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BACKGROUND – WatchDog – how it came about

In 2011, Len Johnson lay awake at night, wondering if he would have to shut the doors of Advanced Flow Technologies Inc. (AFTI), the company he led for the past two years. The price of gas had hit bottom and AFTI was left with a large inventory of its gas well monitors, WatchDog, and no market. As president and a significant shareholder of AFTI, Johnson thought making this difficult decision was becoming more of a reality every day.

The idea behind WatchDog began two years earlier in 2009, when a district manager at Cenovus Energy - with whom AFTI was already doing business with its earlier product - Flow Net, wondered if temperatures of gas wells could be monitored for a low cost to tell if the wells became frozen.

Cenovus and AFTI agreed to spend a year testing monitors on its wells at a Cenovus field in southeast Alberta. Together, they measured temperature at various points above and below ground. Study results concluded monitoring temperature above ground at the flow line would tell when a well was frozen. The science was simple. Gas carries heat. As long as the well is flowing, the graph representing the heat of the gas shows a steady, even pattern. When the well is frozen, the temperature plummets to a point far below zero, making the discrepancy between normal and frozen obvious.

AFTI quickly saw that prior to the well freezing, the temperature pattern began to change so that with its monitoring system and some algorithms, its monitors could actually predict when a well was about to freeze. This meant field employees had an opportunity to get to the well to prevent it from freezing. From this research, WatchDog was created and marketed to natural gas producers with a promise WatchDog could help avoid wintertime production losses as a result of frozen wells.

The price was right for gas producers too. WatchDog was only \$2,000 per unit. (and, is still the same price today). A small monthly monitoring fee allowed customers to read and receive data. Customers with shallow gas wells signed up including Conoco Phillips, Pengrowth Energy and Encana. Just as AFTI was experiencing some success with the new product, natural gas prices plummeted. It was 2011 and there was no market for gas well monitors. Fate intervened with a chance comment shortly afterwards from Rob Hari, vice president of production, at TriAxon Oil Corp. (TriAxon) a Calgary-based junior oil and gas producer. Hari told Johnson of his search for a low cost device that could simply tell if an oil well was flowing or not. He wanted to find an electronic monitor for TriAxon's mature, low flow oil wells so he could keep TriAxon wells operating to optimize run time.

TriAxon and AFTI began to collaborate and develop a monitor system for oil wells that had a simple user interface so that so Operators could easily accept and adopt the technology. The system needed to be able to notify operators immediately when pumps and compressors stopped working and/or if the temperature trend changed. Information needed to be provided in real time to reduce inefficient hunts for problem wells. Finally, a key component was that data needed to be stored so operators could analyze historic trends.

Within a month, in November 2011, there was a period of extremely cold weather. AFTI personnel had been watching the graphs of the oil well temperature on a daily basis to see what they could learn from the temperature patterns. On November 20, there was a dramatic change in the graphs from one of the wells. The pattern from that well looked like the patterns detected in gas wells when they froze.

AFTI called TriAxon who sent field personnel to the well to discover it was indeed frozen. This was a watershed moment for AFTI as it meant that a whole new market for their technology had opened up. TriAxon was also very excited as it meant they would know immediately when a well was not performing properly without sending

someone to the well, and at a very low cost compared to what else was available in the market that was in the \$10,000 range. They immediately requested all 35 of their wells be equipped with WatchDog.

“When TriAxon works with a supplier, our goal is to work together with them to improve their services to us. This ultimately helps us. We feel we helped ‘father’ WatchDog with the AFTI team in developing the six essential criteria we need from our well monitors,” says Jeff Saponja, President of TriAxon.

Meanwhile AFTI engineers, Jonathan Airey and Steve Conquergood, began working on improvements to the original product offering: faster recognition of incoming temperature signals and instant notification of run status. Airey began working on a vibration detection capability, which he then tried out successfully on Hemisphere Energy wells. He felt that once the vibration detection capability was added, WatchDog would be able to use that information to tell if the well stopped pumping and notify the producers immediately. This has since become the most popular WatchDog feature.

AFTI began telling other producers about the new use of WatchDog and its growth from a monitor for gas wells to an effective monitor for oil wells. The AFTI team was so confident it could solve some of the oil industry’s main production problem – keeping wells flowing and contributing to reducing operating costs – it offered 15 potential oilfield customers free 45 day trials. At the end of the three month trials, all 15 oil producers purchased WatchDog monitors and installed them on high producing wells, where the payback was as short as one day. The cost-effective and cost-efficient monitors also proved their value on low flow wells.

“I thought it was a good idea – Renegade was a brand new company drilling horizontal wells in Kindersley, Saskatchewan,” says Neil Getz, Area Superintendent, Renegade Petroleum. “I was impressed with their confidence in their product’s capabilities. It they were willing to put WatchDog on for a 45-day free trial, I’d be willing to try it. The results proved they were right. If a well stopped pumping, I received a signal and was able to go do something about it. The economics were good – it was very low cost for the information we got. One night’s saved production more than paid out for the cost of the equipment,” says Getz. Renegade now has WatchDog on 92 wells. “Every time we drill a new well, WatchDog is added to the well. It gives me the most important information I need. AFTI also has a good service shop, I don’t have to wait weeks for someone to come out if there is a problem,” adds Getz.

AFTI engineers keep improving WatchDog and finding new uses for it. They have now invented algorithms that better detect, from incoming temperature signals, if a well changes flow, a key component of effective well monitoring.

The importance of WatchDog’s features relates to the previous method of oil well monitoring: send a field operator in a truck to the well site on a daily basis. This method was the only way producers had to monitor the vast majority of the 120,000 wells in the Western Canadian Sedimentary Basin. While time-honoured, the method had two key drawbacks:

- Well site visits were daily. If a well went down after the visit, 24 hours could pass before personnel are aware of it;
- the truck check is primarily devoted to issues obvious at surface, so that if pump is going up and down but the well is not producing oil, the truck-bound personnel may be unaware of ‘down-hole’ issues.

Now, Operators go right to trouble spots - which adds up to saved time and production. “If we didn’t have WatchDog on our wells, for sure we’d have hired more people by now,” says Ron Welsh, VP Production, TriAxon.

AFTI estimates that untimely awareness of wells going down and the inability to detect problems below surface cost Western Canadian Producers over \$1 billion annually.

A short three years later, after switching its target market from gas producers to oil producers, AFTI's prospects are bright. The company now has a staff of 18 and counts more than 50 oil producers in Alberta, Saskatchewan and North Dakota, amongst its customers. It has applied for patents for its innovation. It recently announced Harvest Operations Corp. is purchasing 1,000 WatchDog monitors for its oil wells. By the fall 2014, the company plans to have WatchDog on 3,000 wells.

“Our success with WatchDog shows there is a market for a low cost well monitoring system. As more producers become aware of the benefits this type of technology provides, and the efficiency and cost savings it offers, our adoption rate will continue to grow quickly,” says Johnson.