



Predicting Corrosion Failure

Recognizing that tank replacement is costly and that a significant number of tanks can be safeguarded against further deterioration by retrofitting with cathodic protection at a tenth of the cost (on average) of replacement, a number of major oil companies set out to determine if they could predict when tanks would fail. At first, they assumed that the rate of external corrosion was a function of age. However, they soon discovered that leaks and tank age were totally unrelated. In 1979, the American Petroleum Institute asked WRA to examine the physical process of external corrosion to determine if a reliable means of predicting failures could be developed.

The rate of corrosion is a function of the characteristics of the backfill in which the tank system is installed. These include the resistivity, PH, electrical potential, moisture, chlorides, sulfides and stray DC. While none of these characteristics, when taken alone, were adequate for predictive purposes when incorporated in a multi-variate statistical model, a reliable means of predicting the rate of corrosion was developed. Using this model, the Mean Time to Corrosion Failure (MTCF) and probabilities of a leak could be established.

Since the corrosive characteristics of backfill vary greatly, even within a small geographic area, predicting MTCF for USTs is a site-specific task. The formulation of a mean age to leak establishes a narrow range of useful ages in which the likelihood of failure rapidly increases.