PCE
INTERNATIONAL

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Offshore Platform Caisson Legs Protection

Abu Dhabi Marine Operating Company is a major producer of oil and gas from the offshore areas of Abu Dhabi in the United Arab Emirates. This large UAE oil company operates multiple barge-type offshore platforms constructed on caisson legs.

Gas build-up inside the confined compartment around an offshore platform caisson leg had led to an explosion, with the gas found to be hydrogen generated by the depleted anodes inside the caisson leg. An investigation of the fatal explosion made several recommendations, including removal of the anodes, biocide-treated water and blasting grit that had accumulated inside the caisson legs over two decades.

The internals of the platform caisson legs had been left uncoated and filled with biocide-treated water, with suspended sacrificial anodes being used for protection. Over time, the anodes depleted, which required an alternative, environmentally friendly method of protecting the caisson legs to be found.

PILOT STUDY

A successful pilot study was conducted to evaluate the use of a Cortec's Vapor Phase Corrosion Inhibitors, and the system was adopted for rectification of the problem. The final recommendation was corrosion management utilising Vapor Phase Corrosion Inhibitor (VpCI). To assess the effectiveness of this approach, a pilot project was launched in 2009 whereby one caisson leg was emptied and preserved with VpCI. Carbon steel weight loss corrosion coupons were used to assess the effectiveness of this approach.

Unlike traditional contact corrosion inhibitors, VpCI's have a moderately high vapour pressure that allows them to function in the vapour phase without applying VpCI directly to the metal surface. Therefore, they provide protection in the liquid phase, vapour phase, and critical interphase. They access the most difficult to reach spaces and also provide effective protection against crevice corrosion.

PRESERVATION PROCESS

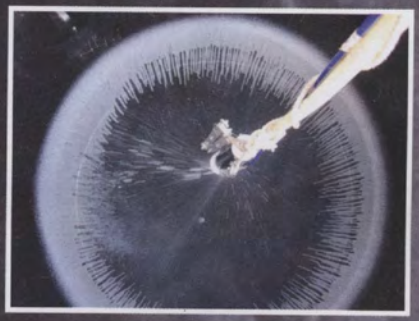
Within the preservation process, Cortec's ready-to-use waterborne corrosion inhibitor VpCI-337 BD was used primarily for robust prevention of internal void spaces, while simultaneously preventing bio-growth.

The inhibitor was sprayed in the caisson legs. After that, water-soluble, biodegradable powder VpCI-609 S was fogged in to the void space to counter the dead volume of water at the bottom. Custom made strips of Cortec's easy to use EcoPouch were then suspended from the top side for additional protection. EcoPouches are filled with VpCI-609 powder and constructed from breathable Tyvek, which allows the VpCI molecules to be emitted through the membrane and form a molecular layer on metal surfaces providing corrosion protection.

The Contract was executed by A-Hak industrial services, offshore division, which specialises in cleaning and inspection. The team used was small, consisting of a supervisor and two technicians. Once legs were drained and cleaned, application of all Cortec products only took a matter of days per leg.

STRONG IMPROVEMENT

The results showed strong improvement in the VpCI-treated caisson leg, where corrosion rates were maintained at low rates that were deemed acceptable. The methodology was then adopted for the treatment of all other caisson legs at the complex. After two years, the pilot project was deemed a success and Cortec VpCI inhibitors were proven to effectively mitigate corrosion in an offshore environment, by reducing the corrosion rate in the protected leg versus the control by some 584%.



Main picture: Inside the caisson leg

Top Right: Application of VpCI-609 S biodegradable powder using a pipe

Far Right: Inserting Cortec EcoPouches

Below right: Application of VpCI-609 S