Analisis kelayakan operasional jalur pipa kondensat material API 5L grade B terhadap disain sistem proteksi katodik = Analysis of operational reliability of API 5L grade B material condensate pipeline using cathodic protection system design

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Abstrak

Penelitian ini bertujuan untuk menganalisis kelayakan operasional jalur pipa kondensat material API 5L Grade B terhadap disain sistem proteksi katodik. Verifikasi disain dilakukan pada data-data sekunder seperti hasil survey resistivitas tanah; disain awal sistem proteksi katodik; potential logger saat pemasangan, setelah pemasangan, satu bulan setelah pemasangan, serta hasil komisioning; hasil perhitungan umur sisa; dan hasil pengujian anoda korban.

Pengujian yang dilakukan adalah uji tarik dan uji komposisi kimia untuk menganalisis kelayakan konstruksi material API 5L Grade B serta uji metalografi dan laju korosi untuk menganalisis kelayakan disain sistem proteksi katodik pada jalur pipa kondensat material API 5L Grade B.

Dari hasil verifikasi pengujian dengan komisioning menunjukkan bahwa sisa umur pakai memenuhi design life. Guna meningkatkan faktor keamanan, maka perlu dilakukan modifikasi disain dalam hal jumlah anoda korban magnesium 32 lbs yang diperlukan dari 96 batang menjadi 100 batang.

Dari hasil perhitungan most allowable operating pressure (MAOP), pengujian tarik, dan pengujian komposisi kimia menunjukkan material API 5L Grade B dapat dinyatakan layak secara konstruksi sebagai material pipa kondensat.

Sementara itu, dari hasil uji metalografi dan laju korosi menunjukkan sistem proteksi katodik layak secara disain untuk dipasang pada jalur pipa kondensat dengan material API 5L Grade B. Secara umum, jalur pipa kondensat dengan material API 5L Grade B yang dipasangi sistem proteksi katodik dapat dinyatakan layak secara operasional.

<hr><i>The main aim of this experiment is to analyze of the operational reliability of API 5L Grade B material condensate pipeline using cathodic protection system. Design verfication was done by the secondary datas such as: soil resistivity; cathodic protection system design before verification; installation, before installation, one month after installation, and commissioning test potential loggers; remaining life assessment; and sacrificial anode laboratory test results.

Tensile test and chemical composition test were done to analyze of constructional reliability of API 5L Grade B materials. Metallography and corrosion rate tests were done for analyzing of design reliability of condensate pipeline using cathodic protection system.

The result of design verification showed that according to commissioning test, the cathodic protection system was reliable operationally, but, to increase safety factor, it is necessary to redesign of quantity of 32 lbs magnesium anodes from 96 pieces to 100 pieces.

The result of most allowable operating pressure (MAOP) calculation, tensile test, and chemical composition test showed that API 5L Grade B material was reliable constructionally as a condensate pipeline material.

The result of metallography and corrosion tests showed that cathodic protection system design was reliable to protect API 5L Grade B condensate pipeline from the external corrosion. Generally, API 5L Grade B

condensate pipeline with cathodic protection system installed was reliable operationally.</i>