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CASE STUDY – TANK INTERNAL LINING

Introduction

This case study summaries the history of the internal protective coatings within KCGM’s Kaltails water storage tank, sited in the Borefields region of Kalgoorlie/Boulder, Western Australia.

The tank is of mild steel constructions, has a capacity of 377 kilolitres, and is located approximately 11 km south west of the KCGM open pits.

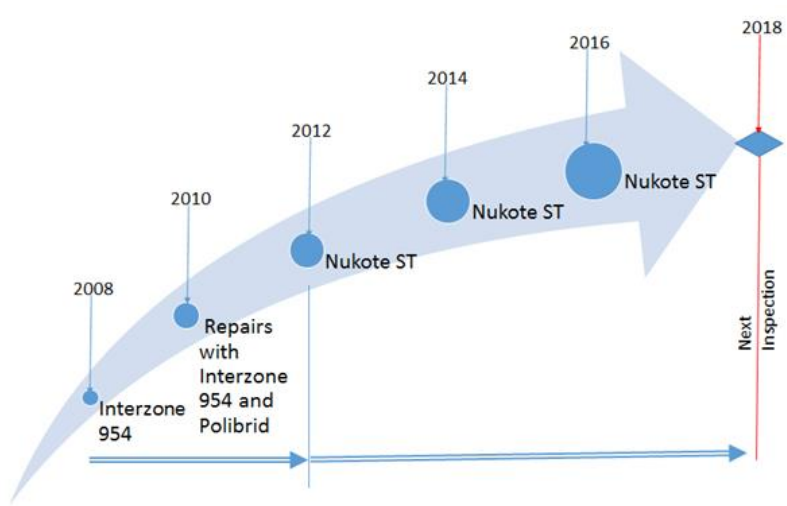
The Kaltails tank is an important and integral part of the KCGM’s infrastructure. As such, the upkeep and the reliability of this asset is essential to ensure a continuous water supply source to sustain KCGM’s gold production at the Fimiston plant. The groundwater from the Borefields area is extremely high in salt which means that any failure in the integrity of the lining system can result in rapid corrosion of the substrate.

Following the internal lining refurbishment project of the tank with Nukote ST Pure Polyurea in 2012 (as detailed herein), the tank has been inspected bi-annually.

In July of 2016 Nukote Australia were commissioned by KCGM’s ‘Site Services’ department to carry out the second of these inspections. This case study includes the inspection process, the observations made and the recommendations arising from that inspection.

Historical Information

This tank’s interior surfaces have undergone a number of coating specification changes and repairs as shown in Figure 1 below.



Interior Coating History



The initial coating systems specified and used on this tank, both on the interior and exterior are unknown. However, in 2008, the interior and the exterior were coated with Interzone 954. During an inspection in 2010, it was observed that the external surfaces had suffered minimal corrosion damage while the interior was exhibiting more significant damage due to defects in the coating and the hypersaline nature of the water. Repairs were carried using Interzone 954 and Polibrid-705E.

One of the recommendations from the 2010 Inspection Report was to fully line all internal surfaces with Nukote ST.

Application of Nukote ST Pure Polyurea in 2012

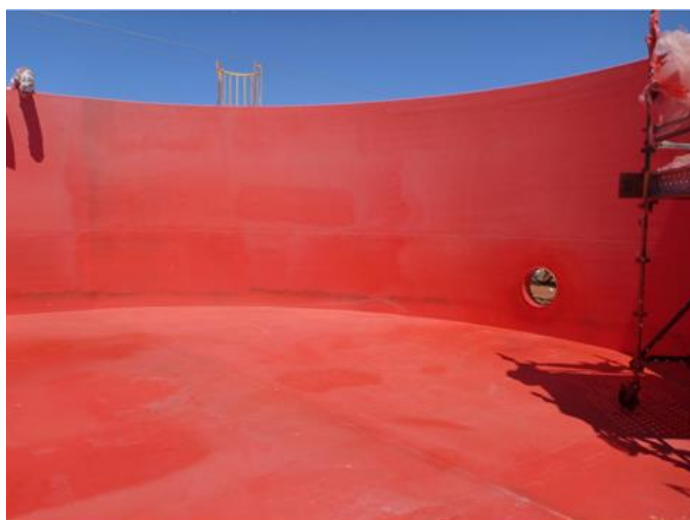
In November 2012, Nukote Australia performed the internal tank lining refurbishment.

The previous internal lining repairs from 2010 (using Interzone 954 and Polibrid-705E) showed signs of deterioration. Most of the Polibrid patches were not adhered to the substrate and were able to be removed manually by hand and scraper.

All of the Polibrid-705E patch repairs were removed and the wall and base were abrasive blasted. Defective coating, corroded areas, corners and weld joints were abrasive blasted back to bare steel. Sound existing Interzone 954 was whip-blasted and not removed completely.



Surface preparation on tank wall



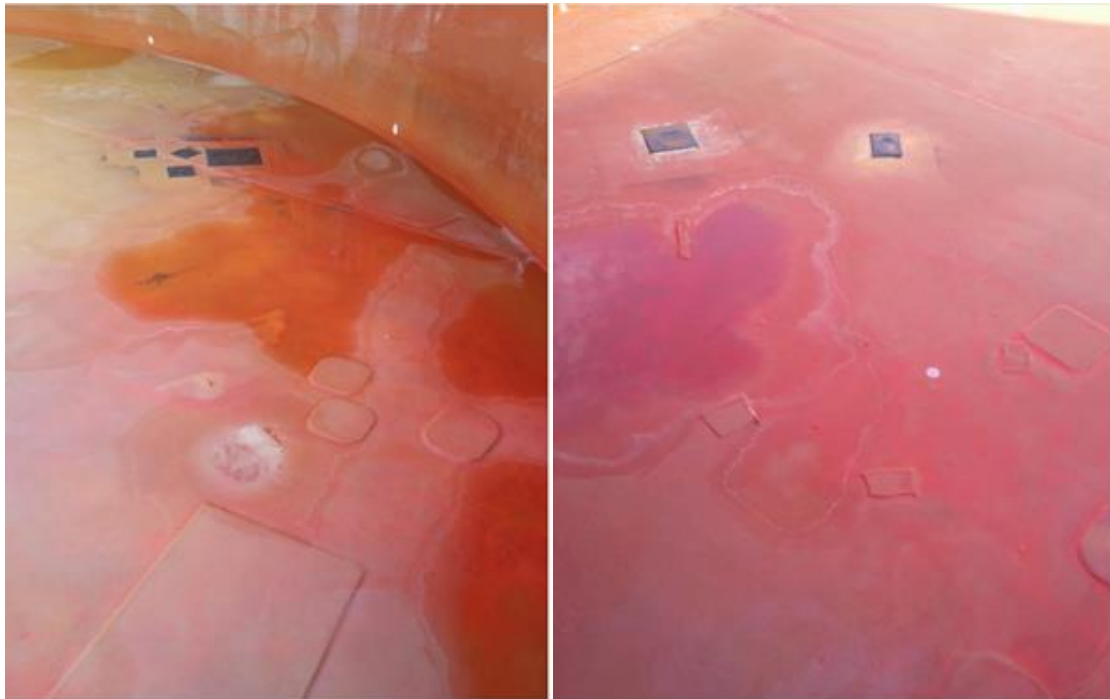
Completed Nukote ST Polyurea in 2012



Inspection in 2014

In June 2014, the first inspection of the Nukote ST Polyurea internal lining was undertaken.

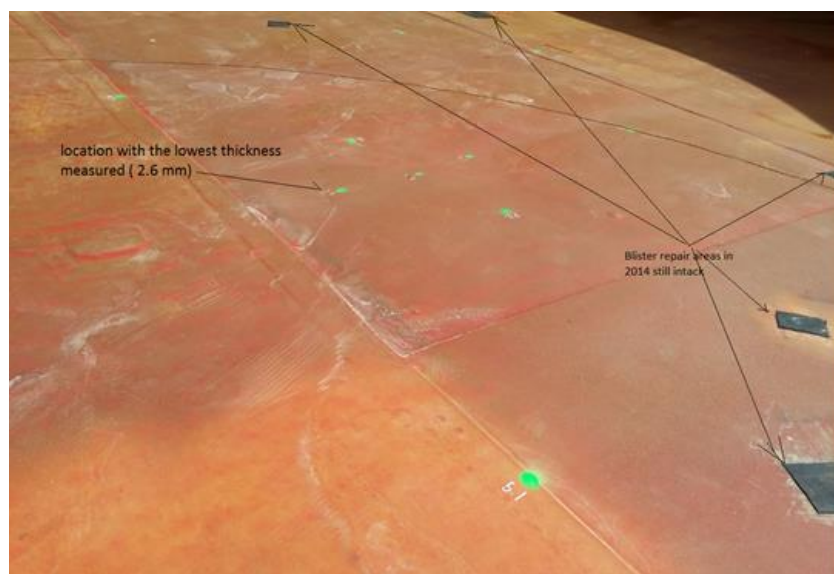
A number of localised blisters (each covering an area of less than 100 mm x 100 mm) were observed. Although these did not affect the integrity of the lining, they were removed and patched. Due to the rapid cure time of Nukote ST, the repairs could be completed at the time of the inspection, and without delaying returning the tank to service.



Patch repairs on floor in 2014

Inspection in 2016

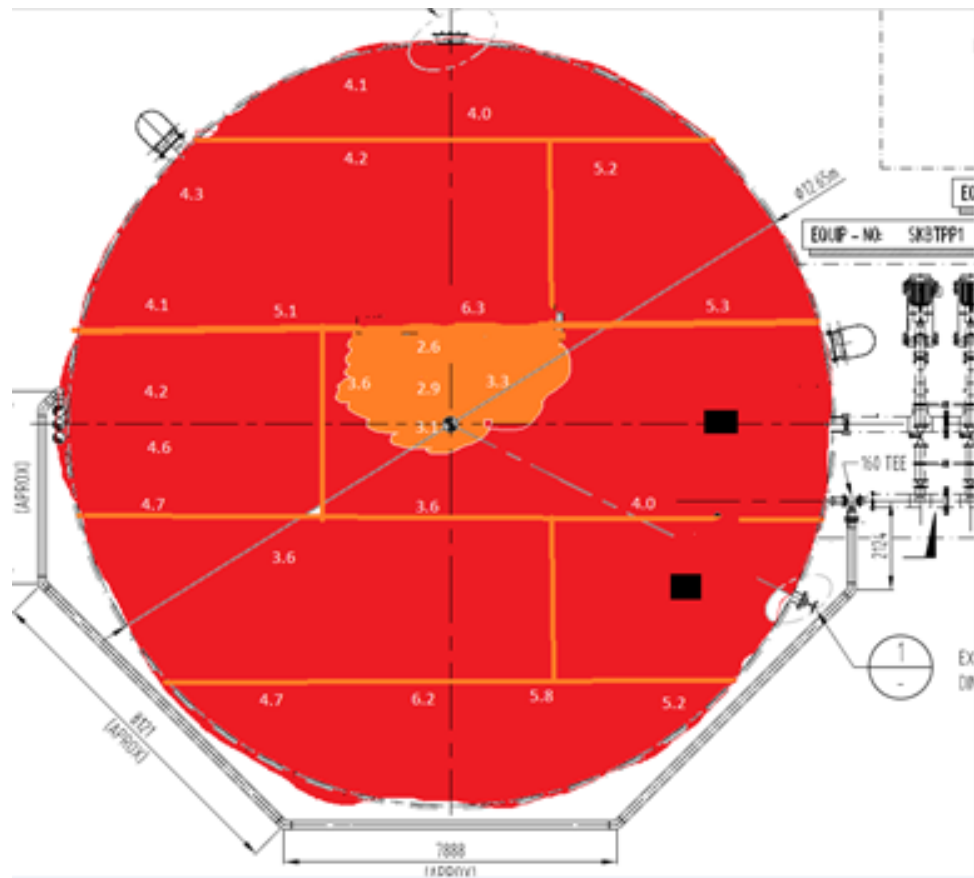
In July 2016, another inspection was undertaken by Nukote Australia. No blisters or damage to the interior lining were observed. The blistered areas that were repaired in 2014 were still intact and in good condition.



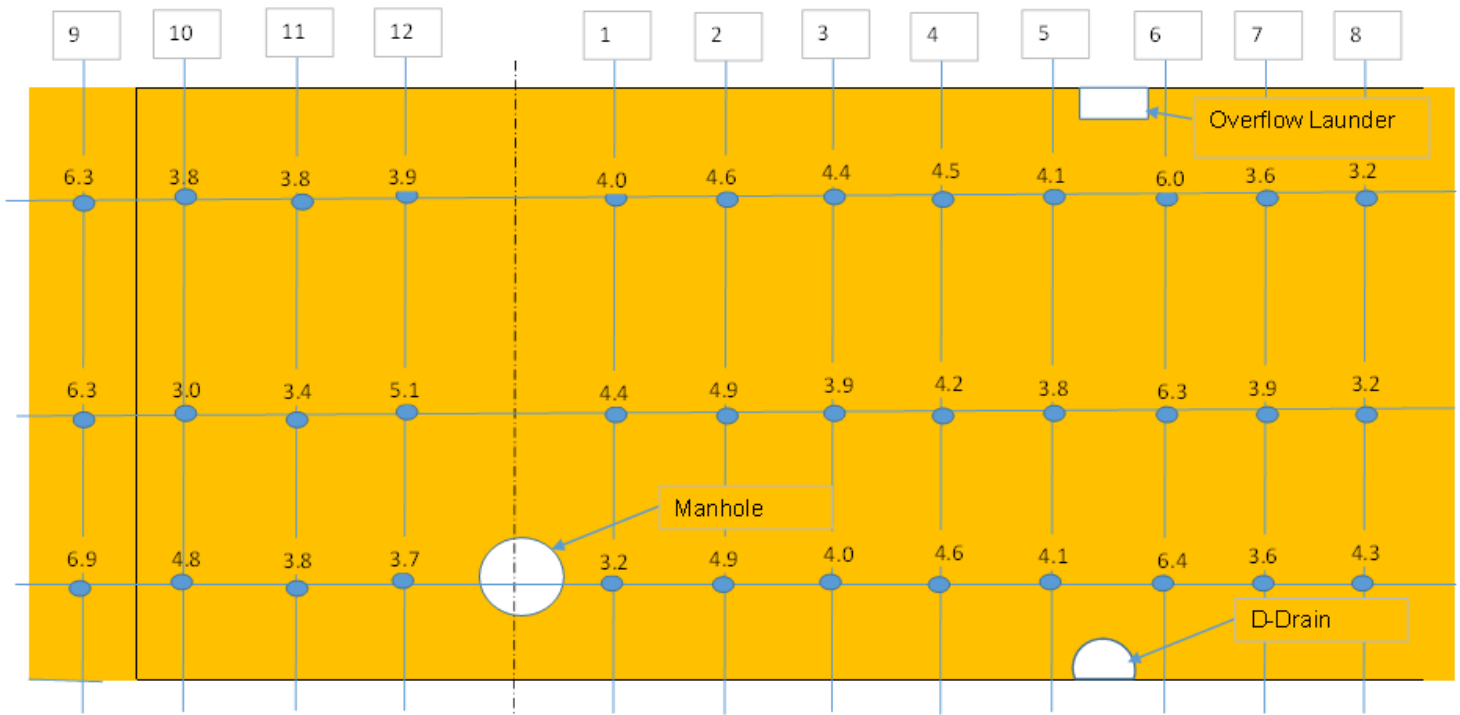
Tank floor conditions in 2016



Thickness testing was performed on all internal areas (floor and wall) using calibrated Positector 6000 thickness gauge and the results are shown in the images below.



Tank floor coating thickness measurements



Tank wall coating thickness measurements

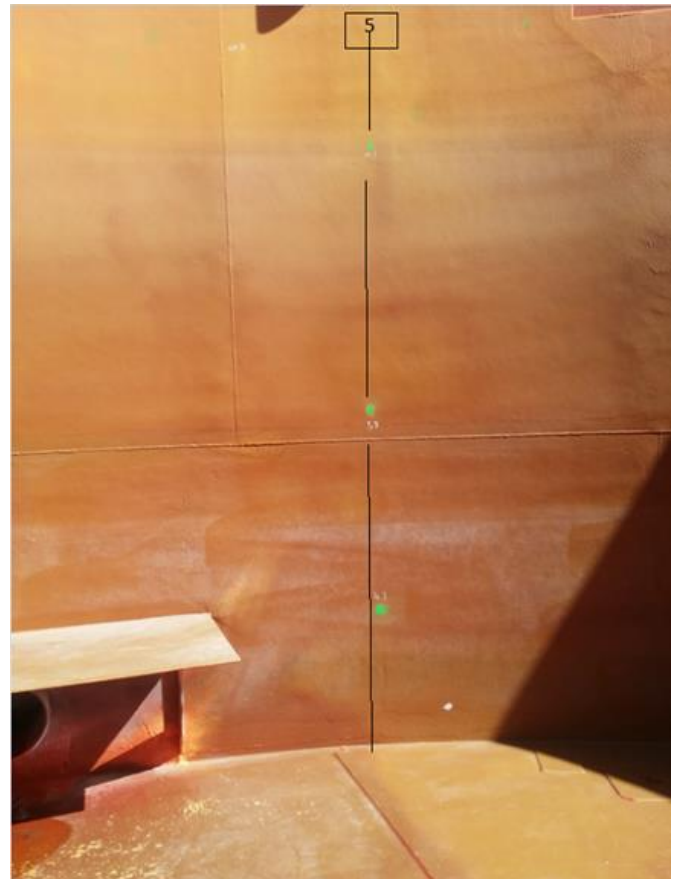
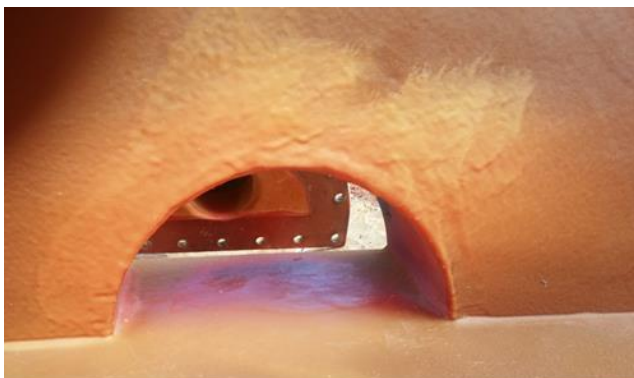
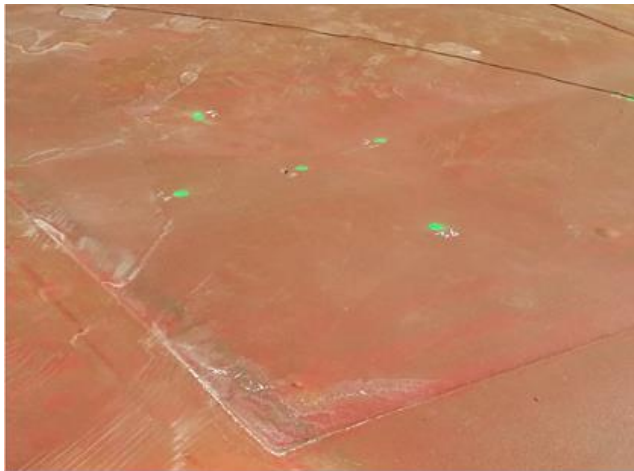


Holiday (spark) testing, using a High Voltage Holiday Tester, was carried out on all internal surfaces to ensure the continuity of the tank internal lining. There were no defects (i.e. pin holes or cracks) detected on the internal lining.



Holiday Testing

The tank interior lining (Nukote ST Pure Polyurea) was in excellent condition and there were no integrity concerns. There was no evidence of blistering or mechanical damage. The lowest thickness recorded, in an isolated area on the tank floor was 2.6mm and no coating or lining repairs were required. As such, it was recommended that another inspection be undertaken after 2 years.



Tank internal lining conditions in 2016



Conclusions

The Nukote ST Internal Lining System, applied direct to abrasive blasted mild steel and whip blasted high build epoxy (Interzone 954), is continuing to provide protection to the mild steel substrate, from the hyper-saline ground water.

There are no signs of any degradation or damage to the integrity of the lining system after the first four years of service.

Additional Notes

Nukote ST Pure Polyurea has been applied within numerous new and operational static and agitated tanks in the mineral processing industry, with excellent results. There have been no failures and the expected service life is typically in excess of 15 years.

Nukote ST cures within seconds, exhibits very good chemical and abrasion resistance, while retaining high flexibility and elongation. These characteristics ensure that it is the ideal lining system for static and agitated tanks containing water, process water, slurries and many chemicals.

Nukote ST Pure Polyurea is also used to line and protect many other items in the gold processing industry, including Ball/SAG mill shells, trommels, screen decks, chutes, bunds, structural steel, and transport bins.

For very high abrasion applications, Nukote Australia recommends Nukote HAR – High Abrasion Resistance Polyurea for lining equipment such as chutes, launders, underpans, screen decks and trommels.

For exposure to various acids, alkaline and other more aggressive chemicals, Nukote Australia recommends Nukote XT Plus, Extreme Conditions Polyurea.

Please contact Nukote Australia for more information and recommendations for your application.