



July 12, 2011

Boise Paper - Microbial Induced Corrosion

Location:	<i>Boise Paper Mill Wallula, Washington - USA</i>	Date of First Inspection:	<i>May 24, 2011</i>
Application:	<i>W3 Starch Line</i>	Date of Second Inspection:	<i>July 12, 2011</i>
Purpose of Installation:	<i>Inhibit internal pipe Microbial Induced Corrosion (MIC)</i>		
Installation Date:	<i>March 28, 2011</i>		

Installation Details

Water conditioner model	<i>HydroFLOW 120i</i>
Pipe Outer Diameter	<i>4.5" [115mm]</i>
Pipe Material	<i>Stainless Steel</i>
Installation location	<i>W3 Starch Line</i>

Overview

What is Microbial Induced Corrosion (MIC)?

- 1. Bacteria settles in grooves inside a steel pipe and starts secreting corrosive acid.*
- 2. The secreted acid starts dissolving the pipe from the inside out and forms rust colonies that develop into pin-hole leaks over a period of a few months.*

Note: The rust colonies are not "biofilm"; they're patches of oxidized steel.

Trial method:

- 1. Monitor the effect of Hydropath Technology on a contaminated 30" [762mm] pipe spool section.*
- 2. Monitor the effect of Hydropath Technology on a clean 30" [762mm] pipe spool section.*

Expected results:

- 1. Hydropath Technology is expected to cause the bacteria to leave the rust colonies inside the contaminated pipe spool section and stop the steel oxidization process. This will occur due to the unique Hydropath electric signal which passes along the steel pipe and agitates the bacteria.*
- 2. Hydropath is expected to prevent new rust colonies from forming inside the contaminated and clean pipe spool sections.*

Picture of the 120i and the pipe spool sections



Installed 120i



Contaminated and clean 30" [762mm] pipe spool sections

(the 120i is installed several feet [3 meters] before the pipe spool sections)

Before and After Pictures

Contaminated pipe pool section



March 28, 2011

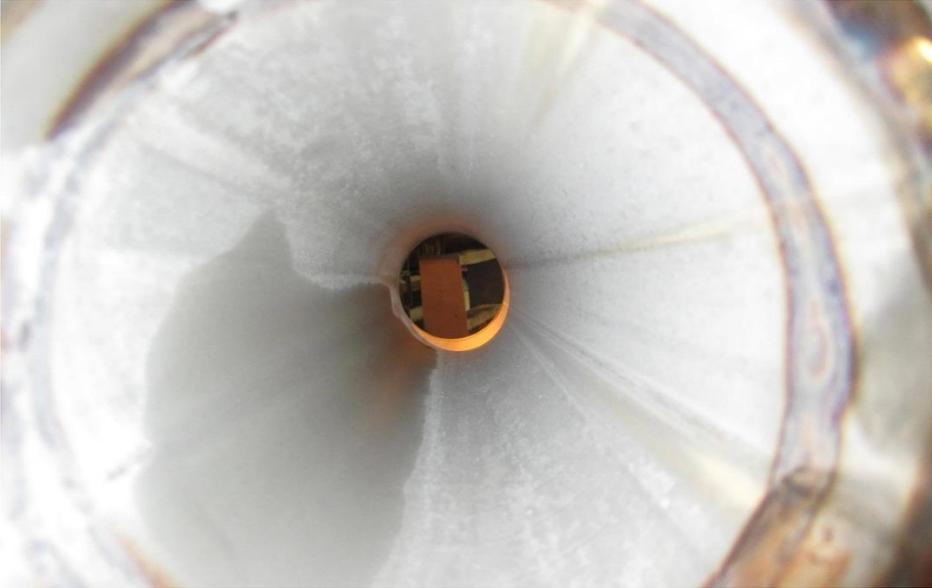


May 24, 2011

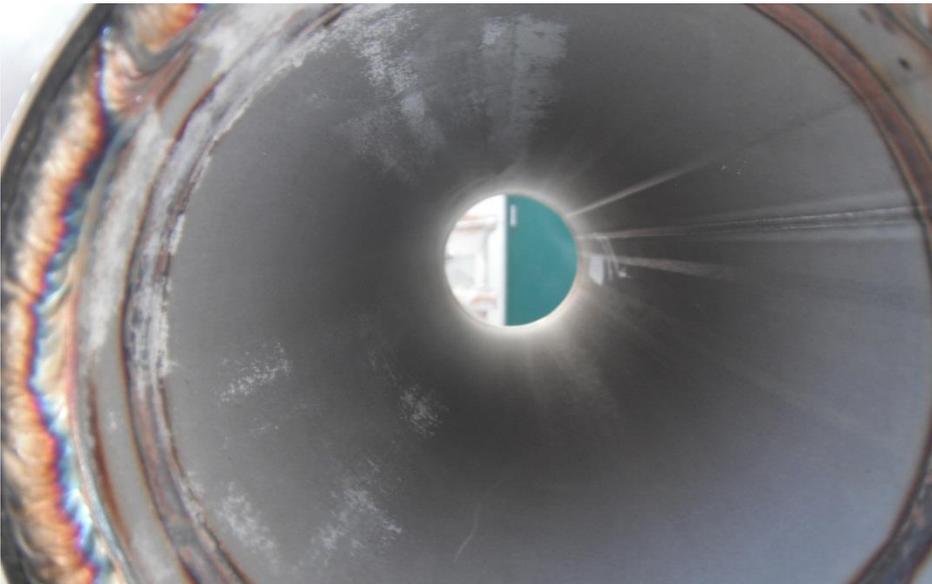


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Clean pipe Spool section



May 24, 2011 (after 8 weeks)



July 12, 2011 (after 15 weeks)

First rust colony



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Second rust colony



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May 24, 2011



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Third rust colony



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May 24, 2011



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Fourth rust colony



March 28, 2011



May 24, 2011



July 12, 2011

Fifth rust colony



March 28, 2011



May 24, 2011



July 12, 2011



Definitive results after 15 weeks

- * New rust colonies did not form inside the contaminated and clean pipe spool sections.*
- * The flow of liquid inside the starch line began a slow and gradual break-down of the existing rust colonies.*

Conclusion

- * Hydropath Technology can be recommended as a chemical-free method of inhibiting Microbial Induced Corrosion.*