

Drilling Fluid Corrosion Monitoring

Oilfield drilling activities can contribute to corrosion activity within the wellbore. The severity of corrosion or erosion mechanisms can be monitored by installation of corrosion rings in the drill string. Drill fluids require frequent adjustments to maintain the required fluid quality and chemical treatment levels to ensure control parameters are maintained throughout the process. Deviations in control parameters can result in significant damage to the casing string over a short time period. In drilling operations there are contaminants like oxygen, carbon dioxide, and hydrogen sulfide that intensify corrosiveness of drilling fluids, suspended solids and flow velocity can also cause high rates of erosion or flow accelerated corrosion. A component of monitoring the corrosivity of drill fluids is utilization of weight loss corrosion rings installed in the drill string and at surface drill fluid conditioning equipment.

Corrosion coupons are widely used in the oil industry to evaluate corrosiveness of various systems and monitor the effectiveness of corrosion control programs. In drilling operations, installation of corrosion ring coupons within the drill string is the most common direct method to evaluate the corrosiveness of drilling fluids on the drill string and the permanent casing installed during the process. Removal and examination of these rings after exposure downhole can be highly informative as to corrosiveness of the drilling fluid as well as the type of corrosion encountered. Examining scale and defect morphology on the exposed rings can help in identifying the causes of corrosion and aid in selecting proper mitigation techniques.

Figure 1 illustrates an encapsulated corrosion ring and position within the drill string.

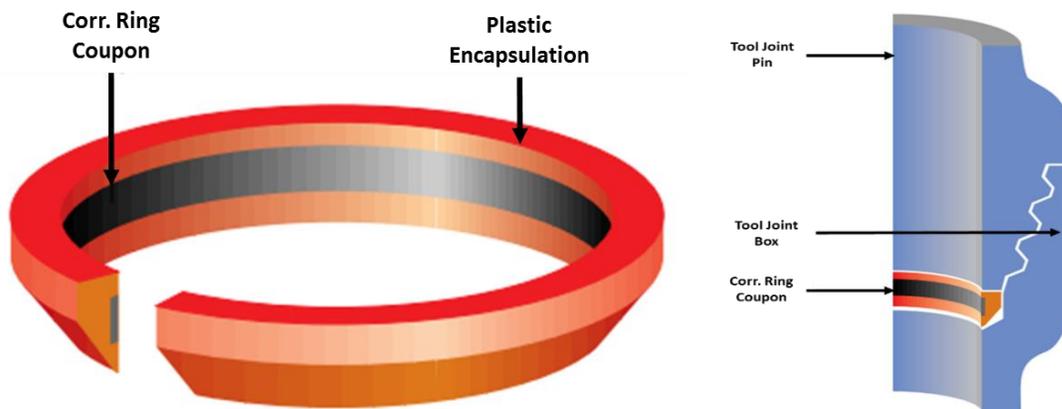


Figure 1: Encapsulated corrosion ring coupon

Corrosion Ring Analysis:

Cormetrics offers an analysis service for the drill pipe corrosion ring coupons. Corrosion rings received are descaled, cleaned, weighed, and inspected. A corrosion rate is calculated from the mass loss of each coupon.

A comprehensive report is submitted to the client, with the following features:

- Summary table of coupon location, time in service, mass loss corrosion rate
- Photograph of as received coupon envelope with well and mud information
- As received and after cleaning photographs on each coupon
- Select photographs of significant features, such as crevice corrosion, coating damage, erosion etc.
- Before and after comments on as received condition and type of corrosion activity observed

The client report documents the rig, field operator, date and depths of the ring exposure with confirmation of ring serial number match to provided initial ring mass. The corrosion loss can be reported in units specific to client requirements mpy, mm/yr and ft-lb/yr. Our standard corrosion rating criteria is, <25 mpy low, 25-75 mpy moderate, 75-125 mpy high and >125 mpy is severe. The complete analysis is typically within a ten day period from receipt and rush analysis can be complete within one day. We suggest an exposure period of greater than two days with rings positioned in the tool joint at top of first stand above drill collars and another in the topside mud system.

The service provider requesting analysis can obtain a compiled history of analysis results to discuss data trends with our corrosion specialists. Our analysis offers an independent evaluation of drilling mud system corrosion activity levels.

Additional to analysis of drilling rings we also provide laboratory testing of field mud samples or evaluation of additives for corrosion rate control in our specialized corrosion testing apparatus.