

Challenges in developing coupon DC current density-controlled impressed current cathodic protection system for buried steel pipelines

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Abstract

When a well-coated pipeline in soil crosses an aboveground DC railroad crossing, it is laid within a casing pipe. The space between the carrier pipe and the casing is filled with electrolyte to supply cathodic protection current to the carrier pipeline. The point of the pipeline just under the railroad crossing with low track-to-earth resistance goes into exposure of stray current corrosion and overprotection as regenerative trains pass.

Thereupon, to keep acceptable CP levels on the pipeline at all times, a coupon is placed at the point of maximum exposure where constant coupon DC current density is to be maintained. To accomplish this corrosion management, the author has developed coupon DC current density-controlled impressed current cathodic protection (ICCP) system. The developed system has proved to be an excellent long-term CP performance. The enhanced characteristics of this system include a faster, more accurate alternative to conventional methods, with respect to control on a rectifier (DC power source) using pulse width modulation (PWM) circuit.