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Microstructural Characterization of Mild Steel Used in Oil and Gas Pipeline

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Abstract— Results associated with microstructural and strength analyses of the material collected from the oil field are presented. The effects of varying microstructure and hardness by the heat treatment process were presented. The microstructural characterization and surface analysis were carried out by scanning electron microscope (SEM), Energy Dispersive Spectroscopy (EDS), X-ray Diffraction (XRD), and Rockwell for hardness analysis. The energy dispersive spectroscopy EDS indicated that the samples were in the range of low carbon steel (AISI 1008) i.e., highly ductile, and soft. XRD analysis showed that the Iron Carbide phase was formed during service conditions which is brittle in nature. Scanning electron microscopy SEM of the surface examination denotes that the material was greatly affected by erosion leading to crack initiation and propagation.

Keywords—Low Carbon Steel, Corrosion, Microstructure, Hardness, Microscope