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ABSTRACT
A DESCRIPTION OF LOW TEMPERATURE
HYDRIDING OF ZIRCALOY AT HANFORD

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A DESCRIPTION OF LOW TEMPERATURE
HYDRIDING OF ZIRCALOY AT HANFORD

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ABSTRACT

A DESCRIPTION OF LOW TEMPERATURE
HYDRIDING OF ZIRCALOY AT HANFORD

The two K Reactors at the Hanford Plant of the Atomic Energy Commission were retubed in 1963 with ribless Zircaloy process tubes. These tubes, 1.81" OD x 0.037" wall, were made by tube reducing methods from extruded blooms and were installed without final pickling or autoclaving. These tubes are used with once-through filtered water with a maximum coolant temperature of approximately 110 C.

After approximately two years' service, it was discovered that these tubes were absorbing hydrogen in a totally unexpected and alarming manner. It was found that the downstream few feet of these tubes had a layer of massive hydride platelets, several mils thick, on the inner surface, and that the hydrogen content of the tube wall beneath this layer had increased from the as-fabricated level of 5 - 15 ppm to 50 - 75 ppm. The portion of the tubes so affected was downstream of the fuel charge.

Physical testing has indicated loss of ductility but no significant changes in strength. Cold burst tests resulted in a ductile failure mode with no tendency toward brittle fracture.

A program to determine the basic mechanism responsible for this phenomenon, as well as practical means for its elimination will be the subject of a companion paper.

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