World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:9, No:07, 2015

Subway Stray Current Effects on Gas Pipelines in the City of Tehran

Authors : Mohammad Derakhshani, Saeed Reza Allahkarama, Michael Isakhani-Zakaria, Masoud Samadian, Hojjat Sharifi Rasaey

Abstract : In order to investigate the effects of stray current from DC traction systems (subway) on cathodically protected gas pipelines, the subway and the gas network maps in the city of Tehran were superimposed and a comprehensive map was prepared. 213 intersections and about 100150 meters of parallel sections of gas pipelines were found with respect to the railway right of way which was specified for field measurements. The potential measurements data were logged for one hour in each test point. 24-hour potential monitoring was carried out in selected test points as well. Results showed that dynamic stray current from subway on pipeline potential appears as fluctuations in its static potential that is visible in the diagrams during night periods. These fluctuations can cause the pipeline potential to exit the safe zone and lead to corrosion or overprotection. In this study, a maximum potential shift of 100 mv in the pipe-to-soil potential was considered as a criterion for dynamic stray current effective presence. Results showed that a potential fluctuation range between 100 mV to 3 V exists in measured points on pipelines which exceeds the proposed criterion and needs to be investigated. Corrosion rates influenced by stray currents were calculated using coupons. Results showed that coupon linked to the pipeline in one of the locations at region 1 of the city of Tehran has a corrosion rate of 4.2 mpy (with cathodic protection and under influence of stray currents) which is about 1.5 times more than free corrosion rate of 2.6 mpy.

Keywords : stray current, DC traction, subway, buried Pipelines, cathodic protection list
Conference Title : ICMMSE 2015 : International Conference on Metallurgy, Materials Science and Engineering
Conference Location : Prague, Czechia
Conference Dates : July 09-10, 2015