

ABSTRAK

OPTIMALISASI *IMPRESSED CURRENT CATHODIC PROTECTION* SEBAGAI PENGENDALIAN KOROSI PADA JALUR *CROSS COUNTRY PIPELINE* DI PT X

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Fenomena korosi pada pipa bawah tanah menjadi salah satu permasalahan pada industri minyak dan gas yang dapat menyebabkan kerugian ekonomi, gangguan operasional, dan risiko keselamatan. Salah satu metode untuk mengendalikan korosi pada pipa bawah tanah adalah dengan *Impressed Current Cathodic Protection* (ICCP). Namun, pada jalur *cross country pipeline* (CCPL) sepanjang 5,3 kilometer di PT X, hasil inspeksi menunjukkan bahwa sebagian besar titik ukur arus potensial berada di bawah standar NACE SP-0169, sehingga sistem ICCP yang terpasang belum optimal dan masih ditemukan indikasi korosi. Penelitian ini bertujuan untuk menganalisis faktor lingkungan dan teknis yang mempengaruhi kinerja ICCP pada jalur CCPL di PT X yang kemudian dilakukan proses rancangan parameter operasi aktual pada sistem untuk mengurangi laju korosi. Tahapan penelitian meliputi pengamatan visual pipa, pengukuran ketebalan pipa, pH tanah, arus potensial, dan perhitungan kebutuhan proteksi katodik. Hasil penelitian menunjukkan bahwa dari 80 titik ukur, hanya 3 titik yang memenuhi standar proteksi sesuai NACE SP-0169 yang nilai arus potensialnya ada pada rentang -850 mV hingga -1050 mV. Melalui *re-design* sistem proteksi dengan standar DNV RPB401, diperoleh kebutuhan arus proteksi sebesar 87,855 A untuk luas permukaan total pipa 83.652,677 m². Dibutuhkan anoda pada sistem ICCP agar optimal sejumlah 13 buah anoda MMO *titanium tubular* dengan jarak pemasangan 407,67 meter, arus tiap anoda 6,756 A, dan satu unit *rectifier* berkapasitas 226,29 V serta 97,617 A *output*. Optimalisasi ini diharapkan mampu menekan laju korosi dan memberikan proteksi yang lebih merata sepanjang jalur CCPL.

Kata kunci: ICCP, korosi, pipa bawah tanah, proteksi katodik

ABSTRACT

OPTIMIZATION OF IMPRESSED CURRENT CATHODIC PROTECTION AS A CORROSION CONTROL METHOD ON THE CROSS COUNTRY PIPELINE AT PT X

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Corrosion in underground pipelines is a major issue in the oil and gas industry, potentially causing significant economic losses, operational disruptions, and safety risks. One of the methods to control corrosion in underground pipelines is Impressed Current Cathodic Protection (ICCP). However, along the 5.3-kilometer cross-country pipeline (CCPL) at PT X, inspection results indicated that most potential current measurement points were below the NACE SP-0169 standard, showing that the existing ICCP system was not yet optimal and corrosion indications were still present. This study aims to analyze the environmental and technical factors that affect the performance of ICCP on the CCPL line at PT X, which then carried out the process of designing actual operating parameters on the system to reduce the corrosion rate.. The research stages include visual inspection of the pipeline, measurement of pipe thickness, analysis of soil pH, measurement of potential current, and calculation of cathodic protection requirements. The results show that out of 80 measurement points, only 3 met the NACE SP-0169 protection standard with potential current values in the range of -850 mV to -1050 mV. Through a re-design of the protection system based on DNV RPB401 standards, the required protection current was calculated at 87.855 A for a total pipeline surface area of 83,652.677 m². The optimized ICCP system requires 13 MMO titanium tubular anodes with an installation spacing of 407.67 meters, each providing 6.756 A, supported by a rectifier with an output capacity of 226.29 V and 97.617 A. This optimization is expected to reduce the corrosion rate and provide more uniform protection along the CCPL.

Keywords: underground pipeline, corrosion, ICCP, cathodic protection