



MANAGING OILFIELD OPERATIONS UNDER ADVERSE ECONOMICS

BOTTOM LINE

During adverse economic conditions, operators must explore all possibilities for reducing operating costs or increasing production. If wells or leases must be shut in, precautions must be taken so that production can be cost-effectively regained when wells are brought back on line.

PROBLEM ADDRESSED

Decisions to shut in wells must be made quickly, but wisely. For some wells, damage removal or stimulation treatments are an option. Operators must know how to identify those wells, and then how to remove damage or stimulate the wells. Operators also must know which reservoirs and wells are rate-sensitive. To minimize costs when bringing production back on, it is also important to know how to protect both down-hole and surface equipment.

KEY WORDS:

Damage Removal
Stimulation
Hedging
Mothballing Facilities
Marginal Economics
Sliding-scale Royalty
Shut-in Wells

TECHNOLOGY OVERVIEW

Operators must consider many factors when faced with sub-economic conditions. They must decide whether to shut-in individual wells, or the entire lease, which may impact keeping the lease. Temporary shut down will bring concerns about rate recovery. Operators usually know which reservoirs are rate-sensitive (i.e., the well will not produce as strongly when brought back on line); most are not. In many cases, wells may produce at a higher rate after shut in, partially alleviating the revenue loss.

Concerns about surface facilities are related to corrosion and solids buildup within process equipment, the deterioration of electrical equipment and instrumentation, and pilfering. When shutting in, the most important decisions deal with flushing the system, excluding oxygen, and wrapping critical equipment. Before reactivating, producers should visually inspect all electrical systems and equipment. It also is important to pay attention to purging and start-up procedures. When shutting in facilities, producers will probably not know the duration, so they must balance the cost and time commitments against potential damage.

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SPEAKERS:

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Price-Based Sliding-Scale Royalties:
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Wellbore Damage. Potential sources of wellbore damage include phase separation, water blockage, completion fluid effects, wettability changes, and corrosion/scale. To avoid downhole corrosion damage, wells should be chemically treated with an appropriate inhibitor prior to shut in.

Productivity of many wells is restricted by wellbore damage, either near wellbore or in-depth. Removal treatments are an option for increasing a well's margin. To assess wellbore conditions, one must review the well's production and operations history, fluids and solids data, and the experiences of other wells in the area. In many cases, well testing will be required to assess the damage and its causes. For damage removal, changes are more economically significant at lower skin values (i.e., reducing skin from 5 to 0 usually yields more return than reducing skin from 25 to 20).

FracPacs used for production enhancement are appropriate for formations under certain conditions: those with moderate or high permeability with deep damage, those that do not respond favorably to acid, those where large fracture treatments are not advised, or those where pore collapse is a problem. FracPacs also can be used for sand control in poorly consolidated formations or those with low cohesion. For stimulation, production can be enhanced by fracing past the damaged zone or reducing pressure drop and supporting the formation. Within an area, risks decrease as producers learn from the experience gained through initial treatments.

Limiting Price Risk Exposure. Although hedging may be perceived as risky, not doing it can expose producers to risk. Clear strategies must be established for hedging, especially those based on the effect of an oil price decline on earnings. Operating and hedging strategies should address cash flow targets. Varying market conditions will dictate different hedging strategies. Some options include: selling at a fixed price in the forward market, buying downside price insurance, selling upside insurance, or both. The confidence in the price forecast, cost of insurance, market liquidity, and basis risk all are important factors. When making hedging decisions, producers must know where they are in the price cycle: above or below long-term trends.

CASE STUDIES

Marginal Well Management. In the Wilmington Field in California, Tidelands Oil Production Co. operates hundreds of wells. When a well goes down, Tidelands must decide quickly whether to return it to production. Tidelands first diagnoses the problem and estimates repair costs. To know whether that cost is justified, it relies on daily revenue and cost projections from a corporate database that calculates the well's operating costs, both direct and indirect, using real-time data. Within minutes, Tidelands knows whether economics justify returning the well to production. And since cost data are broken down to logical elements, the system helps prioritize cost-cutting efforts.

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Priced-Based Sliding-Scale Royalties. The California State Lands Commission developed a price-based sliding-scale royalty rate for Aera Energy's Huntington Beach Field. This royalty rate slides with the price of oil and reduces cash flow variation (or risk) and the likelihood of negative cash flow. When oil prices are down, leases remain profitable longer, avoiding premature abandonment. When oil prices are up, royalty rates are higher, but the operator can afford to pay more royalties and still maintain profitability. In Aera's Huntington Beach Field, the agreement also included a \$7 million investment clause, stimulating further field development. Although other factors may be involved, total field production has increased more than 34 percent since the rate was implemented in June 1995. Because of increased production, both Aera and the state of California have received more revenue than they would have with the prior fixed royalty rate.

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