Case Study: Design and Construction of Cost-Effective Produced Water Infrastructure for Start-Up Operators and Midstream Companies

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Case Studies - Summary

**Background:** For a start-up producer or midstream company, initial construction and operations can be a challenging undertaking, based upon available capital and manpower resources.

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<td>Producer C</td>
<td>Water Midstream D</td>
<td>Producer E</td>
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<tr>
<td>Pipeline</td>
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<tr>
<td>Wellsites</td>
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<td>SWDs</td>
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<td>2</td>
<td>1</td>
<td>7</td>
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<tr>
<td>Recycle</td>
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<td>None</td>
<td>None</td>
<td>5 Facilities</td>
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Producer A

Problem: Needed to maximize flowrate of existing produced water pipeline to reduce frac feed time

• 10” HDPE, SDR 11 pipeline
• Hydraulic model not available
• Multiple producing wellsites
• Multiple legs and tie-in points
• Large elevation changes
Producer A:

Solution:

• Maximized flowrate of 36,353 BWPD achieved
• Analyzed multiple scenarios
• Optimized pump sizing and locations
• Optimized Maximum Allowable Operating Pressure (MAOP)
• Improved valve stations
• Reduced frac feed time
• Cost savings

Takeaway:

Design pipeline for maximum flowrate to reduce frac feed time
Producer A:

**Problem:** Needed to improve water quality for existing produced water recycle storage facility treatment within budget constraints

- Total capacity
- Tanks vs. pits
- Pump sizing
- Treatment rate
- Treatment methods
- Reduce $\text{H}_2\text{S}$, Fe$_2$S, Bacteria
- Cost-effective design
Producer A:

Solution:
• Equipment selection
• Pump sizing
• 250,000BBL produced water pit
• Treatment method options
• Construction cost data for future expansion

Takeaway:
Determine water quality level and treatment method for facility budgets
Producer B: SWD #1

Problem: High SWD Truck Hauling Costs: isolated wellsites, rough lease roads.

Internally built SWD #1:

- 5,000 BWPD @ 500psig
- Future expansion to 25,000 BWPD
- Pump redundancy
- Filtration
- Electrical control panel
- Alarm system with SCADA
- 6 week start-up date
Producer B: SWD #1

**SWD #1**
- Initial schedule: 6 weeks
- Multiple subcontractors
- Difficult management

**Issues:**
- Actual start-up: 3 months
- Continued trucking costs
- Significant cost overruns
- Manual pump operation
Producer B: SWD #2

**Solution:** Design and construct SWD #2 using EPC methodology:

- 20,000 BWPD @ 1000psig
- 6,000 BBL storage capacity
- 100% pump redundancy
- Fully automated unmanned facility
- SCADA communication
- Engineering, procurement, and construction (EPC) approach
Producer B: SWD #2

EPC methodology

Benefits:
- Significant cost savings
- Fast track 6 week construction timeframe
- Single point of contact
- Quick, efficient, cost-effective
- Utilized a hybrid contract with a fixed price, variable cost bonus/penalty structure

Takeaway:
EPC approach saves money throughout construction
Producer C: SWD Options

Problem: High SWD Truck Hauling Costs

Solution Option 1; SWD #1: Upgrade Existing SWD
  • 10,000 BWPD @ 2200 psig

Solution Option 2; SWD #2: New SWD EPC
  • 25,000 BWPD @ 2000 psig
  • Costs 50% higher than upgrade

Solution Option 3; SWD #3: Tie Into existing E&P or 3rd party water midstream pipeline
Producer C: SWD #3

Solution Option 3; SWD #3: Tie into existing E&P pipeline or 3rd party water midstream pipeline

• Analyzed existing producing wells
• Optimized pipeline diameter, material, operating pressure
• Least expensive option

Takeaway:
• Conduct cost benefit analysis for multiple options
Water Midstream D:

**Problem:** Need budgetary cost estimate for produced water system with pipeline, SWDs, and recycle treatment for budgetary approval

**Solution:** Provided design
- 150,000 BWPD max flowrate
- Optimized pipeline diameter, material, operating pressure
- Provided total installed cost estimate/mile

**Takeaway:**
Use EPC estimates to develop budgets
Case Study E - Large Producer

• Full engineering design
• More complex recycle treatment
• Better water quality results
• Large pipeline
• Multiple SWDs
• Economy of scale
• Larger budgets
Conclusion

• Design pipeline for maximum flowrate to reduce frac feed time
• Determine water treatment quality level and facility budgets
• EPC approach saves money throughout construction
• Conduct cost benefit analysis for multiple options
• Use EPC estimates to develop budgets
Thank you for attending.
Questions? Please contact:

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