

## **Memorandum for Record**

**Subject:** Inspection of Humidur coating on sheet pile on Point Pleasant Canal, 17 DEC 02

### **Background**

On 17 DEC 02 I visited the Philadelphia District (NAP) Point Pleasant canal to observe the performance of Humidur coating applied in 2000. I was not present at the time of the application but the work was documented and photographed by District personnel. The application was a test area approximately 2.5m (8 ft.) long and extending from the top of the piles to the mud line. Mud line depth at the location of the test area was estimated at 2m (7ft.) with waterline approximately 1.5m (5 ft.) below the top of the piles. I was accompanied on my visit by personnel from NAP as well as a North American representative for Humidur.

### **Observations**

The test area was observed from a boat at low tide. A wooden board was used to remove marine growth from the surface of the piles to a level approximately 30cm (1 ft.) below the waterline. Thickness measurements in the above water area ranged from 860-3000 $\mu$  (34-80 mil) with most readings in the 1400-1650 $\mu$  (55-65 mil) range.

Test area that was in continuous atmospheric exposure was mostly in very good condition with corrosion only noted along joints that were probably poorly coated due to inaccessibility.

Test area that was in the tidal zone exhibited a considerable amount of rusting. Most of the rusting appeared to be associated with either joints or perforations in the substrate. The rust frequently appeared as bare steel in a vertical line 3-5 cm (1-2 inches) wide extending along a joint or proceeding downward from a perforation in the substrate. No blistering was apparent beyond the corroded area and adhesion appeared excellent. Test area that was at the waterline also had a considerable amount of rusting. Most of this rust was in the form of spots 2.5-7.5 cm (1-3 inches) in diameter. Causes for the failures, such as perforations in the substrate, could not be identified. It was estimated that there was at least 1 spot of corrosion for every 900cm<sup>2</sup> (1ft<sup>2</sup>) of surface.

In areas where the coating was still intact, the coating was smooth, hard and appeared to have excellent adhesion. No blistering was noted.

### **Conclusions**

Overall performance of the Humidur in the test area after only 2 years of service is quite poor. It appears that some of the failure is associated with the edges of the piles or to perforations in the substrate. Records from the time of the application indicate these items were given special attention but the work apparently did not result in satisfactory coating performance.

Coating thickness measured at this time is significantly greater than recorded at the time of application. I found no evidence of underfilm corrosion in the areas where measurements were taken. The coating appeared dense and tightly adherent to the substrate. Cause for the increased thickness readings is unknown.

**Additional Information**

Humidur was applied to laboratory panels at the ERDC-CERL Paint Technology Center on 16 NOV 99. The panels were mild steel, abrasive blasted with Al<sub>2</sub>O<sub>3</sub> grit to achieve a 50-63μ (2-2.5mil) profile. Average coating thickness was 400μ (15.7 mils). One set of panels was scored and placed in tap water. After 3 years the panels each had 1-2 ASTM #3 blisters on the score but no other defects. Rust undercutting at the scores was approximately 1 mm (1/16 inch) where no blisters were present. There was no apparent change in coating thickness. The coating was hard, smooth and appeared to have excellent adhesion.

One set of panels was exposed in an ultraviolet condensation chamber (ASTM D4587) for over 2000 hours. The exposure removed all gloss from the coating but resulted in no other change to the coating. The scores were rusting but no measurable rust undercutting took place.

An attempt to apply the coating to panels that were wet with water at the time of application failed. The coating did not adhere.

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24 DEC 02