Coolant Leakage from Lab Grown SCC Tubes and Operating Steam Generator Tubes

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Abstract

Primary water stress corrosion cracking of steam generator tubings occurs on many tubes in pressurized water reactors (PWRs), and they are repaired using sleeves or plugs. In order to develop proper repair criteria, it is necessary to know the leak behavior of the tubes. Out side diameter(OD) and inside diameter(ID) cracks were developed at room temperature, and leak rate and burst pressure were measured on the degraded tubes at room temperature and high temperature. 100 % through wall cracks did not show a leakage at 1560 psi, which is an operating pressure difference of pressurized water reactors (PWRs). In some tests, leak rates of the tubes increased with time at a constant internal water pressure. A test tube showed a very small amount of leakage at 2700 psi in high temperature pressure test at 282 °C, but it disappeared after the pressure increased slightly. Even cracks are 100 % through wall, they need to open in order to reach a certain amount of leak rate at the operating pressure difference. OD initiated crack showed lower leak pressure than that of ID initiated crack