



# Greenhouse Gas Reduction Project

2 July 2007

# Gas Well Completion



- **Gas wells are frequently treated with water and sand to make them productive.**
- **After treatment, natural gas is injected into the tubing in the well to enable the well to return the water back to the surface.**
- **The Greenhouse Unit is used to separate natural gas from the water. The natural gas is compressed, measured, and sold onsite into a pipeline.**
- **The water and a small volume of sand are collected in a portable tank.**
- **The water is pumped into EPA approved water disposal wells.**



# Improvements from historical venting of flowback gas



- **Natural gas was previously vented to the atmosphere during the flowback**
  - **50 wells per year**
  - **Venting for approximately 3 days**
  - **Producing 100 to 200 MCFPD**
  - **Resulting in 15 MMSCF/year to 30 MMSCF/ year of natural gas that is sold instead of vented as a result of this project.**

*A key aspect of the success of the project is the BP gas gathering.*

# Factors that contributed to success of the project



- Gas pipeline owned by BP
  - Lower pressure line requires less compression horsepower for gas sales
  - Metering requirements are clearly defined and already well understood
- No liquid hydrocarbons simplifies separation
- Weatherford's vision and commitment
- Equipment is utilized about 75% of the overall time for a completion operation.



- Completion
  - Cost of greenhouse unit - approximately 30% more than a conventional air cleanout unit .
  - Cost of gas sold - roughly equal to the additional cost of the greenhouse unit.
  - Elimination of venting – priceless
- Well Maintenance - challenges to application
  - Flowback accounts for only about 10% of well maintenance
  - Artificially lifted wells are not vented

# Future plans



- Completion
  - Two greenhouse gas units will be used to eliminate venting from most new wells during the completion work
  - Reverse circulating will be used on some wells . This approach also is designed to eliminate venting
- Well maintenance
  - Reduced cost will allow for increased use for well maintenance.????
- Open hole cleanout
  - Pilot test to be evaluated