Analisis efektivitas desain sistem impressed current cathodic protection (ICCP) dalam mengendalikan laju korosi pada struktur tiang di Dermaga Perusahaan X = Analysis of the effectiveness of the impressed current cathodic protection (ICCP) system design in controlling the corrosion rate of the pole structure at the Company X Pier

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Abstrak

Penelitian ini menganalisis efektivitas desain sistem Impressed Current Cathodic Protection (ICCP) dalam mengendalikan laju korosi pada struktur tiang dermaga di lingkungan rawa air tawar. Berdasarkan standar ISO 15589-2 dan NACE SP0169, sistem didesain dengan arus proteksi 1,42 A dan anoda MMO tubular, menyesuaikan kondisi pH, resistivitas, dan suhu air. Hasil menunjukkan penurunan laju korosi dari 0,2027 mm/tahun menjadi 0,01352 mm/tahun, dengan efisiensi proteksi lebih dari 93% dan peningkatan umur struktur hingga ±443 tahun. Potensial proteksi aktual mencapai –915 mV vs Cu/CuSO, menunjukkan keberhasilan sistem. Rekomendasi mencakup pemantauan lingkungan otomatis dan penguatan distribusi arus agar performa sistem tetap optimal dalam kondisi tropis air tawar.

.....This study evaluates the effectiveness of an Impressed Current Cathodic Protection (ICCP) system design in reducing corrosion on jetty pile structures in a freshwater swamp environment. Based on ISO 15589-2 and NACE SP0169 standards, the system was designed with a 1.42 A protective current and tubular MMO anodes, considering local pH, resistivity, and temperature. Results showed a corrosion rate reduction from 0.2027 mm/year to 0.01352 mm/year, with over 93% protection efficiency and structural life extended to approximately 443 years. The actual protection potential reached –915 mV vs Cu/CuSO, indicating system success. Recommendations include automated environmental monitoring and improved current distribution to maintain optimal performance in tropical freshwater conditions.