dissolved oxygen in the primary coolant to a level that will no longer facilitate intergranular stress corrosion cracking of stainless steel components. Each BWR responds differently to such hydrogen injections which lead to expensive HWC minitests. The main difference between the Aptech HWC predictive methods and a minitest is that no hydrogen needs to be added to the feedwater. Rather, the predictive methods utilize the indigenous hydrogen and oxygen generated by radiolysis in the core.

Remarks/Potential for dose limitation: The ability of any specific downcomer/jet pump region to facilitate the recombination of hydrogen and oxygen varies from plant to plant. This has required expensive HWC minitests in order to determine the precise amount of feedwater hydrogen needed to reduce the ability of the recirculating water to facilitate IGSCC of the external recirculation piping, typically made of welded steel. Such mini tests cost upwards of \$1.0 million.

References: Fox, M., "Easy Inexpensive Hydrogen Water Chemistry Predictive Methods," *Water Chemistry of Nuclear Reactor Systems 6*, Vol. 1, pp. 222-223, British Nuclear Energy Society, London, 1992.

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