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GAS PROCESSING & LNG

Two-Part Epoxy Deemed Best For Pipeline at Saltwater Channel

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Polyguard Products entered the liquid corrosion coating industry in the past decade, where two-part epoxy is a typical choice for most pipeline field coating repairs due to its ease of application and exceptional performance characteristics.

Polyguard developed NHT-5600 with those things in mind and wanted to make some tweaks to improve sag resistance and lengthen pot life without extending the cure time. The following case study is an example of how epoxies can solve problems that are specific to other types of coatings.

Background

Polyguard had a client contact them for a coating solution at a location where two of their product lines crossed a channel in a harbor. The channel has a tide shift in the region of 7 to 9 feet (2.1 to 2.7 meters) per day, so the pipelines had a large area that would be affected by saltwater, then experience a drying out as the tide fell. The two lines were originally placed in service with a somastic coating in the 1950s.

Time and the environment had caused the somastic coating to fail and crack along most of the tidal region of the pipeline. In the past, repairs on the coating had been conducted using soft petroleum-based wraps with an associated primer **(Figure 1).** The wraps were then encased in a thick high-density polyethylene (HDPE) shield to prevent floating debris from damaging the soft coating.

The thick plastic wrap also shielded the pipeline from cathodic protection current when the tide would rise to its installation level. While the cathodic protection would no longer protect the pipeline from corrosion, the soft petroleum-based wrap was also leeching into the channel during every tidal event.

These petroleum-based wraps need to be sealed to prevent leeching into the soil or water. The seal most likely would also have shielded cathodic protection current but it would have kept the primer from leeching into the channel. Eventually, after enough tidal events, the petroleum-based wrap would act as a sponge for the saltwater.

Figure 1

Figure 2

Figure 3

As the tide rose, it would get wet. As it fell, it would hold the saltwater against the pipe surface where no cathodic protection could protect it due to the pipe being above the surface **(Figure 2).**

The initial integrity assessment by the operator required sleeving the pipelines for the entirety of the tidal range. Anomalies were found that required immediate repairs, and most of the extensive damage was under the coating that received the wet-dry cycling **(Figure 3).**

Solution

The pipeline operator had already determined that the existing coating in the tidal area was to be removed for a steel sleeve installation. To prevent any corrosion on the installed sleeves, they wanted a more robust coating option that fit the environment.

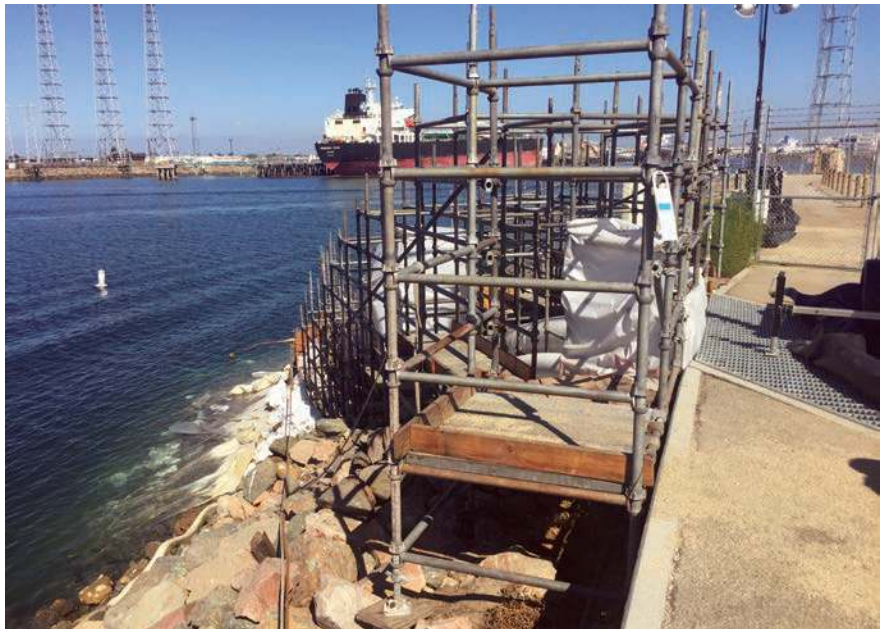

Figure 4

Figure 5

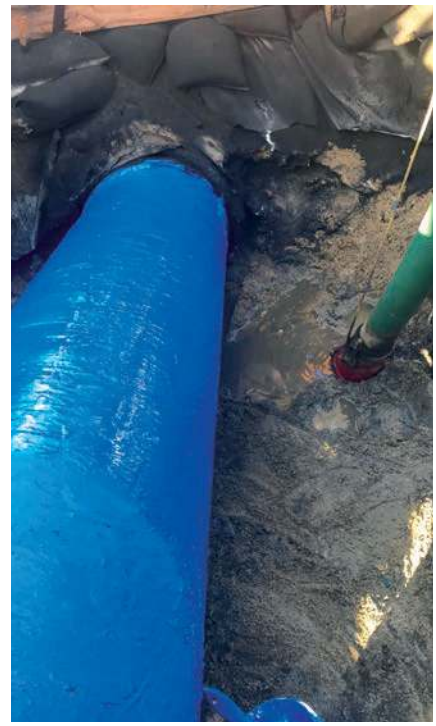

Figure 6

A two-part epoxy corrosion coating was deemed to be the best fit for this project. The epoxies are, for the most part, 100% solids for the corrosion coating industry. Once it is applied to the desired mil thickness, it will remain that way and provide an excellent barrier.

Epoxies are also built to withstand any abrasion or impacts from floating debris in the channel. The rise and fall of the tide will have no effect on this coating and it will not leech any protective properties into the water.

The impact and abrasion resistance of the epoxy is also a function of the excellent adhesion it has to a clean pipe surface. And that is where we ran into our next problem.

The soft petroleum-based coating had been used in the past for repairs because it requires almost no surface preparation to be applied. The rising tides always prevented a proper cleaning of the pipe surface. A two-part epoxy will require a near-white blasted surface to perform to its best properties.

The operator researched proper techniques for being able to keep the surface of the pipe dry while performing the coating and repair work. A coffer dam was constructed around where the pipelines entered the channel to hold the rising tide at bay **(Figure 4).**

The dam that was constructed was not watertight but had to be pumped from a low spot until the pump no longer would keep the area dry. The dam gave the applicators just enough time to clean the surface, apply the coating and inspect for defects before it rose again **(Figure 5)**. A 1- to 2-foot (0.3- to 0.6-meter) section of each pipe was cleaned and coated per day until the applicator was high enough above the water level to work for longer hours **(Figure 6).**

Outcome

After the epoxy recoat and inspections were complete for each line, they were put back into service. The operator determined that the correct course of action moving forward was to inspect the lines each year for further anomaly growth and external wall loss in the tidal area.

Guided wave ultrasonic testing has been used each year in the area in addition to the normal integrity inline inspection. Since application of the NHT-5600 two-part epoxy, no further external corrosion has been noted in any of the repair areas.

In this instance, the coating selection matched perfectly with the service environment in which it was placed, and the operator will no longer have to band-aid the problem with an ineffective coating. ***P&GJ***

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