

Case study for upgrading the design of impressed current cathodic protection for tank bottoms as an external corrosion control method

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Abstrak

Engineering design calculations for tank bottom sections, including direct current requirements and voltage calculations, followed by additional structures, such as electrical grounding systems, have already been successfully implemented and controlled in field conditions. Furthermore, the effect of soil resistivity in layers, oxygen content and the pH value of the soil against the disproportionate IR-Drop voltage, including its effect on potential distribution, have been already successfully observed. Other influences, such as the depth and location of the anode groundbed determination along with the establishment of impressed current cathodic protection related to the main tools and equipment, such as external corrosion control methods, have been defined as the most effective ways in order to control potential distribution against the additional structures. Pursuant to the verification results from the site located at Marangkayu, East Borneo, it has been determined that high soil resistivity could cause error readings in accordance with the accumulation results of the true readings and the IR-Drop voltage, since under real conditions, the tank structure would have received less current flow from an anode compared to a lower result. Naturally, a low pH value from the soil would decrease soil resistivity and enhance potential distribution from the anodes to the tank structures. The results show that the cathodic protection required 10 additional anodes, (each one is of a tubular mixed metal oxide) with a DC supply at minimum amperage of 154 Amps and a minimum voltage supply of 32 Volts. During the research, it was identified that high soil resistivity above 3000 ohm-cm would cause error readings. Naturally, acidic soil is in the region of pH 5-7 value, which would decrease soil resistivity and enhance the potential distribution from the anode to the tank structure.