Welcome!

The program will begin soon.

You will not hear audio until we begin.

Webinars

Technical Advancement to Reduce Emissions by Combating Flow Assurance Issues

October 25, 2022

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Opportunities for Hydrate Management Optimization Technologies

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October 25, 2022

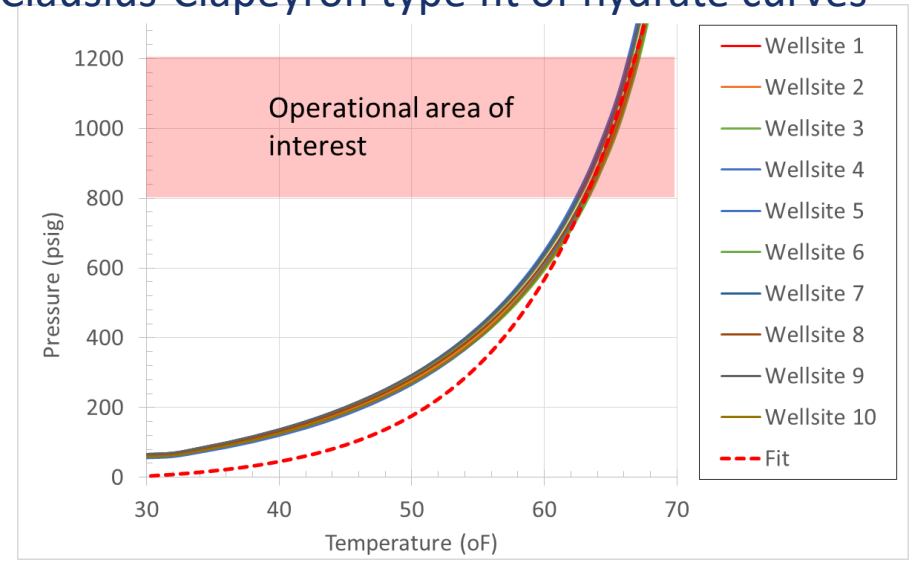
SPE International

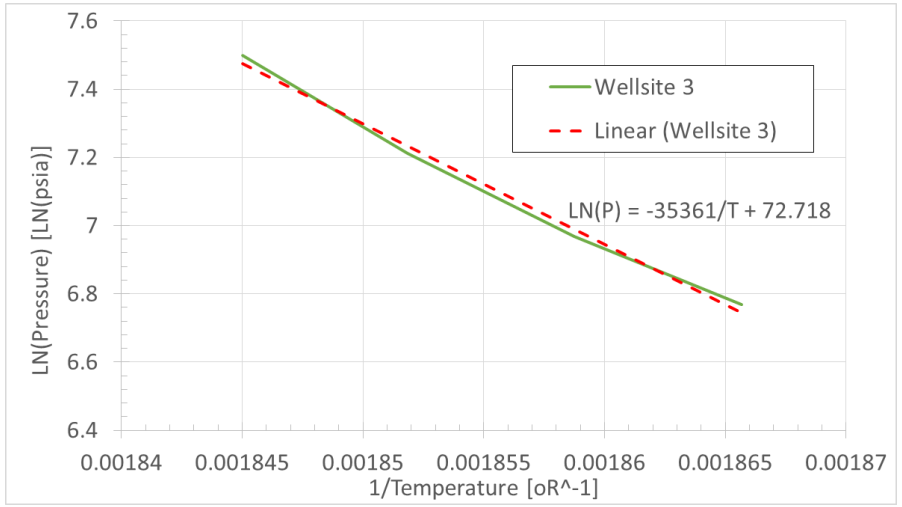
ExxonMobil

Inhibitor reduction through automated dosing

- Scalpel rather than hammer:
  - Applicable to continuous inhibitor injection fields
  - Often inhibitor rates based on worst conditions (max subcooling water cut) even early in season
  - Field condition surveillance with automation can result in significant inhibitor reduction
  - Empirical regressions for inhibitor rate vs. field conditions are utilized
    - Gas flowrate
    - Outlet temperature
    - System pressure

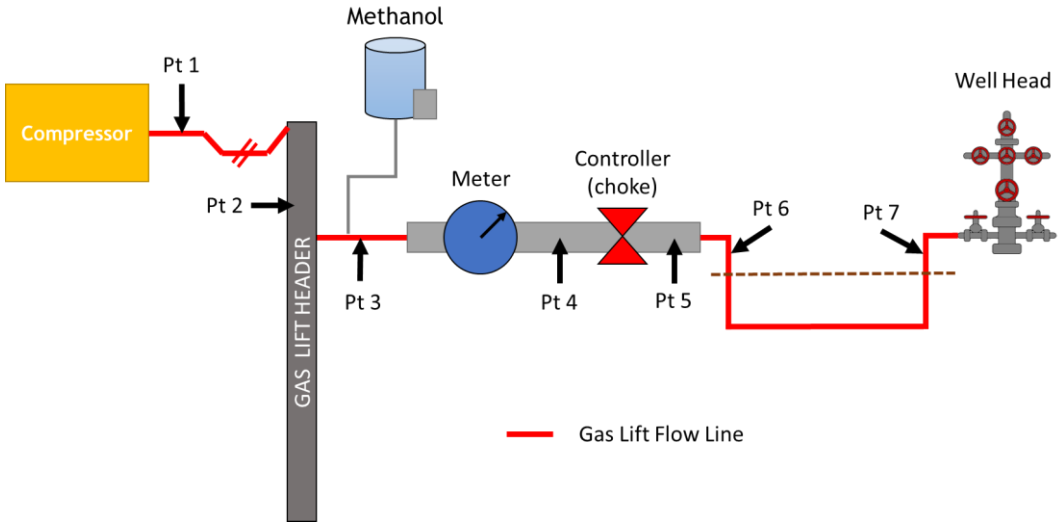
Clausius-Clapeyron type fit of hydrate curves





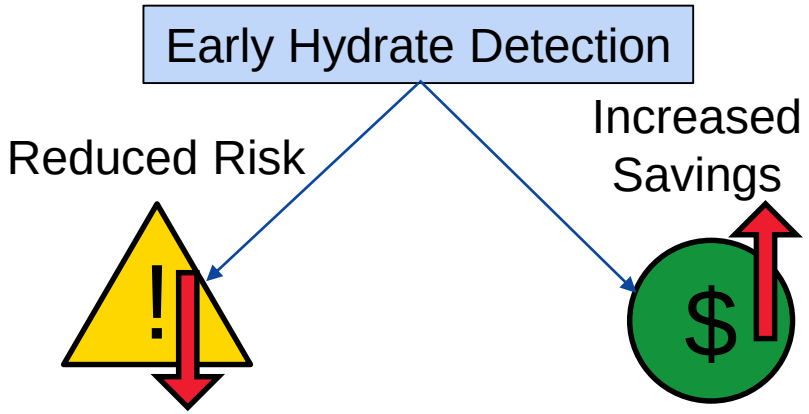
Inhibitor reduction through automated dosing

- Method relevant to numerous field applications:
  - Delaware Basin gas injection
  - Bakken gas condensate production
  - Qatar gas production
- Reductions seen as much as 60% inhibitor use

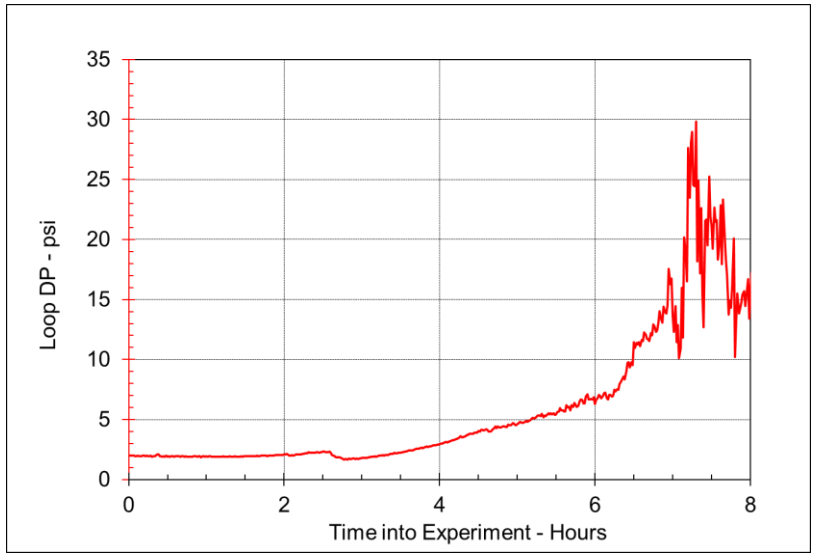


Next evolution inhibitor optimization: Early hydrate detection

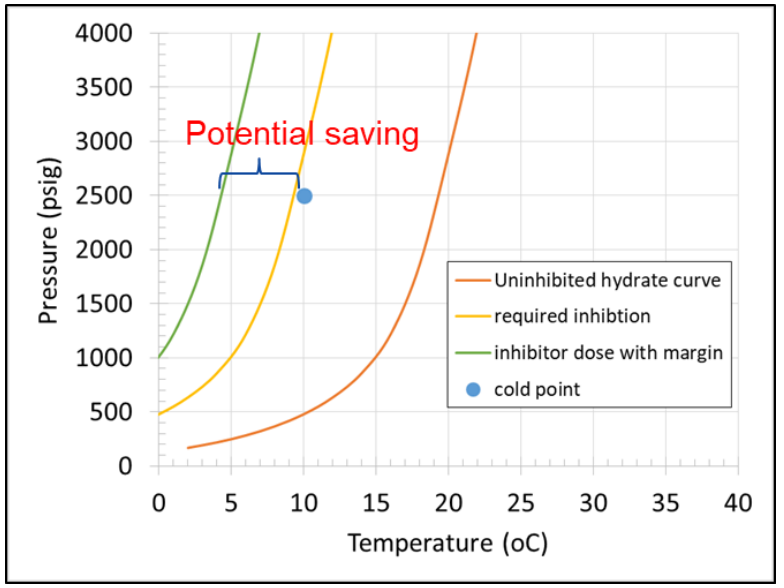
- Typical hydrate detection: pressure differential increase
- Often occurs after significant amount of hydrate formation



- Significant inhibitor reduction through continuous optimization
- Reduced downtime by extending hydrate response time
- Reduced downstream impacts of inhibitor use (e.g., chemical disposal, degraded product)



Sloughing events in the ExxonMobil Friendswood flowloop

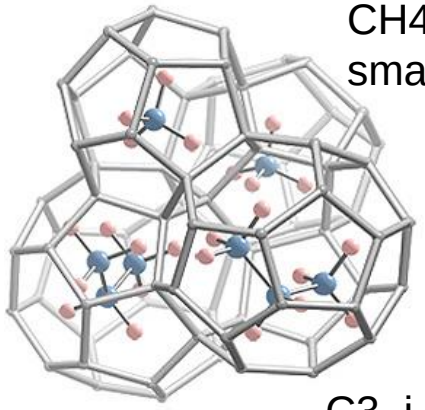


Inhibitor reduction through automated dosing

Solution Technology

- Hydrate formation modifies hydrocarbon stream compositions:
  - Selectively captures specific gas components (C1-C4, i-C5, H2S)
  - Expected hydrocarbon composition change is predictable with flash models
- Online gas composition analyzers (e.g., GC, QCL) provide early detection at hydrate onset, long before plugging

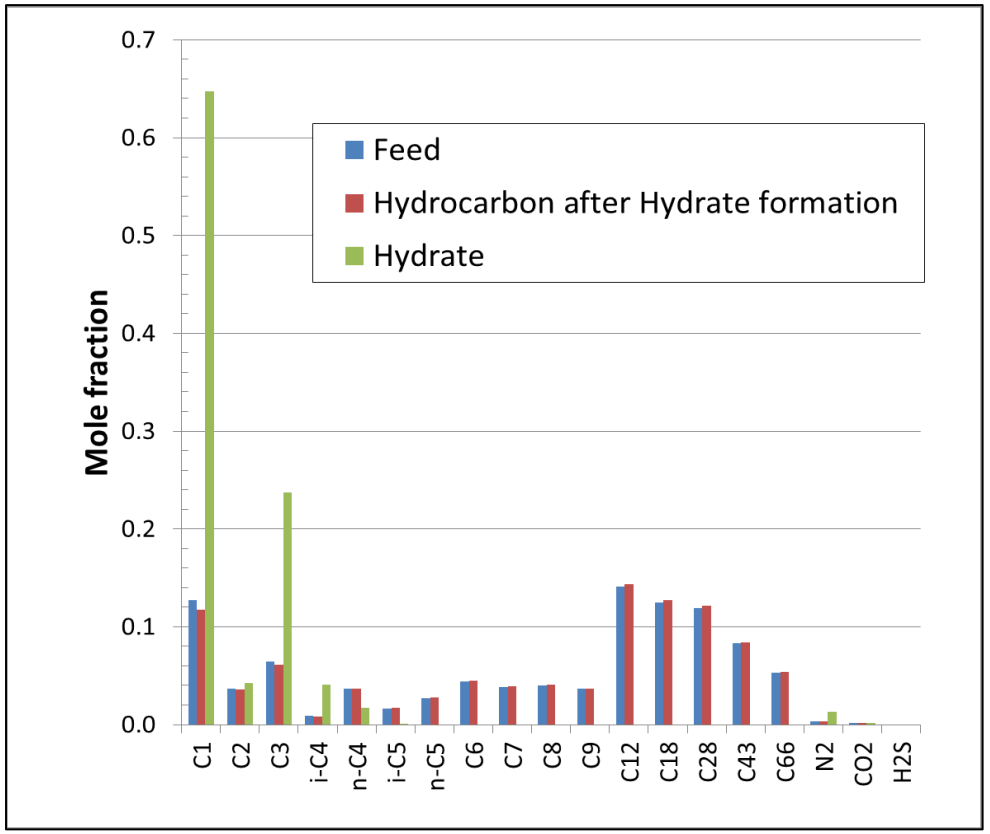
Field GC



CH4, C2H6, H2S in small cages (5^{12})

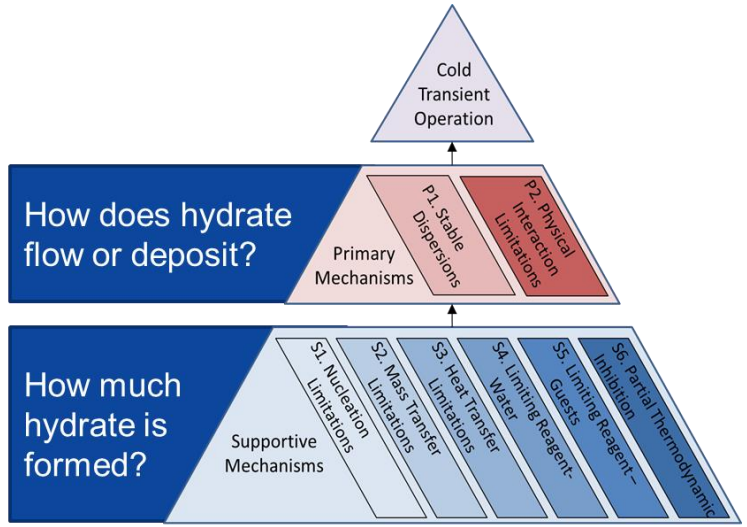
C3, i-C4, n-C4, i-C5 in large cages ($5^{12}6^2$)

Hydrate structure	Small : Large cages
sI	1 : 3
sII	2 : 1



Beyond optimization: risk management

- Operating temporarily within hydrate conditions may be achievable under appropriate conditions such as the following:
  - Low water cut
  - Low GOR
  - Low subcooling
  - Brief durations
  - Proper geometry (e.g., dry trees)
  - Emulsifying or “magic” oils



Risk-managed field trial: start-up after 7-day pressurized shut-in: