



## Midstream Solutions

### Multi-Chem Customizes Long-Term Corrosion Mitigation in High H<sub>2</sub>S Gathering System.

Location: Central Canada

#### Overview

This Canadian producer operates a gathering system that produces and transports various volumes of gas, condensate and water from a field where the challenging terrain and quality of production causes both major pipeline corrosion problems and emulsion issues at the gas treatment plant.



Initiated in the 1950's, the field is located in an environmentally sensitive area of hilly terrain with lots of swampy land and many creek/river water crossings. Production comes from three different zones, one of which is extremely sour, with a field average of 14% H<sub>2</sub>S and some wells as high as 25%, in addition to an average CO<sub>2</sub> concentration of 3%, downhole temperatures of 78°C (158°F) and downhole pressures of 3000 kPa (435 psi).

Most of the gathering system must traverse many low spots where sand/solids/debris/water will hold up and settle in the pipeline, increasing the likelihood of corrosion and under-deposit corrosion, while the high H<sub>2</sub>S concentrations make pitting corrosion attack another major concern. Because of the terrain, some 98% of the field is not piggable to help clear solids hold up in pipeline low spots, and there are few locations available for corrosion monitoring via coupons or liquids sampling. In the face of these challenges, the producer required an effective, long-term solution.

After an extensive field assessment in 2009, Multi-Chem began R&D, performing corrosion inhibitor development and evaluations in the Houston corrosion laboratory, including multiple runs of high pressure/high temperature autoclaves, reaction kettle tests, wheel box tests, compatibility testing, and materials compatibility testing. After three new corrosion inhibitors were developed and successfully field tested, Multi-Chem was awarded the business in 2010, and the new products began to be widely used throughout the Canadian operations.

In a process of continuous improvement, Multi-Chem continues to make adjustments to the corrosion program as needed, including re-evaluating performance as even newer products are developed.

In 2012, Multi-Chem completed new high pressure/high temperature autoclave testing to evaluate the incumbent products (MC MX 820-6, MC MX 6-1674), after the producer found conflicting internal corrosion monitoring results between smart pig run results and the physical cut outs for the main production pipelines, as well as failures due to under-deposit corrosion from the lack of pigging.

Multi-Chem initially identified an alternative product, but small pits seen under laser scanning microscope suggested it would be incompatible with the high total dissolved solids brine in this field.

Additional laboratory testing then led to development of MC MX 6-3688, a new product that effectively reduces the current corrosion rate by 50%, with no pitting observed even after extended reaction times.

With successful introduction of MC MX 6-3688 in this very high H<sub>2</sub>S concentration field, Multi-Chem continues to provide effective, continuously-improving corrosion mitigation to a very highly-valued production system.

CHALLENGE	SOLUTION	RESULT
<p><b>Difficult terrain and sour production</b> causes major pipeline corrosion problems in H<sub>2</sub>S gathering system, requiring an extensive and long-term solution.</p>	<p><b>Multi-Chem R&amp;D of new corrosion</b> mitigation products, with ongoing performance monitoring and laboratory investigation leading to further product refinements for a customized treatment.</p>	<p><b>Multi-Chem's continuous improvement</b> approach to customizing corrosion mitigation provides effective, long-term treatment solution.</p>