

# Protecting the Oil You Didn't Know Was Missing: The Next Generation of Well Monitoring

*A White Paper Developed by OpenTundra*

*www.opentundra.com*

---

## **A Growing Problem Across the Industry**

As the price of oil continues to increase, crude oil theft is becoming a significant problem for producers, royalty owners and authorities across the United States. While specific statistics are difficult to track due to unreported crimes and under detection, the country's top oil-producing states are developing strategies that attempt to combat the problem — one that has existed for years but began growing in popularity in the mid-1970s as the price of oil began to rise.

In Oklahoma, an increase in energy crime led the State Bureau of Investigation in 1982 to develop an Oil Field Theft Unit to investigate oil field-related crimes, including equipment theft, crude oil and natural gas theft, and oil and gas investment fraud. In the past five years, the unit has investigated 19 cases per year, on average.<sup>1</sup> Other states have similar agencies. In 2008, Texas law enforcement agencies and Energy Security Council representatives formed a statewide hotline in response to a dramatic increase in oil field-related crimes, including the theft of crude oil. By 2011, the Energy Crime Stoppers program had expanded to Pennsylvania, Arkansas, Colorado, Louisiana, Oklahoma, New Mexico, Utah and Wyoming.<sup>2</sup>

---

1 Oklahoma State Bureau of Investigation. *Annual reports, 2007-2011*. Retrieved May 14, 2012 from [www.ok.gov](http://www.ok.gov)

2 Energy Security Council (Nov. 10, 2011) *Energy Crime Stoppers Expands to Pennsylvania's Marcellus Shale*. Retrieved May 14, 2012 from <http://energysecuritycouncil.org/default.aspx/MenuitemID/171/MenuGroup/Home.htm>

Today, at nearly \$100 a barrel, crude oil theft is an expensive problem that is growing more costly each year.<sup>3</sup> For example, if one barrel a day is misrepresented on 10 wells, a producer loses approximately \$1,000, or \$30,000 a month. In a year, the producer's total loss comes to more than half a million dollars — a substantial hit to small- and mid-sized producers. It is not unusual for theft to continue over several years without detection. One Texas investigation uncovered \$1.2 million in stolen crude between 2003 and 2007 from two wells alone.<sup>4</sup>

If oil theft is a common problem across the industry, why is it so difficult to pinpoint and prevent? As mentioned previously, the crime often goes undetected — a result of the industry's widely accepted yet limited inventory monitoring techniques.

#### **Limitations of Current Monitoring Methods**

Most oil producers today are using the same tank measurement methods utilized by their counterparts for hundreds of years. Current inventory monitoring relies on what is being indicated by a pumper or crude hauler. The process requires an individual to routinely visit each well to measure a tank's crude oil and water height with a manual tap gauge and water paste.

While recognized across the industry, this method does not detect a tank's Basic Sediment and Water (BSW), in which oil and water are

---

<sup>3</sup> Oil-price.net *Crude Oil and Commodity Prices*. Retrieved May 15, 2012 from <http://oil-price.net>

<sup>4</sup> Heatly, Staley (July-August 2009) *To catch an oil thief*. Retrieved May 15, 2012 from <http://www.tdcaa.com/node/4814>

emulsified in different ratios. As a result, the tank's saltwater and BSW are not measured separately from the crude oil. When BSW is pulled from the tank, it is often only reported as water. However, the oil in the layer can be reclaimed and sold.

Recognizing oil theft as a growing problem, some companies have installed video cameras at their wells to prevent crime.<sup>5</sup> However, video surveillance is an expensive solution for multi-well producers and typically requires operators to play back videos to monitor the well site — a time-consuming process. Worse yet, this security method does not prevent stolen oil or misrepresented data during scheduled pulls, when most incidents occur. An on-site security guard, while more hands-on, would be an expensive theft prevention technique, as well, and therefore, unrealistic for most small- to mid-sized producers.

As you can see, the industry's widely accepted monitoring methods leave gaps in security and don't paint the entire picture of what is occurring day in and day out with a producer's inventory. They also utilize measurement methods that are not 100 percent accurate and produce subjective results based on individual interpretation, opening the door to possible fraudulent activity.

### **Innovative Technology Increases Inventory Security**

The next generation of oil well monitoring systems does not rely on manual checks, which can be misreported or fabricated. Instead, innovative technology tools report inventory accurately and automatically in real time or near real time. Well data can be accessed remotely while the producer is in the field, at the office or even on vacation.

---

5 News9.com (April 15, 2006) *Oil theft increases*. Retrieved May 14, 2012 from <http://www.news9.com/story/8173018/oil-theft-increases?clienttype=printable>

OpenTundra's remote, real-time oil well monitoring system is a patent-pending inventory management program that is able to distinguish a tank's amount of pure oil from its emulsive layer. In this way, the system is able to determine whether a drop in tank volume is due to a water bottom pull, a crude oil pull and/or possible theft. The well monitoring system can be placed in the tank of a new well or added at a later time.

Since a tank's emulsive layer typically is the "blind spot" where most theft occurs, the system utilizes floats with electronic sensors set at specific gravity and positioned along each layer in the tank, including the BSW. Because the tank's sensors gauge movement inside the tank, the producer is able to determine from which layer the tank is being pulled.

By monitoring each layer electronically in a reliable and repeatable manner, the OpenTundra system is able to determine minute changes in the temperature, level and volume of the oil and water. The sensors can be remotely programmed to send measurements to the monitoring system as often as every five minutes. The measurements are automatically recorded and uploaded into a secure, web-enabled interface accessible by the producer through a secure Internet log-in.

The OpenTundra system can be programmed to send alerts to the producer via email, phone call or text message when anomalies in oil volume occur in a particular tank. Using GPS, the system identifies the location of the accessed tank via physical address, map location or GPS coordinates and delivers this information to the producer. The alert allows action to be taken immediately when the drop is occurring, such as contacting the operator or proper authorities. Environmental issues, such as a leak, also can be detected in near real-time and reported within a few minutes after the event has occurred. As one OpenTundra

client commented, “Any time someone takes oil out of our tanks, I know about it.

“It’s sort of like having a security system on your well. When you have 30 wells, you can’t have a security guard running all over the place or security cameras at every well. This way, you can verify what your pumper and crude hauler are doing.”

### **Well Data Easily Trackable with Online Tools**

Beyond theft prevention, today’s oil well monitoring tools help producers track their wells’ operational efficiency through a single web-enabled interface that reflects drops and rises in the tank as production and pumping occur.

OpenTundra collects and aggregates well data from a producer’s remotely located assets and delivers it to a central facility via the Internet and TCP protocol. InVision™, OpenTundra’s data management application, automatically organizes the data into spreadsheets and charts to provide producers with an accurate and visual picture of what is happening at their wells nearly minute-to-minute. The InVision application is accessed via cellular, Ethernet or private networks and consists of:

- Multidimensional data warehouses
- Customizable views
- Context Sensitive Data Presentation
- A memory resident searchable catalog
- Open API for integration to other platforms
- Tanks and data points viewable from a single console
- Pre-built views that contain vehicles, deliveries, geo-positions, tanks, critical tanks and errors

A current read of all tanks can be displayed with the click of a mouse. Selecting an individual tank provides a more detailed report and history and allows volumes on the BOL to be compared to the changes in the tank. Site-specific data is loaded into the software, so the operator can select info from pull-down lists and reduce data entry errors.

Access to this range of well data allows producers to make operational decisions and mitigate risk through a range of application features.

Using OpenTundra's InVision platform, a producer can:

- Evaluate, trend and graph production information with real-time automated decline curves

- Determine production abnormalities that link to equipment issues like separator problems with water builds, etc...

- Create and maintain automated reports by user to be delivered on a user-defined time schedule

- Have immediate notification of critically low tanks, overfills, transfer pulls, water bottom pulls and abnormal drops/theft based on the producer's predetermined inputs

- Access current inventories, production, delivery and load detail

- Interactively download information for further analysis with third-party tools

To ensure proper use of InVision's data management tools, a producer's employees or its authorized representatives must complete at least one day of training, available onsite at the customer's location(s) of choice, on the web via [www.gotomeeting.com](http://www.gotomeeting.com) or at OpenTundra's offices in Tulsa, Okla. A help-line is available to assist customers with questions or issues with the OpenTundra monitoring system and InVision application.

## **The Future of Well Monitoring**

Since rolling out its real-time, remote oil well monitoring system in November 2011, OpenTundra has already seen success with providing precise well monitoring and theft prevention. In early 2012, the platform uncovered approximately \$40,000 in suspected crude oil theft.<sup>6</sup> Had the missing oil gone undetected, it could have amounted to a half-million-dollar annual loss.

OpenTundra continues to develop technology solutions that complement and supplement customers' existing investments and will potentially change the future of well monitoring. The current system allows producers to view crude oil, gas and water production through one web-enabled interface, providing drilling and work-over reports at one point of access that can be viewed on an iPad or other electronic device in the field.

*This white paper is provided courtesy of:*

OpenTundra  
6226 E. 101st St., Ste. 200  
Tulsa, OK 74137  
918.770.4897  
info@opentundra.com

[www.opentundra.com](http://www.opentundra.com)

---

<sup>6</sup> Information provided by OpenTundra