Evaluation of Tellus Underground Technology Corrosion Protection System

November 2012

Tellus Underground Technology shipped GTI a 2” pipe with their enclosure unit already attached and sealed to the pipe. In order to establish the baseline condition it was decided to remove the enclosure and grit blast the pipe to a white metal condition.

Figure 1 Surface of 2" pipe after grit blasting

After the pipe was blasted the leak repair fitting that came on the pipe from Tellus was refitted. This fitting however is constructed of stainless steel and plated and painted carbon steel , and therefore not as prone to corrosion as the pipe itself.

The enclosure provided by Tellus is not intended to be representative of what would be produced for field application. It is intended only as a device for testing the concept of an enclosure filled by hand- pumping in heated wax. For field use a more sophisticated enclosure would have to be designed that could be snapped-on and sealed tight from above in a keyhole. For the purpose of the test of the prototype a layer of silicone sealant was used all around the circumference of the enclosure to prevent leaks of wax. The enclosure was then bolted shut. Three gallons of Trenton Wax Tape Primer (brown) was heated in a steel bucket with a Powerblanket electric bucket heater. Per the recommendation of Tellus the wax was heated to 120F in order to lower its viscosity sufficiently to pump. The hose on the pump came loose and had to be a tightened with a hose clamp. After this was accomplished the enclosure was filled with melted wax pumped in from the bottom and it could be seen to be flowing out of the two top bleeder tubes. The heater provided, a Powerblanket BH05PRO 160

watts was just adequate to heat the wax to 124F in a 70F laboratory. A higher power heater would appear be called for in field applications.

Figure 2 Liquefied Trenton wax-tape primer after heating with bucket warmer

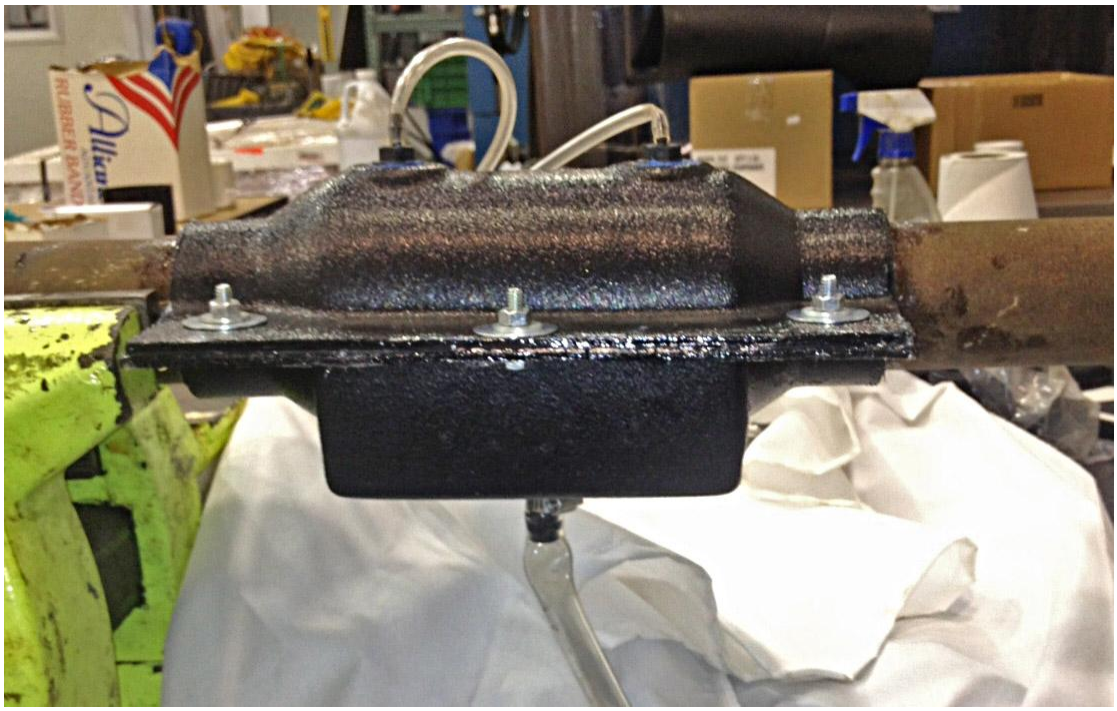

Figure 3 Enclosure before filling

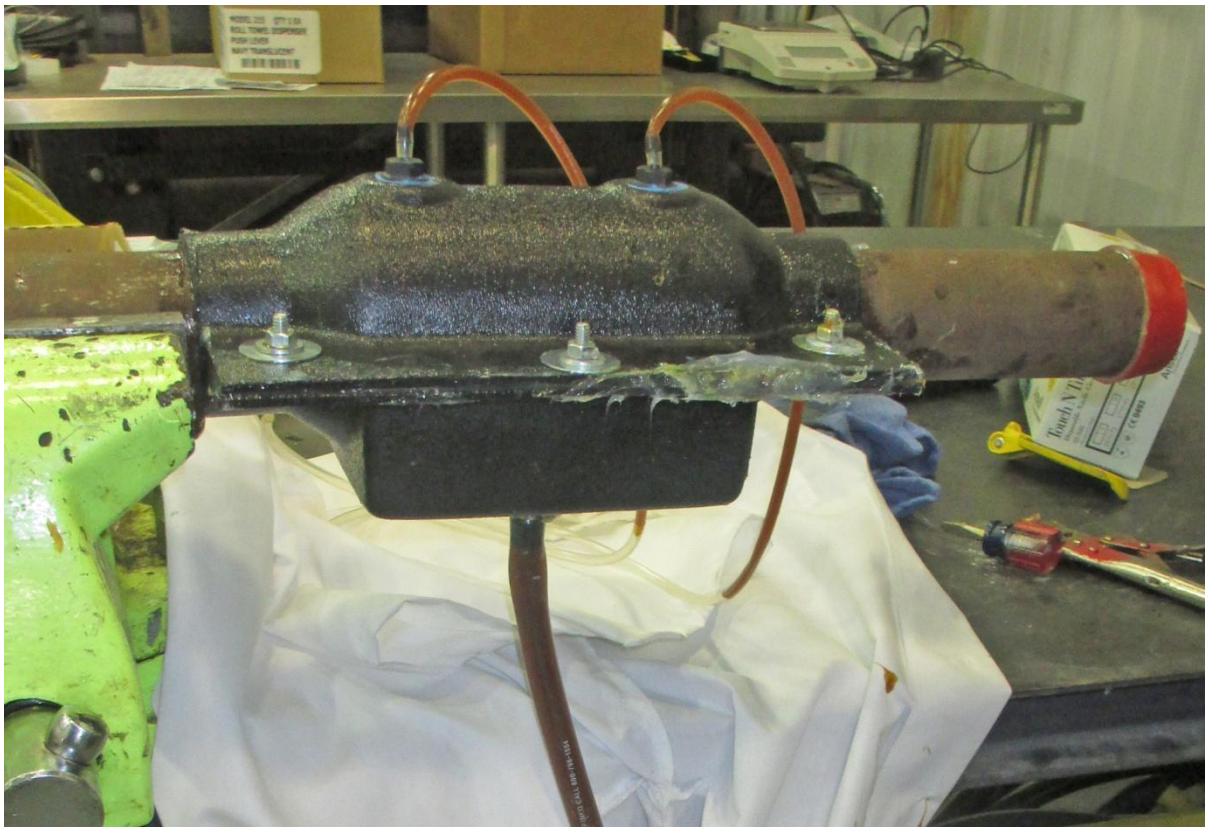

Figure 4 Enclosure after filling with melted wax

After the enclosure was filled with wax, the entire assembly including the hoses was buried in 2.5 cf of sand within a plastic container placed within an environmental chamber. The sand was then brought to 100% saturation with 5% salt solution . The chamber was set to 110°F with continuous air evacuation so that the sand would undergo wet to dry cycling. When the soil saturation dropped below 10% additional water was added to bring the sand back to 100% saturation. This same test has been used before by GTI to test corrosion coatings for underground service.

DATE	% SATURATION				
21-Sep	100				
9-Oct	18.4				
15-Oct	9.25				
16-Oct	100				
1-Nov	15.4		(Nov. 2 End of test)		

Figure 5 Percent Soil saturation by date

After the completion of 1000 hours of testing, the test specimen was removed from the sand, cleaned, and examined for the corrosion.

Figure 6 Test specimen after removal from corrosion chamber

Figure 7 After partial removal of enclosure and wax

Figure 8 Test specimen after removal of all residual wax

Visual examination of the pipe revealed no rust spots within the wax-filled portion of the enclosure. There were a few lt rust spots at the extreme ends (collar) of the enclosure probably where wax was unable to flow in.

	ASTM D610 rating		% Rust
within wax-filled volume	10		0.0
under enclosure collar	6		1.0

Figure 9 ASTM D610 ratings