

SNYDER E 1-A*

FLOWBACK PROCEDURE

***Revised August 1, 2017**

Flowback Procedure

Technical information regarding flowback procedures is attached to this document. The flowback period is anticipated to last approximately 66 days with 50% of the recovery occurring within the first approximately 25 days (see trucking schedule attached to Supplemental Information Exhibit). Any natural gas produced during flowback operations will be flared and/or produced to a sales line. Flowback itself will not be vented or flared unless there is an upset condition requiring temporary venting or flaring. Recaptured LPG is planned to be returned to the supplier. No waste (e.g., sand, brine) is anticipated from the flowback, but in the event any waste is produced it will be disposed of at a facility in Pennsylvania permitted to accept such waste.

LPG Frac Flowback Procedures

Objective: To safely flowback and capture the LPG frac fluid as a liquid into pressurized tanks using a closed-loop system to minimize vaporization and excess emissions, and to separate natural gas for flaring and/or production to a sales line.

Safety:

- All personnel shall wear a minimum of NFPA 2112 FR Clothing, safety glasses, steel toe boots, and hard hat while on location. Smoking will NOT be allowed anywhere on the lease. Do not stand near high pressure lines and remain a minimum of 75' away from the wellhead during operations. Perform pre-job safety meeting each morning and before beginning new operations. All flowback operations are to be conducted in accordance with "Well Testing and Fluid Handling, Industry Recommended Practice (IRP), Volume 4 – 2007.
- NOTE: Though liquid under moderate pressures, LPG returns are flammable gases and must be either flared, gathered into pressurized tanks or directed to a pipeline for recovery at facilities. At no time should LPG returns be directed to the atmosphere or non-pressure tanks. Refer to LPG Hazards below for additional information.

Minimum Equipment Specs:

- 10K Pneumatic ESD Valve with nitrogen bank
- 10k psi vertical sand trap
- 10k dual choke manifold
- 10k 1MMbtu/hr line heater
- 36" X 10' 1440psi MAOP Horizontal 2-phase test separator
- 36" X 10' 500psi MAOP Horizontal 3-phase test separator
- 15MMscfd Refrigeration Plant (1440psi MAOP)
- 2-500bbl horizontal sealed frac tanks with external site glass and 16oz thief hatches
- 60' dual flare stack with detonation arrestors, propane pilot, and electronic spark ignitor
- Pneumatic control valve (relief) to flare
- 3-18,000 gal pressurized tanks (250psi MAOP)
- Multiple LEL sensors

Procedures:

1. Conduct pre-job safety meeting with all onsite personnel and complete JSA
2. MIRU flowback equipment per the attached schematic using 1502 iron (Note: flare is to be a minimum of 100' away from the wellhead or any production equipment)
3. Install and test LEL monitors
4. Function test ESD valve & zero out chokes
5. Pre-heat line heater to 120 degrees Fahrenheit

6. Record shut-in wellhead pressure
7. Slowly open choke to establish minimal flowrate to pressurize equipment and check for leaks (NOTE: safety supervisor is to use portable LEL monitor for leak detection)
8. Initial separator set points are to be 900psi on the HP and 225psi on the LP
9. Set relief valve on the pressurized tanks at 175psi
10. Set control valve on sales line at 125psi
11. Open choke to establish flowrate of ~2-5bbls/min
12. Adjust chokes upstream and downstream of line heater to split the pressure drop
13. Monitor separator temperatures and adjust line heater temperature to keep separators between 50-90 degrees Fahrenheit. (Note: refer to propane saturation chart to ensure the LP separator temperature and pressure remain within the liquid region)
14. Operate the refrigeration unit within the parameters specified by the manufacturer
15. Closely monitor separator and tank levels
16. Record hourly gas and liquid rates as well as pressures
17. Immediately shut in the well for any safety reason

LPG Hazards:

- LPG is approximately twice as heavy as air when in gas form, will tend to sink to the lowest possible level and will accumulate in low areas.
- LPG in liquid form can cause severe cold burns to the skin owing to its rapid vaporization.
- Vaporization can cool equipment so that it may be cold enough to cause cold burns.
- LPG forms a flammable mixture with air in concentrations of between 2% and 10%.
- LPG can be a fire and explosion hazard if stored or used incorrectly.
- Vapor/air mixtures arising from leakages may be ignited some distance from the point of escape and the flame can travel back to the source of the leak.
- At very high concentrations vapor can have an anesthetic effect and subsequently become an asphyxiant by diluting the available oxygen.
- A component that has contained LPG is normally empty but may still contain LPG vapor and be potentially dangerous.
- Refer to the Material Safety Data Sheet for LPG for complete safety information.