Magnetec Monthly Chronicle

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Magnetec Inspection, Inc.

Excellence in Eddy Current Inspection Technology & Failure Analysis

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We were caught off guard with that one !!!

It was an Expected 5 Year Operating Timeframe

The exchanger is found in a major Southern Gulf Coast refinery. The bundle was inspected to determine active corrosion mechanism and to aid in life expectancy and service reliability for an expected 5 year operating time frame.

The exchanger had no failed tubes prior to inspection and no history of tube related problems. The material is carbon steel SA-179.The previous visual inspection performed 2 years earlier through an inspection manway in the shell found adverse conditions/corrosion to the tubing. The bundle was not expected to

have any corrosion problems and the inspection was planned as a cursory look at the bundle condition as the shell was being inspected on its 10 year cycle. The inspection was performed on 25% of the tubing across the entire bundle matrix.The tubing was found to contain O.D. pitting type corrosion mechanism (Oxygen pitting) to the top ½ of the tube matrix with defect depths of 60% in most cases. A corroded tube section was removed after the inspected to confirm the inspection results and provide tube sections for analysis. The tubing was found with heavy

fouling and tubercle-like deposits (Phosphates) and under deposit corrosion (Concentration cell initiated) due to the heavy lay-out of entrained constituents found in the condensate.

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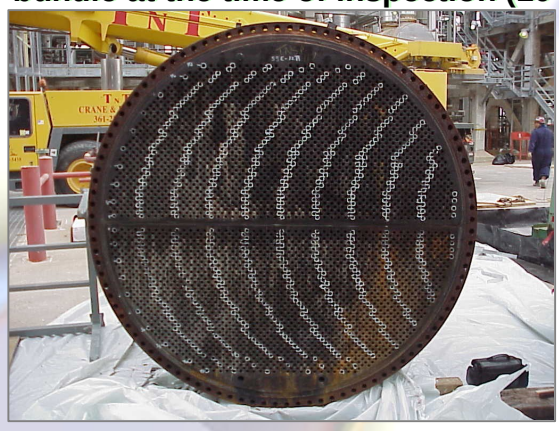
The pitting was found as multiple pit locations of heavy concentration along the tube length and across the bundle tube matrix with the most defect concentrations and severity on the top half of the exchanger. Based on the age of the bundle at the time of inspection (10



years) and the severe corrosion attack documented the bundle was considered in poor service condition and was recommended for a retube during the turnaround. The exchanger was expected to have accelerated corrosion and possible tube failures with high unit impact and lost opportunity from continued extended service. Operating conditions such as condensate make-up, Water chemistry, Oxygen content, temperature, and contaminants in condensate supply all contribute to the corrosion rate which can vary the expected life to a high degree. The sister bundle was also inspected and determined to be unsuitable for continued service and was also scrapped.

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