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Installation of a Double Walled Containment System for the Disposal of Brine in West Texas

Background:

A large service company that trucks brine from well sites and injects it in its own disposal wells had an existing steel transfer line laid above ground, which incurred a leak due to corrosion. The line was approximately one mile in length and injected 5,000bbls per day of brine at 1,200PSI. The objective of the company was to get the line back up and running while minimizing the risk of future leaks which would contaminate ranch land.

Pressure drop curves were calculated using 3.5" Thermoflex® tubing to be pulled through the repaired existing steel. The annulus would be sealed off and the pressure monitored creating a double walled system that would minimize the potential for environmental contamination. When the steel line was opened a polyethylene liner was observed in the pipe creating an inside diameter less than the 3.5" OD Thermoflex® line. As a result, the final solution was to layout an SDR 11 6" HDPE line, pull the Thermoflex® through the line, seal off the annulus and run a two inch line from the annulus back to the storage tank. Any fluid excaping into the annulus would flow back to the tank with less than 30PSI on the annulus.

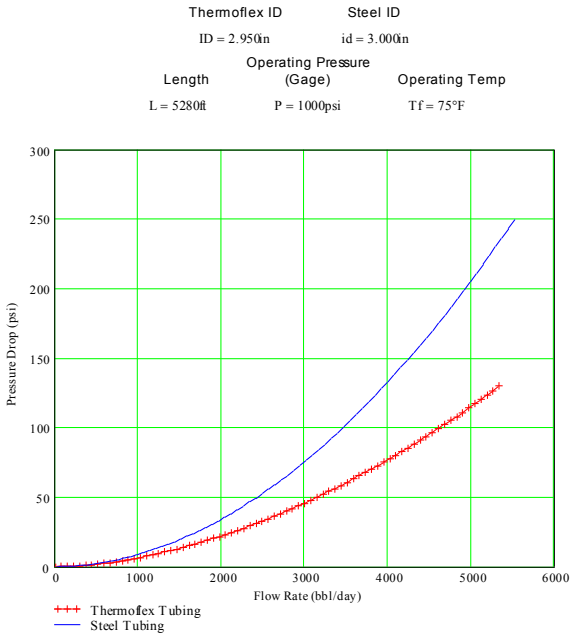
The system has been up and running since December 2010 without issue.

Preparation and Installation:

Below is the pressure drop curve for a 3.5" (2.95" ID) Thermoflex line. The pressure drop for a one mile length transferring 5,000bbl/day of fluid is 115 PSI. This was acceptable to the customer who could operate the entry pressure and inject at a 1,000PSI minimum pressure. Please note that the equivalent pressure drop for a 3" ID steel line is 200PSI.

Polyflow, Inc, W2280 West Dr., PO Box 434, Oaks, PA 19333

610 666 5150, Fax: 610 666 5144, www.polyflowinc.com



Pressure Drop Calculations

The HDPE secondary containment line was installed in preparation for the pull through of the Thermoflex® tubing. A pig was run through the HDPE line pulling an aramid fiber cable. Steel can be used but the light weight rope requires less than 30PSI of pigging pressure to pull the line thorugh the HDPE. Steel cable weight approximatley 10 times more requring pigging pressure in excess of the HDPE pressure rating.

After the Thermoflex® was pulled through the line, the Thermoflex® stainless termination flange was flanged to a flexhose flange termination. The entire flange connection was surrounded by the HDPE secondary and sealed off against the steel flext hose. A rubber flex connector was the sealing mechanism which can withstand 30PSI. (See figure 1 & 2)

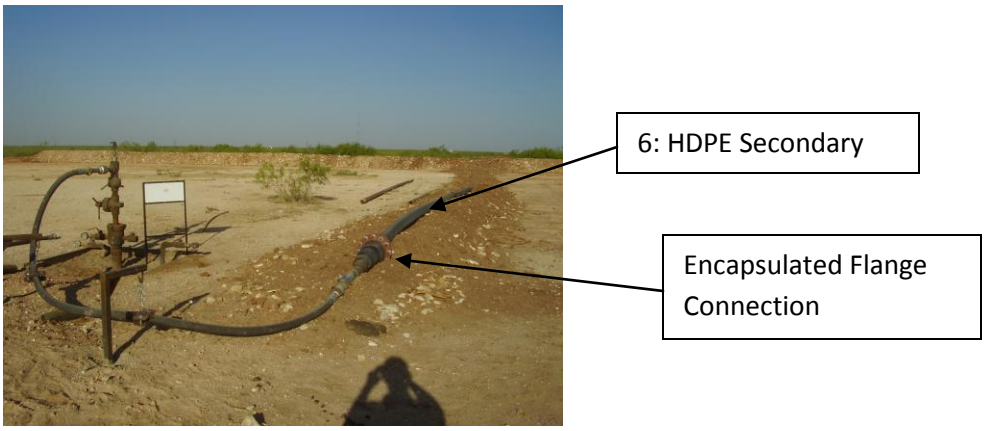


Figure 1: Termination at Well

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Figure 2: Termination of Secondary

The secondarily contained pipeline was then covered with approximately one foot of earth to protect the line from brush fire and excessive heat due the summer sun in West Texas. HDPE lines are suitable for 140F maximum temperature.

Conclusion:

This case study provides an example of an inexpensive rapidly installed secondary contained system to minimize the potential for environmental damage due to leaks. Brine is extremely corrosive to metals. Thermoflex® nylon lined piping is inert to both brine and hydrocarbons making for a system not requiring ongoing maintenance.

Polyflow has installed other systems with continuous monitoring of the annulus to shut the injection pressure with any spikes in annulus pressure. Polyflow should be consulted for specific design considerations and modeling.