

# MEL Frac Water Flowback Water Treatment and Recycling

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## Hydraulic Fracturing (Frac) Process

- Process applied to boreholes to improve well production.
- Frac. fluids are used to fracture the reservoir rocks.
- Frac. fluids vary from pure water to hazardous gummy gels.
- Frac. fluid additives vary with well condition.
- Fluids are recovered when well is flowed back to surface.

## Hydraulic Fracturing (Frac) Water

- Fluids recovered from water fracs..
- Toxic chemicals become an integral part.
- Varies with well condition and location.
- Different from normal production brines.
- Volumes vary from hundreds to over 100,000 gallons.

## Common Fracturing Additives

- Foaming agents and antifoams
- Emulsifiers and de-emulsifiers
- Gellants and gel breakers
- Biocides
- Surfactants
- Viscosifiers
- Cross linkers
- Stabilizers

## Davnor Process Highlights

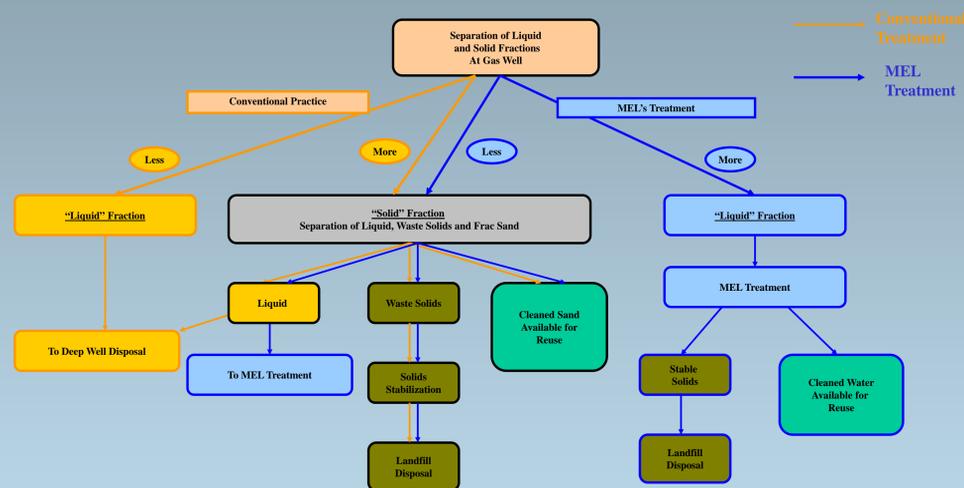
Three Stage Process:

- Stage One
  - Breaking complex polymeric suspensions
  - Sedimentation and clarification
- Stage Two
  - Breaking mineral complex.
  - Sedimentation and clarification
- Stage Three
  - Stabilization and polishing for end use.

## The Product Water

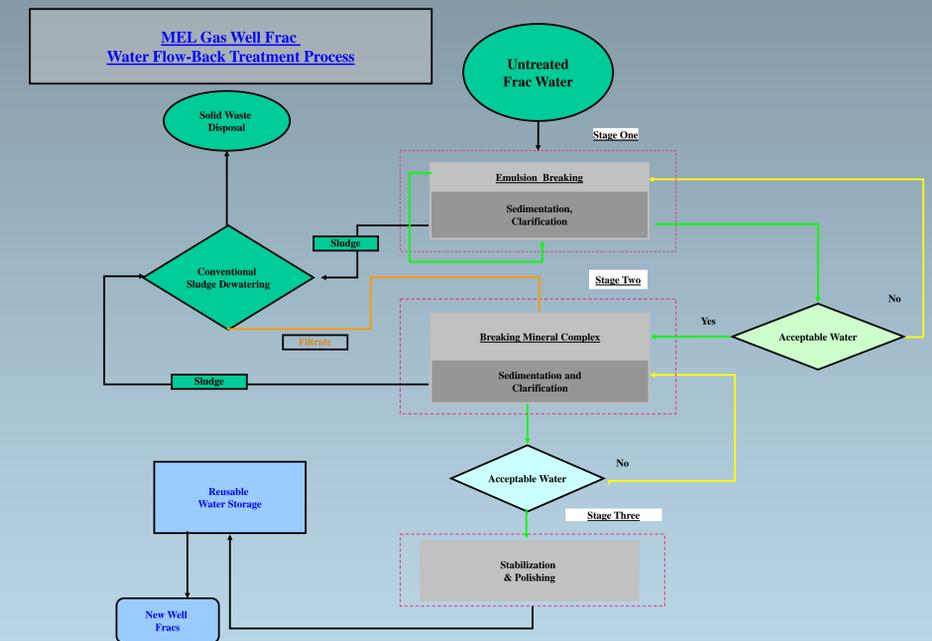
- 1<sup>st</sup>. stage water is suitable for flushing and cleaning of the frac. process equipment.
- 2<sup>nd</sup>. stage water is suitable for recycling in frac. process.
- Bacteria cannot survive in the treatment environment.
- Contains hydrocarbons which may be toxic – ethanol will not be removed.

## Comparison of MEL Gas Well Frac Water Flowback Treatment and Recycling To Conventional (Current) Disposal Practice



## MEL Frac Water Flowback Treatment Facts:

- Recycle 100% of frac water flowback water.
- Reduce consumption of fresh potable water by 30% to 50%.
- Treatment and recycling competitively priced when compared to currently used disposal methods.
- Solid waste is stable and readily land filled.
- Treatment process extensively tested on a wide variety of frac water flowback produced by all major companies operating in Western Canada.
- Waste water from frac sand cleaning operations can be treated and recycled.
- Treatment process is simple and robust – Minimum Capital Investment with Appropriate Level of Operator Training.
- Excellent technical support.
- Unique technology.



## Bench scale Testing on Frac Water Flowback Samples from Various Operators in Southern Alberta



Bench Scale Testing – 4 Cubic Metre Sample Tests



Setting Up Field Test Reactors for 4 Cubic Meter Tests on Flowback Water in Brooks, Alberta



Gel Breaking and Coagulation



Clarification in Progress

Product Water Ready for Reuse and Dewatered, Stabilized Sludge Ready for Disposal in Landfill