

FRAC FLOWBACK WATER TREATMENT PROCEDURES

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|---|--------------------------|--------------------------|--------------------------|----------------------------|
| 1. Sample the Frac water at both ends of the pit prior to treatment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Marcellus Treatment |
| 2. Check pH with litmus paper. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Notes: pH |
| 3. Treat the Pit water with bag slack lime, to a pH of 6.5-7.0. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. Place a screen/filter at inlet to Turbojett to catch debris. | | | | |
| 5. Set the Turbojett® system at one end of the pit and collect a sample from the outlet of the Turbojett® system. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 6. Recycle the Pit at least once. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 7. Collect a sample of the frac water after the treatment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 8. Re-sample the Pit when the precipitate settles. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 9. Pump the water out from the Pit through a screen when it meets the water discharge criteria. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 10. Check samples as the Pit is drained to insure water quality is maintained. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 11. The Pit should be emptied of the water since the soluble metals and sulfates will be precipitated and the water will be clean when pumped through a screen. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

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1. Sample the Frac water at both ends of the pit prior to treatment.
2. Check pH with litmus paper.
3. Treat the Pit water with bag slack lime, to a pH of 7.0.
4. Set the Turbojett® system at one end of the pit and collect a sample from the outlet of the Turbojett® system.
5. Place a screen/filter at inlet to Turbojett to catch debris.
6. Recycle the Pit at least once.
7. Collect a sample of the frac water after the treatment.
8. Re-sample the Pit when the precipitate settles.
9. Pump the water out from the Pit through a screen when it meets the water discharge criteria.
10. Check samples as the Pit is drained to insure water quality is maintained.
11. The Pit should be emptied of the water since the soluble metals and sulfates will be precipitated and the water will be clean when pumped through a screen.

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DISCHARGE LAND APPLICATION

Sample 1 Sample 2 Sample 3

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|---|--------------------------|--------------------------|--------------------------|
| 1. Sample the Frac water at both ends of the pit prior to discharge | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Check pH with litmus paper. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Check DO with on-site test kit. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Check Iron with colormetric. | | | |
| 5. Check TSS with indicator field test. | | | |
| 6. Check Chlorides with on-site test kit. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Set the Turbojett® system at one end of the pit and collect a sample from the outlet of the Turbojett® system. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Collect a sample of the frac water mid (½) discharge. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Collect a sample of the frac water at end of the discharge. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Pump the water out from the Pit through a screen when it meets the water discharge criteria. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Check samples as the Pit is drained to insure water quality is maintained. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. The Pit should be emptied of the water since the soluble metals and sulfates will be precipitated and the water will be clean when pumped through a screen. | | | |

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Notes of Treatment Day

Notes of Discharge Day

Site Memo