Implementing a Chemical EOR Project

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Presented by: John Putnam
Purpose-built chemical processing and injection systems for chemical EOR project implementation on a pilot or field scale basis.

Chemical EOR processes include:
- Polymer Augmented Water Flooding
- Surfactant-Polymer (SP)
- Alkaline-Surfactant-Polymer (ASP)
- Alkaline-Polymer (AP)
Modular Style, Factory Pre-Built ASP Chemical Processing & Injection Facility rated to 5,000 BPD
Designing the Facilities

- Project schedule
- Initial design requirements & site orientation
  - Systems performance requirements
  - Internal mechanical, electrical & automation specs
- Process flow diagrams & general arrangement layouts
- P & I Diagrams
- Site drawings & civil work requirements
- Installation & Start-Up
Determine Facility Operating Parameters

- Define Facility Performance
  - Chemical Handling & Processing
    - Polymer
    - Surfactant(s)
    - Alkaline Agents
      - Soda Ash
      - Other Alkaline
    - Water Treating Reagents
      - Biocides
      - Oxygen Scavengers
Facility Operating Parameters

- Define Facility Performance
  - Injection Rates & Pressures
    - How many injection wells?
      - Individual rate control – dedicated PD pump per IW
      - Or, High Pressure Slip-stream Scheme
  - Fluid characteristics
    - Mechanical degradation
    - Viscosity
    - Temperature
Operating Logistics

- Raw Chemical Receiving & Handling
  - Bulk
  - ISO Containers
  - Semi-bulk bins
- Special handling requirements
  - Polymer
  - Surfactants
  - Alkaline Agents
- QA/QC of Received Chemicals
  - Factory Certification
  - Field verification
  - Quarantine & Record Keeping
Facility Construction Style

- Construction style
  - Modular – oil field skid type
    - Pre-built & shipped to location
    - Minimizes on-site installation activities
    - Fastest method lab-to-field for pilot projects
    - Portability permits inter & intra field moves
  - Build In-Place - permanent building type
    - Install process systems at the location
    - Construction trades required on-site
    - More economical for full-field or large installations
Site Infrastructure & Utilities

- Water Source
  - Required water pre-treatment
- Facilities site plot plan
  - Chemical & Process Facility Location
  - Supply tanks
  - Delivery truck access
- Electrical Power
- Flow Line & Injection Header Scheme
Operations & Training

• Theory of operation
• Process logic & Operator interaction
• Controls & Automation
• Daily tasks
  • Filter changes
  • Preventative Maintenance
  • Injected Fluid QA/QC
  • Raw Material QA/QC
• Facility Start-Up & Commissioning
• Operator Training
Human Machine Interface
Injected Fluid Quality

- Daily QA/QC
  - Process water hardness
  - Viscosity
  - pH
  - Conductivity (ASP)
  - Filter Ratio
  - IFT or Phase Behavior
  - Material balance
Automatic Polymer Dispersion & Maturation
Conclusions: Successful Implementation Defined

Transferring the lab optimized chemical EOR chemical recipe to field injection using reliable, low maintenance chemical handling, processing & injection facilities that are fit-for-purpose.

- QA / QC that insures desired injection fluid quality
- Monitoring response to both the injection and production side and accurate interpretation
- Readiness to diagnose and correct well issues such as injection non-conformance
- Readiness to handle & process production fluids