

“Future Proofing” Surface Facilities Across the Site Development Lifecycle

Williston Basin Petroleum Conference April 28-30



Environmental Regulation Growth and Change

Environmental Regulation is Evolving

Risks:

Water Quality

- ⊙ Ground and surface water contamination
- ⊙ Siltation of streams from drilling and construction activities
- ⊙ Wastewater Management

Air Emissions

- ⊙ Pad, road and pipeline construction
- ⊙ Well drilling and completion
- ⊙ Processing, storage and transmission equipment

Drivers to Change and Improvement:

Community Stakeholder Concerns Lead to Regulatory Solutions

- ⊙ Concerns drive the introduction of regulations. As unconventional resources play a greater role in energy supply and the concerns surrounding their development increase, **regulatory-driven solutions will become an important force for technology development and deployment in the oil field.** (IHS 2015)

Penalties

- ⊙ If the **penalties for not meeting regulations are sufficiently stringent**, these can be a greater driver for innovative technology development in the oilfield than cost. (IHS 2015)

2 <http://blog.ihs.com/gas-flaring-regulations-drive-new-technology-development-in-the-bakken>
<http://fas.org/sgp/crs/misc/R43148.pdf>

Parallel Approach to Site Development

Operational & Capital Considerations

- Type Curve Analysis
- Processing Needs
- Storage
- Site Access
- Optimization
- Reliability
- Maintenance
- Logistics
- Shut-in Technique
- Safety / Security
- Access / Re-use

PLANNING

OPERATING

DECOMMISSIONING

Environmental & Regulatory Considerations

- Air/Water Quality Regulation
- Public Outreach
- Federal & State Specifics
- Trending in other States
- Production and Retro-fit
- Spill Response and Remediation
- Record Keeping
- Ongoing Monitoring for Evolving Compliance
- Abandonment Regulation
- Partnering for Safe Decommissioning

Planning Considerations

Environmental & Regulatory Considerations: Planning

PLANNING

OPERATING

DECOMMISSIONING

Key Considerations During Planning

Air / Water Quality Regulation

- ⊙ Emissions
- ⊙ Flaring Regulations
- ⊙ Water Safety – Ground Water Protection Council and the Clean Water Act

Public Outreach

- ⊙ CRED
- ⊙ Energy from Shale
- ⊙ COGA

National vs. Local

- ⊙ Adoption, recognition and enforcement
- ⊙ Native Lands / First Nations

National Trending

- ⊙ Who is adopting what nationwide?

Environmental & Regulatory Considerations: Planning

PLANNING

OPERATING

DECOMMISSIONING

Planning Micro-case

Client

- ⊙ Bakken Producer

Regulation

- ⊙ Air Quality

Solution

- ⊙ Vapor Recovery Towers



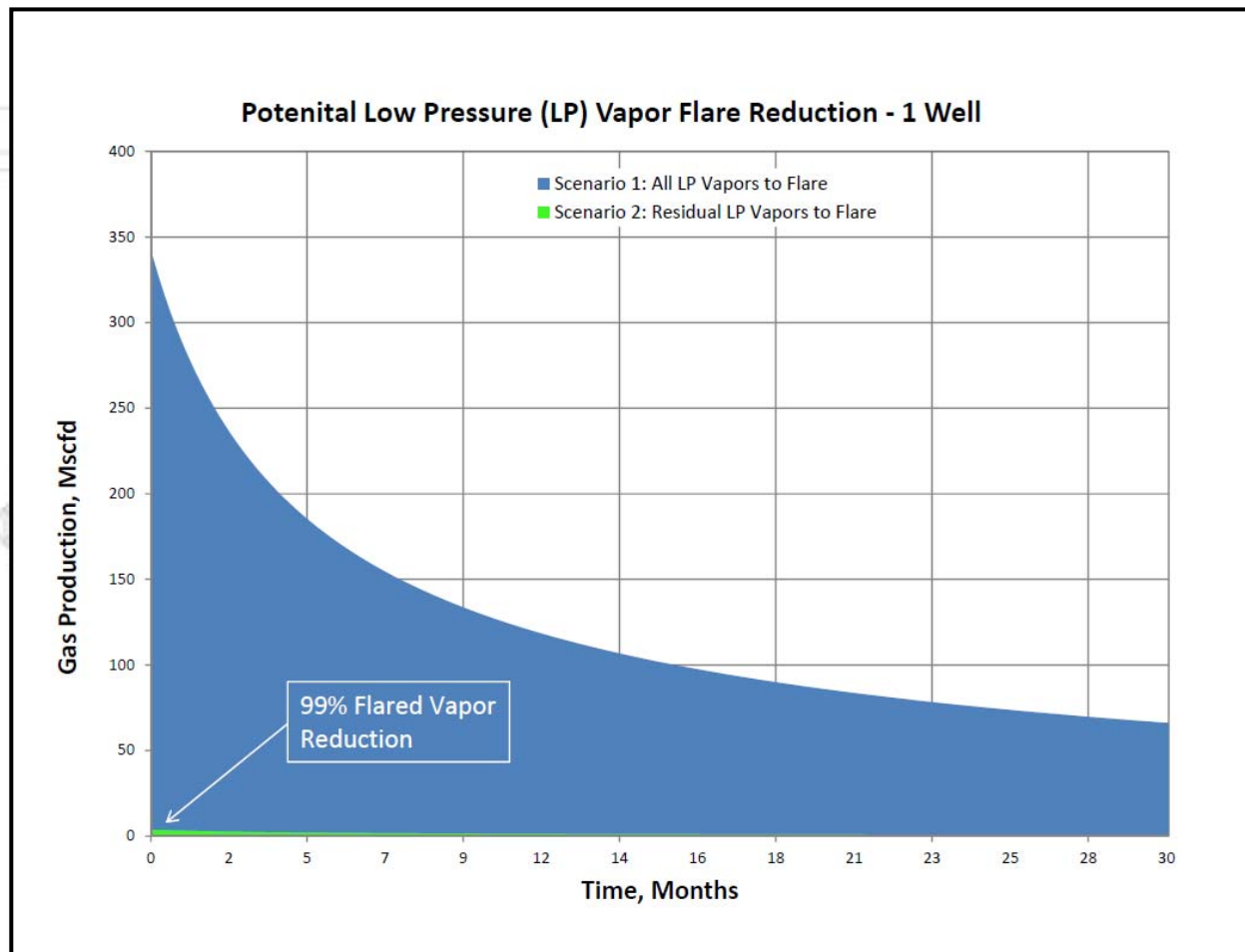
Environmental & Regulatory Considerations: Planning

PLANNING

OPERATING

DECOMMISSIONING

Planning Micro-case



Operating Considerations

Environmental & Regulatory Considerations: Operating

PLANNING

OPERATING

DECOMMISSIONING

Key Considerations During Operating

Production

- ⦿ Oil Conditioning

Spill Response and Remediation

- ⦿ Reporting
- ⦿ Clean-up

Records Keeping

- ⦿ What needs to be on file for an audit?

Ongoing Compliance

- ⦿ PSM/OSHA/EPA

Environmental & Regulatory Considerations: Operating

PLANNING

OPERATING

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Operations Micro-case

Client

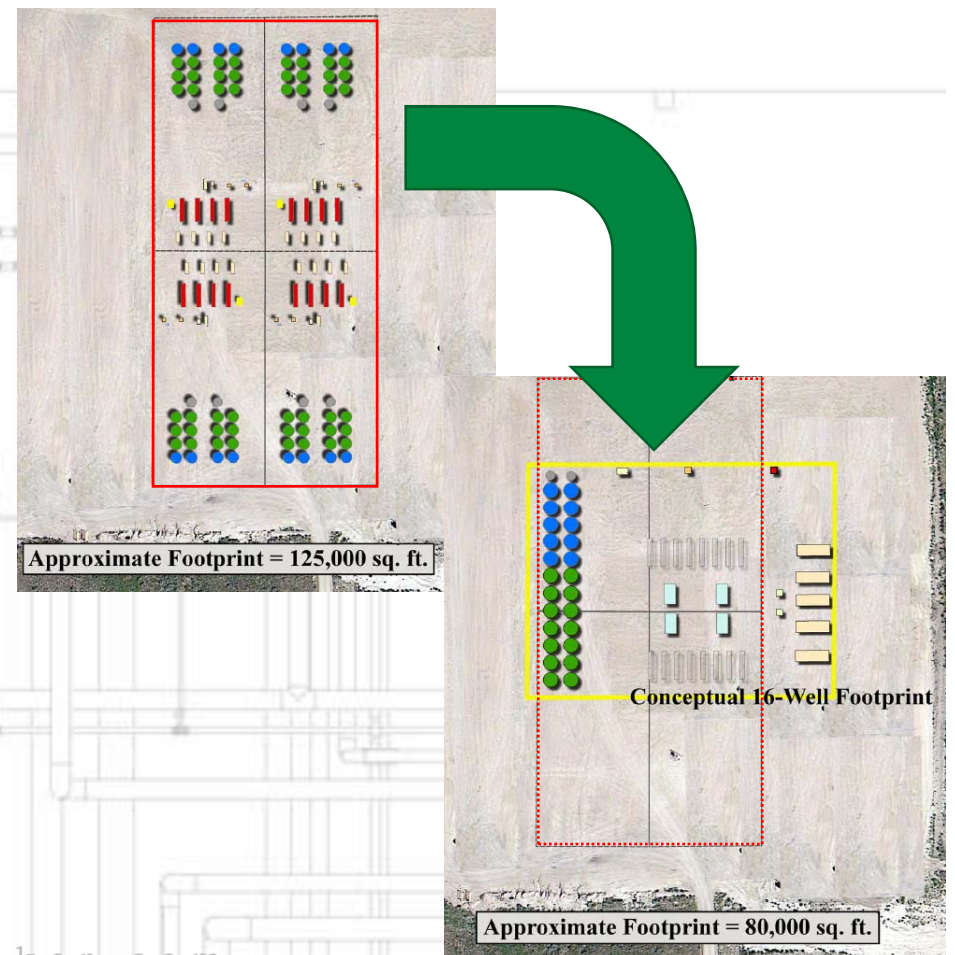
- ⊙ DJ Basin and Bakken E&Ps

Regulation

- ⊙ Traffic Emissions, Land Use

Solution

- ⊙ Decrease footprint



Environmental & Regulatory Considerations: Operating

PLANNING

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DECOMMISSIONING

	(4) 4-Well	16-Well Design
Approximate Site Footprint	250x500 (2.9 acres)	320x250 (1.8 acres)
Number of Wells	16	16
Land Use Per Well	0.18 acres/well	0.11 acres/well
Major Pieces of Equipment (per site)	112	53
Major Pieces of Equipment (per well)	7	3.3

Decommissioning Considerations

Env. & Regulatory Considerations: Decommissioning

PLANNING

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Key Considerations During Shut-down

Abandonment Regulation

- ⊙ Currently limited onshore regulation – offshore regulations may be trend

Partnering for Decommissioning

- ⊙ Choose credible partners for documentation and risk management as well as potential reuse in the future.
- ⊙ By plugging wells correctly, future environmental issues related to fluid or gas leakage can be avoided and thereby preserve savings otherwise eroded by remediation or litigation costs.

⊙ **Environmental Regulation Drives Innovation and Operations**

Required changes will drive the need for new ways of gathering and processing. Engineering rigor and skill sets will meet this need in an accelerated, data-informed manner.

⊙ **Early Consideration Pays Dividends**

Looking ahead, identifying trending, and building an environmental discipline will streamline field evolution

⊙ **Ongoing Monitoring Increases Agility**

Remaining educated to changing regulation keeps field evolutions on schedule and helps to manage capital expenditures and operating cost

⦿ Engineering Facilitates Longevity

Designing field infrastructure with a systems approach allows for cost-effective expansion and minimized maintenance

⦿ Documentation and Management Mitigate Risk and Increase Safety

Well documented adherence to regulations and standards help to defend site integrity in the event of accidents and audits

Why Halker?

⦿ **Speed-to-market**

Our specialization accelerates our clients' abilities to engineer and design, getting them to market faster, so that they may more quickly recognize revenue and market share.

⦿ **Agility**

Halker cultivates a culture of collaboration, innovation, and knowledge generation. This helps our clients to identify and implement solutions more quickly, to overcome challenge and capitalize on opportunity.

⦿ **Safety and Quality**

Halker Consulting practices continuous improvement at all levels of the organization. This allows us to remain current and compliant in engineering functional designs that are safely deployed and deliver the production results they were intended to provide.

⦿ **Flexibility**

Not only can we help you remain agile, our firm can flex with your organization to provide fit-for-purpose solutions to your business objectives, even as they may change over time.

⦿ **Engineering Orientation**

Halker was founded by real engineers. We are comfortable with ambiguity and engage clients in consultative ways in which we seek to understand and then present multiple options.