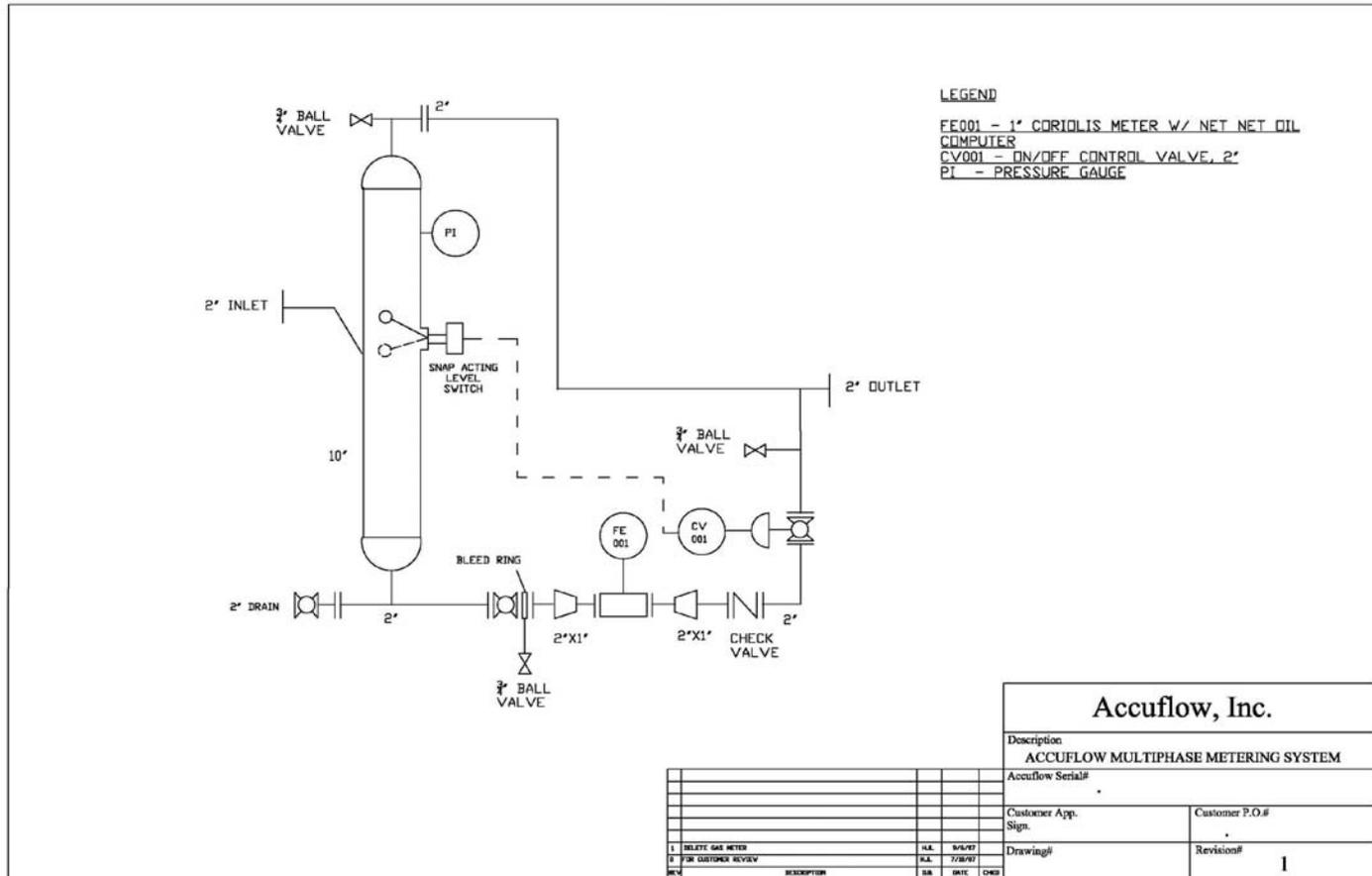


Purpose-Fit Portable Multi-Phase Production Measurement System

Presentation created by James Cron
Ward Williston Oil Company



Conception



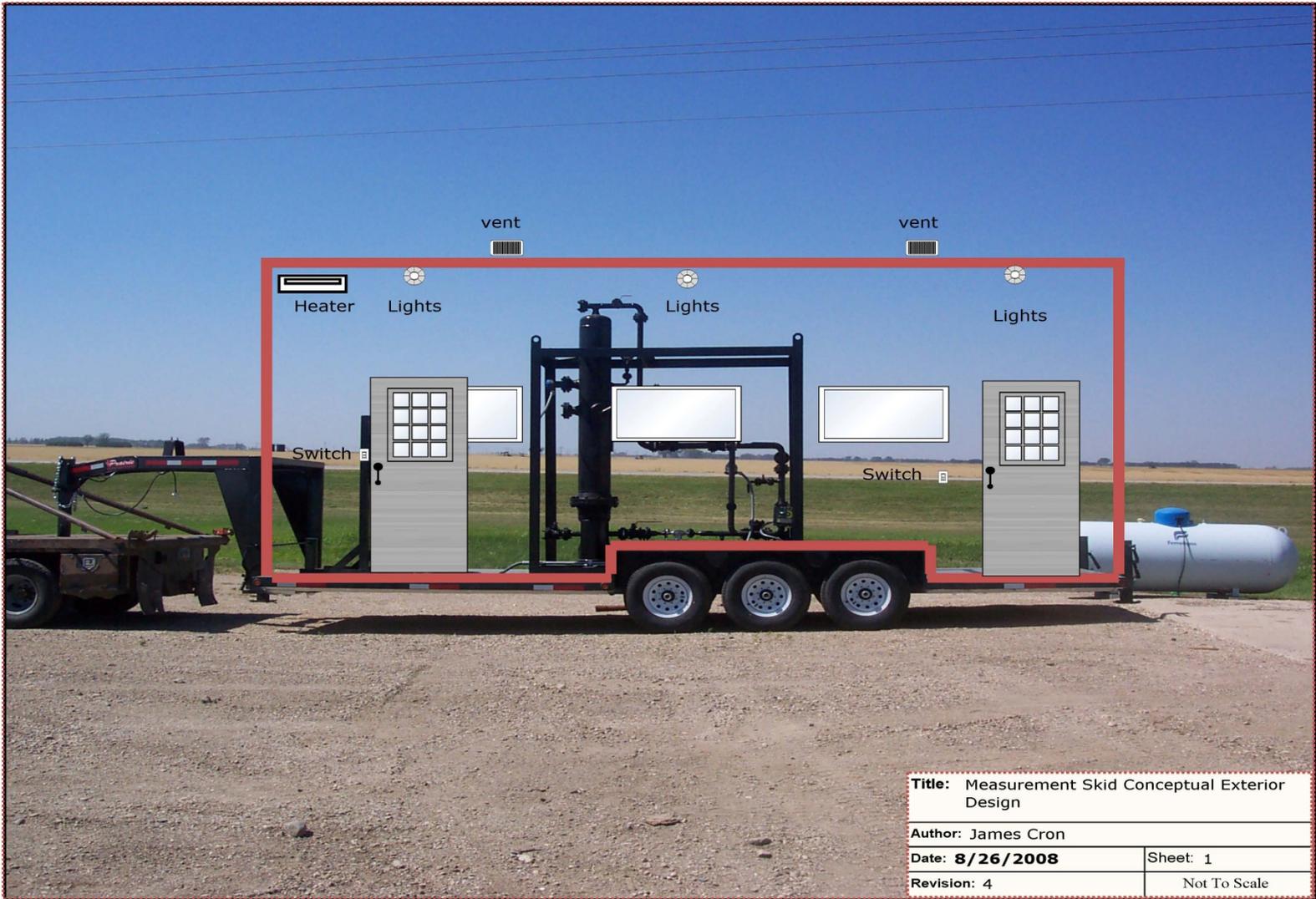
Key Points

- Measurement system design occurred over several iterations.
- Final design and modifications and for the measurement skid were made with delivery in summer 2008.
- **Key vessel indices:**
 - **Design/Welding code:** Per ASME B31.3 design code, w/ 10% X-ray radiography of welds
 - **Coating:** Vessel and Piping will be internally coated.
- **Separating System**

Accuflow Jr. multiphase metering system, consisting of:

 - 10" diameter pipe separator
 - 2" diameter gas flow line
 - 1" diameter liquid flow line





Key Points

- Trailer custom made by Prairie Trailer in Minot, ND.
- Measurement skid was mounted on trailer and positioned.
- Software was used to mock up the outside building, position of windows, etc.
- Final design was reviewed by builder, electrician and Ward Williston Safety Coordinator.



Construction



Key Points

- Building construction was the source of largest delay due to resources.
- Building and electrical labor and materials both sourced locally (Ron Gustafson Builder, Bottineau Lumber and Northland Electric).
- Heated hoses, major valves procured from Jasper Engineering from Bismarck.
- Minor materials procured from Eng Hardware of Sherwood and various oil field supply stores in Mohall and Westhope.
- Pulling vehicle purchased from Theel Motors in Bottineau.
- Foam applied to bottom of trailer for insulation.
- Live oil samples were collected and analyzed.



Completion



Key Points

- First test in December of 2008.
- Shake out lasted several months.
- Trailer snowed in for nearly two months.
- Total of 9 wells have been tested over various time periods (24 hours to two weeks).
- Overall results very good. Field people have acclimated well and testing cycle time and hookup have been reduced.



Project Observations

- Overall design works well; using the coriolis meter offers repeatable results.
- Results have offered significant insights (individual well production and oil cuts) that have impacted development plans.
- Opportunity exists to standardize and reduce costs for other skids.
- Low points have been the heated hose performance and gas metering accuracy. Both have resulted in lessons learned for hose procurement and measurement facility design.

