Enhanced Oil Recovery OGCC Regulatory Requirements

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Wyoming OIL & GAS CONSERVATION COMMISSION

Stages of Oil Production

- **Primary Recovery**– natural pressure in the reservoir or gravity drives oil into the wellbore, which can be combined with artificial lift to bring the oil to the surface.
  - Artificial lift includes rod pumps, electric submersible pumps (ESP), gas lift, plunger lift, etc.

- **Secondary Recovery** – injection of fluid such as water or gas to maintain reservoir pressure and push oil towards the production wells.

- **Enhanced Oil Recovery (tertiary)** – utilize various methods to improve oil displacement or fluid flow in the reservoir.

Types of EOR

- **Enhanced Oil Recovery (tertiary recovery)** – utilize various methods to improve oil displacement or fluid flow in the reservoir.
  - **Thermal** – introduction of heat to decrease the viscosity of the oil. Steam injection as an example. Not common in WY ~10 total projects.
  - **Chemical injection** – Injection of polymers (increase viscosity of water prevent channeling of water, improve sweep) or surfactants (reduce surface tension. Polymer injection is somewhat common in WY.
  - **Gas injection** – inject natural gas, nitrogen, CO2 or other gases. Expand in reservoir to push additional oil or dissolve in oil lowering its viscosity.
    - Most CO2 injection in WY is WAG (water alternating gas) which improves sweep efficiency and delays gas breakthrough.
    - It is also common to try CO2 or Gas Huff and Puff projects.

EOR Regulatory Process

- Two main requirements specific to EOR:
  - Unitization – W.S. §30-5-110;
  - Injection – OGCC Rules Chapter 4, Section 7, 8, 9, 10, 11 and 12.

- Other statutes/rules may be applicable depending on planned work by the Operator, such as:
  - APDs;
  - P&As;
  - Well workovers;
  - Well/operatorship transfers.

EOR Regulatory Process

- Unitization – W.S. §30-5-110:
  - Why? – provides for efficient and economic operation of a field-wide unit to maximize ultimate recovery of oil or gas. Allows for joint operation of multiple, separately owned tracts within a reservoir.
  - Requirements to unitize:
    - Unit is necessary to protect correlative rights and prevent waste, and can reasonably be expected to increase the ultimate recovery of oil or gas;
    - Provides for an operating plan including provisions for allocating oil and gas produced from unit area to and among the separately owned tracts; and for managing of unit, costs allocated and paid among the owners.
- Unitization is typically completed for Secondary Recovery, it should not add regulatory delay when the field converts to Tertiary Recovery (EOR).

EOR Regulatory Process

- Underground Injection Control (UIC) – OGCC Rules Chapter 4, Sections 7, 8, 9, 10, 11 and 12.
  - OGCC has primacy from EPA to implement the Class II UIC program.
    - Class II = inject fluids associated with oil and gas production.
    - 3 types – disposal, injection (secondary or enhanced recovery), liquid hydrocarbon storage.
  - UIC regulatory requirements can take time to work through depending on site specific needs.
    - Secondary Recovery has the same UIC regulatory requirements. Once approved for Secondary Recovery, the EOR project can progress without duplication which reduces regulatory delays.
      - Certain changes between projects may trigger additional requirements – such as an expansion of the unit area or new injection wells.

EOR Regulatory Process

- Injection – Some UIC actions can create delays.
  - OGCC actions on aquifer exemptions must be reviewed by EPA before final approval. EPA review can add significant time to for final approval.

- Other processes for field conversion to CO2 injection can create delays.
  - CO2 injection may require different materials such as stainless steel, nickel or high chromium piping, tubing, valves, packers, etc.
  - Evaluation of other wells in the field to ensure elimination of migratory pathways for CO2 to escape the intended injection zone may be extensive.
    - May need to repair, plug, or re-plug wells, remedial cement work, etc. to eliminate migration to another formation or to the surface.

Factors Affecting Ability to Conduct EOR

- Well bonds –
  - Authorized by W.S. 30-5-104(d)(i)(D). To ensure Operator's duty to plug or repair wells and to ensure compliance with rules and orders of the Commission.

  - Bond amount set by OGCC rule – Chapter 3, Section 4.
    - Operators may bond each well individually or provide a blanket bond covering all wells.
      - If using blanket bond, then also may be required to submit idle well bonds.

Factors Affecting Ability to Conduct EOR

- Well bonds –
  - Bonds may be used to P&A wells if no Operator responsible to plug exists.
    - Protects Taxpayers from having to cover costs to P&A the wells.
      - For orphan wells the Taxpayers are other oil and gas Operators who pay the Conservation Tax, which covers all costs to P&A wells in excess of the bond.
  - Orphan wells can cause impacts to public health and safety, pose a risk to livestock and wildlife and nuisance to landowners, and can create waste of oil/gas. Orphan wells should be plugged before they create these issues and before deterioration increases the cost to plug.

Alleviating the Impacts From Regulatory Issues

- Well bonds –
  - Bonding Pools – W.S. §30-5-129 passed by Legislature in 2025:
    - Will help many Operators access surety bond market at lower rates with less/no collateral requirements, while still providing necessary bonds to protect the Taxpayer and allow wells to be P&A.

  - OGCC accepts Operator's plans to plug or produce the wells in lieu of bonding. OGCC has accepted idle well plans in lieu of a portion or all idle well bonds for almost every Operator in Wyoming.
    - Ability to accept plans in lieu of bonding allows the OGCC to consider Operator's plans for EOR or any other plan to plug or produce.

Alleviating the Impacts From Regulatory Issues

- UIC permitting process – can create delays, especially when involving EPA. Any delays are mostly encountered in the Secondary Recovery phase of production and not during Tertiary Recovery (EOR). Delays can be addressed by:
  - OGCC/Operator communication early to allow review process to occur concurrently with other preparatory work.
  - OGCC has been directly working with EPA Region 8 to address delays in UIC aquifer exemption reviews.
  - OGCC also working through state UIC association on national scale to address timeliness.
    - Issue that is impacting all classes of UIC wells, not just Class II.

Alleviating the Impacts From Regulatory Issues

- Other processes for conversion to EOR:
  - OGCC requires review and approval for certain work such as well plugging or replugs, remedial well work, etc.
    - Regulatory delays should not be encountered during these processes as the OGCC typically approves these notices within days or weeks.
    - OGCC/Operator communication allows nearly immediate review/approval if necessary.
  - In the case of federal wells, OGCC and BLM authorities overlap for some of this work. OGCC can assist Operator in obtaining BLM approval if delays are encountered on the federal side.

Thank You

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