



Corrosion Technology Services Case Study – ME-IND-379

Cathodic Protection Design for Well Casings

Client:	Various
Start:	2011
Completion:	2011
CP Cost of Project:	\$ 700,000
Project:	Design of CP System for New and Existing Well Casings

Introduction

Many Oil and Gas Wells were, when originally drilled, were expected to have limited producing lives. Improved recovery techniques have resulted in the life expectation of the wells being significantly extended. In addition, the general opinion at the time many wells were drilled was that corrosion rates would be low due to reduced levels of oxygen at depth. Experience has shown that corrosion does occur on casing materials and failures have been noted - in some cases only a few years after commissioning. CTS have established a reputation as a regional leader in the field of well casing corrosion prevention and in recent years we are pleased to have been selected by companies such as Qatar Petroleum, ZADCO and ADMA as specialist subcontractors for the design consultancy for well casing projects covering almost 1000 wells.

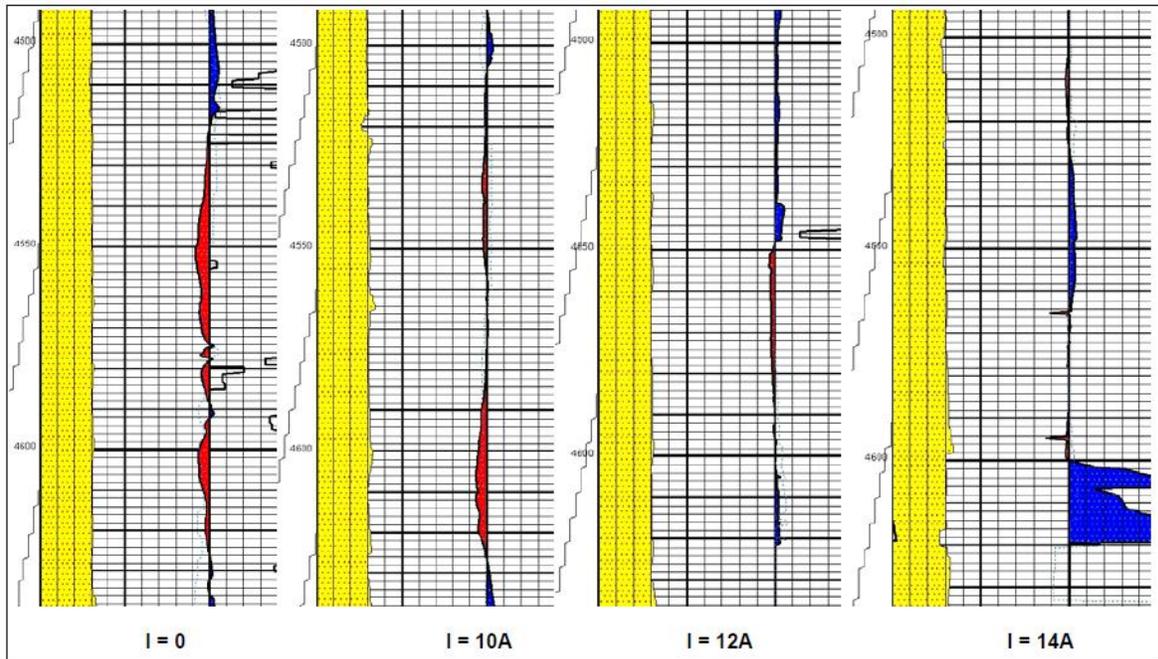


Surface Corrosion of Well Casing

The Problem

CTS have acted as specialist consultants on projects where wells already exist and also where new wells are proposed. The approach taken depends upon the specific situation but for all projects the construction method used to install the casings and the lithography of the formations through which the casings will pass has to be considered. If existing experience is available, then previous corrosion problems and workovers can also be evaluated.

One basic problem is to assess the current required to protect the wells. Unlike pipelines, methods such as measurement of pipe to soil potential cannot be used to check on protection levels. Other methods have therefore to be used. Where the wells are already in existence CTS recommend the use of CPET logs on a sample of wells. This specialist technique which relies on the introduction of a tool into the well provides reliable data on where corrosion is occurring and the current required to prevent this. CPET logs are often supplemented by Elogi tests on a larger number of wells. The CPET data can be used as a basis for checking the reliability of the Elogi tests following which the Elogi tests can be carried out on a larger sample of wells to help establish design currents.



CPET Log evaluation with increasing applied current (anodic zones in red, cathodic zones in blue)

Having established the design current, the next stage is to determine how this current should be delivered considering economics, reliability and avoidance of interference. CTS determine the preferred anode type and locations and whether flowlines should be bonded or isolated from the wells. One key consideration is the source of power and CTS can provide an economic evaluation of power sources such as AC, solar and Thermolectric generators to provide a comprehensive design package.

Recent Project Experience

Our work for Qatar Petroleum was for the protection of a large number of existing well casings. In this case, the wells were widely spaced and a dedicated cathodic protection system was required for each well. For most sites, solar power was shown to be the most economic. Due to the water cut in oil producers and injection wells it was decided to avoid the use of isolating joints as these can cause both internal corrosion problems and contribute to interference between wells if not carefully evaluated.

For ADMA and ZADCO, CTS was commissioned to advise on protection for clusters of up to 60 closely spaced wells. In addition to the usual considerations interference between the wells due to their close spacing and the high currents required to protect these clusters was a major consideration. CTS commissioned computer modelling studies to assess both the distribution of current along the well casing and also interference between the proposed casing cathodic protection and nearby foreign structures.