



PROJECT BRIEF: Multi-well production facilities engineering and design

Client:

S&P 500 leading independent energy company

Location:

Western United States

Employees:

2,200

BOE/D:

+/- 1.2Billion (reserves)

Revenue:

Assets over \$17 billion

Services:

Project management
Design
Process
Civil and mechanical engineering



Market landscape

The paradigm of American energy is undergoing a massive transformation.

In addition to the evolution of renewable energy technologies, and the changes being driven by the consideration of climate issues, the oil and gas opportunities evolving within the United States could be the key factor in the country's successful energy independence. At the heart of this opportunity in oil and gas is directional drilling techniques and multi-well well sites. These off-shore-born approaches to upstream production have come onshore and are proving to be true game changers.

To give an example of the effectiveness of directional drilling, the U.S. Department of Energy indicates that using directional drilling can lead to an increase in reserves by 2% of the original oil in place. The production ratio for directional wells versus vertical wells is 3.2 to 1, while the cost ratio of directional versus vertical wells is only 2 to 1 and the productivity of directional wells is almost 400 percent higher than vertical wells, while they cost only 80 percent more. (Naturalgas.org, 2011)

By adopting these new techniques, American oil and gas well owners and operators have benefited and derived value across their entire business. However, with increased production at a single site, comes increased risk. This key factor of innovation in drilling is driving the need for professionally engineered multi-well production facilities to mitigate this risk and provide more processing options farther upstream.

These are the engineered surface facilities that leverage directional drilling techniques and provide the primary processing and conveyance for multiple oil and gas wells producing product at a single well site.

Client challenge

A leading independent energy company ("The Client") explores, develops, and produces crude oil and natural gas in the U.S. and internationally and owns and operates facilities in an active oil and gas basin in the Western United States. With the industry moving away from vertical well site drilling, The Client understood that to be successful in the upstream market they had to capitalize on the value that comes from directional drilling techniques.

The exponential increase in production from directional drilling meant The Client would likely experience an increase in risk at the well sites due to increased production, system pressure, and field complexity. They recognized the importance that safe engineering and design could play in their ability to handle increased production. The Client did not have the in-house expertise to address this opportunity. Therefore, they partnered with Halker Consulting, LLC ("Halker").

Halker's multi-well facilities design engineers leveraged an innovative but proven modular approach to scale, centralize, and consolidate surface processing solutions to optimize flow rates and type curve efficiencies. Halker's expertise in this space allowed The Client to stay focused on their core business while Halker managed, designed, and engineered the project to ensure safer, more efficient, and environmentally aware facilities.

The solution

Halker's designers and engineers provided a comprehensive design and construction package. They evolved and optimized the client's multi-well processing facility technology over three generations by taking a modular approach to the design of the processing system. Halker dedicated resources from its process, civil, and electrical engineering groups to complete this project on time and on budget.

The gathering facilities were designed by Halker's engineers to transport gas and commingled oil and water via two separate pipelines to the central processing facility (CPF). The system was hydraulically optimized based on well type curves and total expected production data to maximize capacity and minimize pressure drop. Mobile, skid mounted pigging facilities were designed and specified by Halker's engineers to prevent line accumulation/blockages and allow ease of relocation when pipelines were extended. Halker's engineers collaborated with The Client to provide an inherently safe and efficient gathering system design consistent with DOT Part 192 and ASME B31.8.

The original generation of the multi-well pad allowed for individual trains from each wellhead. This reduced tank battery capacity, co-mingling gas after measurement, and centralizing multiple pads on a single facility. The second phase of the multi-well processing facility reduced equipment needs by introducing bulk separation with test units for allocation. This reduced equipment usage again and allowed for further land savings.

The final phase of the facility simply meshed the multi-well design together with the gathering system and CPF. The equipment is further reduced by sending all production directly into the gathering system and then to the CPF, eliminating the need for 3-phase separation and tank storage at the well site.

The result

By utilizing multi well sites, The Client experienced economic, safety, and environmental benefits.

Economic

Costs Savings—The cost saving technology of directional drilling allowed for several subterranean sources to be accessed by the same pad across multiple locations in a reservoir. The Client was able to maximize asset value through economies of scale and better manage equipment costs across multiple type curve production flows.

Time-to-market—With the centralization of multi-wells and equipment functions, The Client's site construction times were reduced but with higher product volumes. This allowed for faster speed-to-market with more products, resulting in more revenue, sooner.

Safety and Risk

The Client depended on Halker's significant experience in safe facilities design and engineering to help mitigate the risk of increasing production volumes. Halker adopted a framework of field safety based on OSHA PSM regulations. Halker's trained engineers worked off these industry standards and proven best practices to build a high volume, high risk site with a higher level of safety.

Environmental

The additional output of Halker's consolidated and centralized facilities design significantly decreased The Client's environmental impact. The multi-well site solution decreased land disruption and better management of point-source emissions—a key requirement for permitting and accessing in the new basins being considered for production. The multi-well site also lowered the amount of additional acreage needed for extra pads and reduced the amount of surface disturbance needed to successfully produce hydrocarbons.

Ultimately, Halker helped The Client leverage new drilling technologies quickly, safely, and with the correct industry standards. And, as a result, The Client benefitted across all areas of their business.

	Project Generation 1	Project Generation 2	Project Generation 2.1	Project Generation 3
Site footprint	525 x 375 (4.5 acres)	550 x 450 (5.7 acres)	575 x 530 (7 acres)	400 x 400 (3.7 acres)
Number of wells per node	8	16	32	32
Number of separators	16	12	12	10
Land use per well	0.56 acres	0.36 acres	0.22 acres	0.12 acres
GAS (MMSCFD)—peak expected	10	10	15	15
OIL (BBL/day)—peak expected	2,450	4,000	6,000	6,000
Time to build	3 months	3 months	3 months	3 months

About Halker Consulting

Halker Consulting has been providing this fit-for-purpose facilities engineering and design from the ground up. Our combined client portfolio of multi-well facilities design is defined to date by over 225 wells on less than 25 sites in various productions basins.

We have accumulated over 100,000 hours of professional engineering and design specific to these new technologies that are now producing an average of 750 BePd per well site.

The complexity of engineering has moved upstream and operators are choosing Halker Consulting to help them remain agile and quickly capitalizing on this new approach to field production in a safe, standardized, and repeatable way for sustained value.

The Client to stay focused on their core business while Halker managed, designed, and engineered the project to ensure safer, more efficient, and environmentally aware facilities.

LEARN MORE TODAY:

To find out more about how Halker consulting can help your operations approach multi-well gathering and production in a safe, professionally engineered and optimized manner, contact us today.

www.halkerconsulting.com

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