Plugging Modifications Discussion
September 21, 2020
Partnering with West Virginia through INNOVATION to Unlock Value

Who better than Steve Jobs to encourage innovation…?

Innovation distinguishes between a leader and a follower.

But innovation comes from people meeting up in the hallways or calling each other at 10:30 at night with a new idea, or because they realized something that shoots holes in how we’ve been thinking about a problem.

Innovation is the ability to see change as an opportunity - not a threat

Steve Jobs
Agenda & Participants

• Agenda
  • Describe the opportunity
  • Review the proposal
  • Establish next steps
  • Q & A

• West Virginia DEP participants
  • Austin Caperton, WVDEP Cabinet Secretary
  • James “Marty” Martin, Director of the Office of Oil and Gas

• Diversified participants
  • Brad Gray, Chief Operating Officer
  • Ben Sullivan, General Counsel
  • Jeff Mast, Production & Plugging Director

• Industry expert
  • Mike McCown

• Government affairs consultant
  • Larry Puccio
Proposal to Modify Plugging Procedures…the Opportunity

• **Simply stated…effective process, less disruption, lower costs**

• Proven, safe and effective plugging procedures

• Less interference, disruption and impact to surface owners

• Less traffic and road usage by heavy trucks
  • Less road wear and tear
  • Lower emissions

• Less time on well pad lowers risk of safety incidents/accidents

• Lowers project cost by reducing number of project hours/days

• Lower project costs generates opportunity for other operators and state agencies to plug additional wells

• Lower project costs creates incentives for other operators to fulfill obligations
Proposal to Modify Plugging Procedures…the Simple Description

• Two primary well types
  • Non-modern construction - *Older wells that were drilled prior to modern regulations.* Effectively, regulations in place at time of non-modern well construction did not require cement to surface in structural casing pipe in order to provide further protection to water and coal areas.
  • Modern construction – *Newer wells drilled under modern regulations that require cement to surface in open areas around all structural casing pipe which is designed for the protection to water and coal areas.*

• Non-modern well plugging proposal…simply stated
  ✓ Pull production casing, regardless of diameter (DGOC change from initial proposal)
  ✓ Perforate (shoot holes) in multiple casing strings VS. current regulations requiring ATTEMPTS to pull casing pipe (see example – the 10” and 6 5/8” casing)
  ✓ Fill well bore to total depth with combination of cement and bentonite gel

• Modern well plugging proposal…simply stated
  ✓ Production casing string remains in well bore because all other casing pipe is cemented to surface due to modern construction requirements
  ✓ Perforate (shoot holes) in multiple casing strings VS. current regulations requiring ATTEMPTS to pull casing pipe (see example – the 9 5/8”, 7” and 4 1/2” casing)
  ✓ Fill well bore to total depth with combination of cement and bentonite gel
Non-modern well…A picture is worth thousand’s of $’s

- Non-modern well construction
- Note amount of cement used during plug project (light gray)
- 3” production tubing is removed (change from prior proposal)
- Perforate the 6 5/8” and 10” casing
- Cement required zones to surface, supplement with gel spacers
- Effective plugging project complete
• Modern well construction

• Note amount of cement used during well construction (dark gray)

• 4 1/2” production tubing remains in well bore

• Perforate the 4 1/2”, 7” and 9 5/8” casing

• Cement required zones to surface, supplement with gel spacers

• Effective plugging project complete
§22-6-24. Methods of plugging well.

General Requirement

- Recover Casings and Tubulars.
- Cement Plugs - oil, gas, salts, workable coal, fresh water strata.
- 6% Gel between plugs.
- Tag plugs as necessary.
- Surface Cement Plug.
- Install Monument with API PERMIT ID (height 30 inch minimum).

Placement of Cement Plugs

- Bottom Wellbore Plug.
- 100 Feet Cement Plugs Minimum.
- Any Oil and Gas Bearing Strata.
- Across Casing Cuts.
- Above shallowest Salt Bearing Strata.
- Workable Coal Strata (twenty inches).
- Fresh Water Bearing Strata.
- Surface Plug.

Coal Protection Strings (Casing-Annulus Cemented)

- 100 Feet Expanding Cement below Coal Protection String.
- Coal Protection String remains (vent or ‘coal degas’ purpose).
- Well Left for Vent or De-Gas Purposes.

Coal Protection Strings (Casing-Annulus Open)

- Recover Coal Protection String.
- Cement across Coal Strata.
- Surface and Fresh Water Strata plugged.
- Install Monument.

§35-4-13 PLUGGING, ABANDONMENT, and RECLAMATION

§35-4-14 PLUGGING METHODS
Proposed Next Steps

- Establish a pilot program for DGOC to select 10 wells to plug using proposed procedures

- WVDEP to assign one dedicated inspector to work with DGOC on all phases of the pilot program

- Start pilot program to begin in 2021 with potential to complete 1-3 wells during Q4 2020 (weather dependent).

- In 2021, confirm pilot program assumptions for plugging effectiveness and cost reductions

- In 2H 2021, work with WVDEP to modify regulations based on successful pilot

- Modified regulations officially in place 1/1/2022
Questions?

THANK YOU for the opportunity to INNOVATE for the benefit of West Virginia!

DIVERSIFIED GAS & OIL CORPORATION