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CONSTRUCTION AND OPERATION OF AN IN-PILE LOOP FOR BWR COOLANT CHEMISTRY STUDIES

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Objectives: This paper discusses the construction and operation at the MIT Research Reactor of an in-pile loop which simulates BWR coolant conditions. The loop was designed to carry out coolant radiolysis studies, with a focus on O₂ and H₂O₂ generation, electrochemical corrosion potential, and N-16 chemistry.

Comments: The BWR Coolant Chemistry Loop (BCCL) had once-through flow. Neutron and gamma dose rates and core exit quality are comparable to those in an actual BWR. With the exception of the in-core Zircaloy tubing, the system is constructed almost entirely of titanium to insure water purity, and a chemical injection system is provided for controlled addition of chemicals of interest. Charging tank cover gas composition can be varied to simulate a range of conditions between NWC and HWC, or to add a wide variety of gaseous species for test purposes.

Remarks/Potential for dose limitation: Coolant chemistry in a BWR has important effects on materials integrity, ex-core radionuclide deposit, and steam plant dose rates. Radiolysis dominates and is hard to quantify fully by computation alone. This motivated the construction and operation of this experimental facility.

References: Kohse, G.E. et al, "Construction and Operation of an In-Pile Loop for BWR Coolant Chemistry Studies," *Water Chemistry of Nuclear Reactor Systems 6*, Vol. 1, pp. 190-191, British Nuclear Energy Society, London, 1992.

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