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Options for alternative electrical power supplies for ICCP in remote areas of gauteng province of South Africa, Part 1: Technical considerations

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Abstract:

This research is directed at the exploration of the possibility of using the power inherent in water distribution networks as a result of flow gradient to serve as an alternative power supply for Impressed Current Cathodic Protection of pipelines. The use of pressure, head and flow that is available in water distribution networks as a result of gravity or pump to drive micro hydroelectric generation equipment is investigated. A practical water distribution network was investigated through a simulation based on EPANET Simulation Software. The results obtained show that, enough power could be generated to power Impressed Current Cathodic Protection in most segments of the network investigated without an appreciable loss of pressure at the most of the nodes. It was also observed that the amount of power available could be varied by changing inclination angle of shunt pipelines that feed micro hydroelectric generators.

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I. Introduction

Water Utilities all over have the same problem in that metal pipeline infrastructure is exposed to the elements and are prone to corrosion. Pipeline corrosion holds serious implications for water delivery and repairing failed pipelines are costly and arduous tasks. Pipelines could constitute 60 percent of the total asset value for Water Utilities. Consequently, the importance of maintaining pipelines cannot be over emphasised. One of the foremost reasons for pipeline failure is corrosion. Corrosion is "the degradation of materials through environmental interaction" [1].

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