



Case Study: Pigging for Pipe Anomalies

The Challenge

An old, small piping line extending over 6 miles needed to have all of the valves inspected, and, where necessary, repaired or replaced. A sample of the target problem valves is shown in Figure 1. But with the piping buried several feet deep, and no map identifying the location of these valves, the repair team needed a way to identify where to dig. Smart pigs were made for much larger pipe diameters than those in question, so the team came to TECAT for a small, smart pig solution.



Figure 1 Valves Targeted for Repair

System Requirements

- ✓ Compact: The system had to be mounted to a pig capable of traveling through a very small inner pipe diameter.
- ✓ Withstand harsh environment: The system would be exposed to oil, dirt and debris, along with potentially large vibrations, as the pig progressed through the pipeline
- ✓ Power Efficient: The pig would be placed inside a pipe to collect data for several hours. The system needed to guarantee that the data collection would last throughout the entire time that it took the pig to travel the six mile length of the pipe.

The TECAT Solution

TECAT engineers adapted a small sensor system comprised of an inclinometer, an accelerometer and a magnetometer, for mounting onto a small pigging device. The pig, shown in Figure 2, was launched through the pipeline, and recorded data along the path of the pipe. After the pig was retrieved, the data was downloaded for analysis. The team was able to identify every anomaly found along the pipeline by examining all three data parameters collected, as shown in Figure 3. Based on magnetic spikes, acceleration spikes, and the location in the pipeline, the team compiled a list of possible valve locations, along with a probability ranking for each anomaly detected. A large spike in both



magnetometer reading and acceleration reading typically indicated a valve, which was verified upon digging at the identified location. The system was found to be very sensitive, with anomalies detected due to bare welds, double welds, and bare pipe. Each of these was still of benefit, as these sections were also fixed, and wrapped when necessary.



Figure 2 TECAT's Smart Pig



Figure 3 Examination of Three Datasets Simultaneously Provided Strong Correlation to Dig Locations