High Temperature Hydrogen Attack Resistance Using Autoclave Testing of Scoop Samples[SM]

A High Temperature Hydrogen Attack (HTHA) assessment was performed on a SA-302 Grade B (C-Mn-½Mo) Distillate Hydrotreater built in 1976, operating above the carbon steel curves given in API RP 941. This assessment evaluated the potential for existing damage and recommended future inspection intervals based on accelerated HTHA testing of Scoop Samples[SM] removed from the OD of the vessel. Accelerated HTHA testing was performed using specialized autoclaves equipped with displacement sensors to detect incipient damage and determine the rate of through wall damage.

The test results showed that the Hydrotreater had better HTHA resistance than given in the API RP 941 Carbon ½ Mo curves. The test conditions were approximately 100°F above the 100 hour incipient damage curve for C - ½ Mo steel. The time to incipient HTHA damage was also longer than predicted by P_w calculations given in the recently published API High Temperature Hydrogen Attack Technical Basis document (September 2008). Results also showed the relative HTHA resistance of the various plate materials to help prioritize inspection frequencies and locations.

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