The Advantages of Exception-Based Surveillance

In response to rapid production growth, operators are turning to Exception-Based Surveillance (EBS) to reduce lease operating expense, decrease deferred production, alleviate hiring constraints and improve cash flow in today's uncertain price environment.

The recent boom in North American oil and gas production has created unprecedented opportunities for onshore oil and gas operators. Significant improvements in drilling and completion techniques have unlocked vast resources across North American shale plays, which only a decade ago were not considered economical to produce. Along with these opportunities, operators are presented with ever-increasing challenges to effectively manage rapidly expanding production operations and optimize production costs in today's uncertain price environment. As both the number of producing wells and production volumes increase, operators must strive to develop an operating model that effectively supports projected production growth. *See Figure 1*

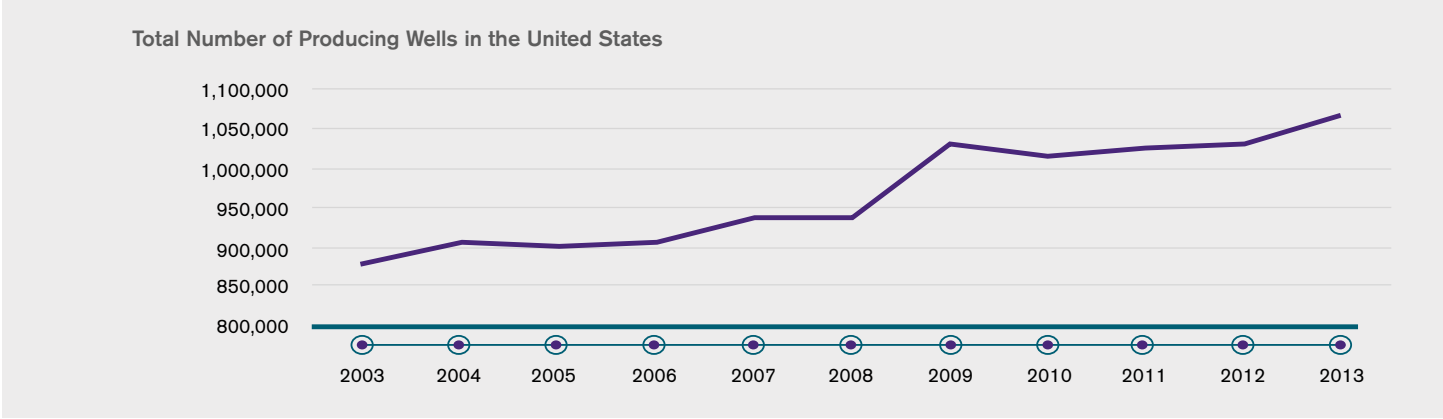

Figure 1 (Source: IPAA)

Some of the key operating challenges posed by rapidly increasing well counts and production include personnel constraints, increased deferred production as a result of strained maintenance capacity and capabilities, and greater risk of safety-related incidents.

In response to these challenges, operators are turning to Exception-Based Surveillance (EBS) models.

EBS is a signal-based operating model which utilizes remote monitoring capabilities through SCADA (supervisory control and data acquisition) systems to manage unplanned production disruptions and proactively focuses Lease Operator time on value-added preventive maintenance tasks.

EBS can yield the following benefits:

1. Improve labor efficiency and costs by increasing the ratio of wells-to-Lease Operator
2. Reduce deferred production by significantly increasing the percentage of time Lease Operators spend on preventive maintenance
3. Reduce the constraint of limited local hiring pools in remote locations
4. Improve safety by reducing Lease Operator driving time in remote locations

How does EBS work?

EBS relies on signals generated by remote monitoring capabilities through SCADA systems to alert Lease Operators when a site needs to be checked. For example, if a SCADA system captures a particular pressure gauge reading that is abnormally high or low, this could trigger an exception signal to go check a well site. This differs from traditional operating models which typically send Lease Operators to "every well every day" to capture meter readings and reactively check for wellhead or facilities issues on site.

EBS shifts the Lease Operator's focus from primarily collecting production data and reactively performing maintenance to spending more time performing preventive maintenance. This move is enabled by efficiency gains realized through remote monitoring of unplanned production disruptions or "exception" signals. The paradigm shift from reactive to proactive significantly reduces non-value added activities such as drive time, data collection, reacting to false alarms and maintenance rework, resulting in improved Lease Operator efficiency and effectiveness. For example, under EBS approximately 60 percent of Lease Operator time is devoted to value-added tasks such as preventive maintenance, versus only approximately 25 percent of time being spent performing value-added tasks in traditional lease operating models. *See Figure 2*

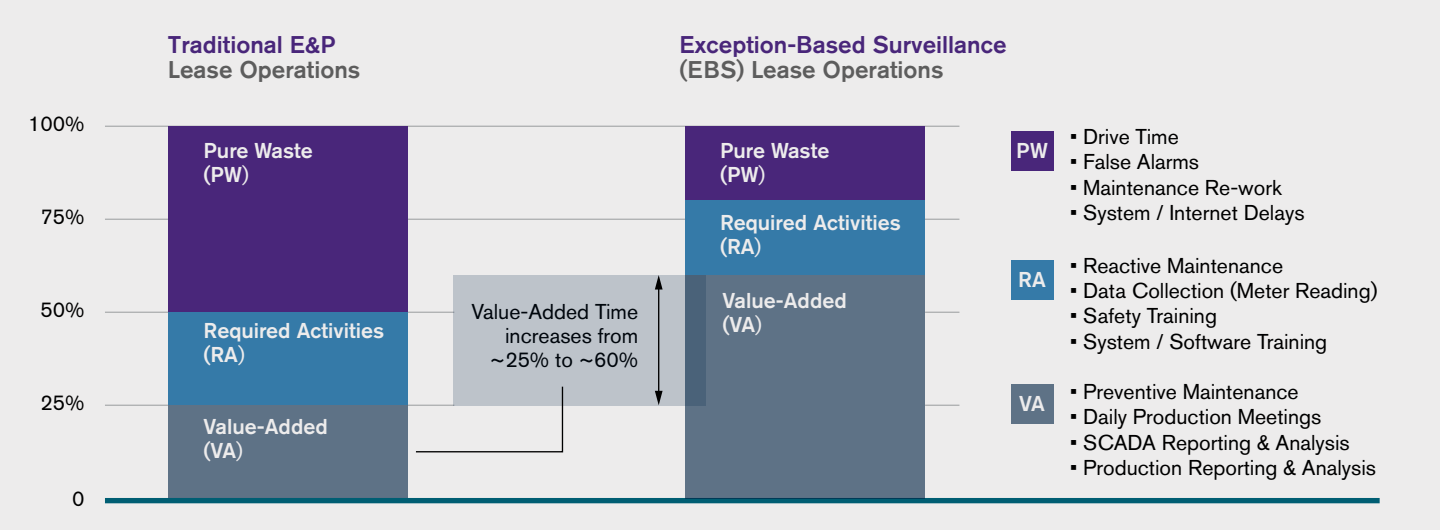

Figure 2

A notable change under EBS is that Lease Operators are not expected to visit every well on a daily basis. The purpose of well visits is driven by scheduled maintenance tasks and exception-based signals that warrant site visits. Lease Operator maintenance tasks are performed according to a detailed maintenance schedule that identifies the key tasks a Lease Operator must perform and the frequency (e.g., weekly).

In order to effectively implement EBS, wells must be stabilized, remote monitoring capabilities must demonstrate a high degree of functionality and reliability, and exception activity must be within an acceptable range. Exception activity is essentially any event / signal that requires a Lease Operator to make an unplanned visit to a well site. If greater than 10 percent of well sites consistently experience exception activity, Lease Operator time will become more consumed by responding to exception signals than dedicated to performing value-added preventive maintenance.

EBS Business Case

First, labor efficiency is improved by focusing Lease Operator activities on preventive maintenance and minimizing disruptive non-value added activities. This enables greater well coverage and efficiency per Lease Operator – essentially increasing the ratio of wells per Lease Operator. For example, instead of needing a Lease Operator for every 20 wells, EBS can enable a Lease Operator to effectively cover 30 or 40 wells in the same area by leveraging remote monitoring capabilities. Focusing on lease operation efficiencies and optimizing the number of Lease Operators will decrease operating costs associated with Lease Operator staffing and allow operators to increase well counts without increasing Lease Operator headcount.

The second, and potentially largest benefit, is the ability to minimize deferred production by reducing maintenance downtime through more preventive maintenance. Remote monitoring capabilities create additional time for Lease Operators by reducing required driving time. This additional time can be used to proactively perform maintenance according to a well-managed maintenance program, which will steadily decrease downtime that often results from inadequate preventive maintenance. Instead of racing around trying to check every well, Lease Operators can spend quality time at designated sites to perform specific maintenance activities.

The value of a strong preventive maintenance program is significant. *Figure 3* illustrates how a 33 percent decrease in production downtime through improved preventive maintenance can increase daily and annual production revenue in a field producing 10,000 BOPD. In this example, an operator decreases production downtime from 7.5 percent to 5.0 percent as a result of increasing preventive maintenance through EBS. This decrease in deferred production yields led to an uplift of 2.5 percent or 250 BOPD as shown in *Figure 3* below.

Average Expected Daily Production (BOPD)		10,000
Average Deferred Productions as a result of maintenance downtime (~7.5%)		750
Average Deferred Productions under EBS (~5.0%) *(downtime decreases due to increased preventive maintenance)*		500
Production Uplift Captured under EBS (BOPD)		250
Crude Oil Sales Price	$	60-80
Projected DAILY Increase in Production Revenue under EBS	**$**	**15,000-20,000**
Projected ANNUAL Increase in Production Revenue under EBS	**$**	**5,475,000-7,300,000**

Figure 3

The third benefit relates to reducing hiring constraints in tight labor markets and remote areas. In many areas, there are not enough skilled and experienced Lease Operators available. In areas like North Dakota and South Texas, projected production growth is outstripping the local supply of potential Lease Operators. Overcoming staffing constraints is imperative to enable many operators to sustain high production and support future growth. Considering the limited personnel available in some locations, it is not feasible for operations teams to just work "harder" to achieve desired results. Operations teams must work "smarter" and deploy their resources in a more efficient manner, which can be achieved through an EBS model.

The fourth key benefit is reducing driving-related accidents by decreasing driving time. In remote geographies where wells are dispersed across hundreds of miles, Lease Operators often spend the majority of their day driving from well to well. Significantly reducing driving time through EBS will mitigate exposure to road and other related hazards and reduce the potential for driving-related incidents.

Other Considerations

Although EBS provides a scalable operating model that helps reduce total operating costs, there are three key considerations that enable a successful and sustainable implementation: (1) maintaining a strong wellhead signal platform through SCADA; (2) creating a sustainable change management plan / program to support all affected stakeholders; and (3) developing and executing an integrated EBS program.

First, enabling EBS success requires a reliable SCADA system / platform. The effectiveness of remote monitoring capabilities is the foundation of EBS success. Critical requirements for an effective SCADA system include a reliable SCADA network, accurate data capture and transfer on the SCADA network, and sufficient maintenance support. SCADA and remote monitoring capabilities enable Lease Operators to not have to visit "every well, every day" to take production readings and, instead, focus the majority of their time on preventive maintenance.

The second consideration relates to creating a sustainable change management plan / program. EBS presents a paradigm shift in thinking and daily activities for Lease Operators, Lift Technicians, Production Engineers and management given the degree of change required to effectively implement and sustain EBS. Thus, it's imperative to develop a comprehensive change management plan that creates awareness, capabilities through training, and willingness among key stakeholders.

The third consideration to address is the development and execution of an integrated EBS program. Given the digital requirements and organizational support required to sustain EBS, it's critical that the model be implemented and managed as a coordinated effort and not in piecemeal fashion. By ensuring that an integrated EBS program is developed, the probability of EBS implementation and sustainment success will be greatly increased.

Conclusion

Responding to the challenges posed by increasing production growth targets and constant pressure to reduce operating costs requires an improved operating model that more effectively manages and scales resources. Exception-Based Surveillance provides this improved model by properly leveraging SCADA capabilities and deploying lease operating resources in an efficient manner. EBS implementation can yield the following benefits: improve labor efficiency and costs, lower deferred production, reduce local hiring constraints and improve driving safety.

EBS is a departure from traditional operating models and requires sufficient planning, resources and leadership to implement and sustain. However, the benefits from successfully employing this model are significant and offer a decisive opportunity for operators to effectively manage increasing production growth, while reducing operating costs. Given oil price volatility and the need to tightly manage operating costs, consideration of an improved operating model such as EBS becomes increasingly important every day.

KEY CONTACTS

Mark Clevenger
Senior Director, Houston
+ 1 832 443 1811
mclevenger@alvarezandmarsal.com

Derrick Shannonhouse
Manager, Houston
+ 1 832 367 3128
dshannonhouse@alvarezandmarsal.com

Marc Patterson
Manager, Dallas
+ 1 972 672 2796
mpatterson@alvarezandmarsal.com

Richard Avant, Victor Burk and Lee Maginniss contributed to this paper.

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