

Niobrara Operator Recovers More Oil and Improves Economic Value of Gas While Reducing Emissions

ECO² system inhibits vaporization of organic compounds, increasing recovered oil from 85% to more than 95% of produced oil

CHALLENGE

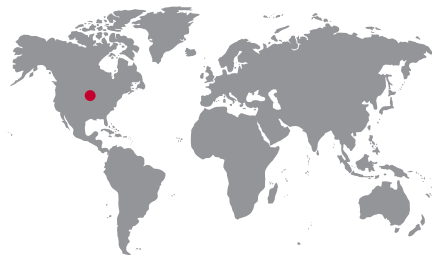
Increase total retained production and reduce emissions.

SOLUTION

Use the ECO²* VOC emissions reduction system to reduce vaporization of natural gas liquids (NGLs) and eliminate flaring or incineration of volatile organic compounds (VOCs).

RESULTS

- Increased recovered oil from 85% to 95.66% of produced oil
- Reduced emissions to near zero
- Enhanced the thermal content and value of the natural gas produced



Volatile compounds reduced retained production and increased emissions

An independent operator in the Niobrara Shale in the US was finding a 15% discrepancy in the volume of oil produced and the volume of oil in storage tanks. When the pressure on high-gravity oil is reduced from reservoir pressure to storage tank pressure, NGLs flash off from the liquid phase. This vaporization causes shrinkage in the storage tanks and a loss in total retained production. It is common practice to contain and burn these VOCs by flaring or incineration, losing valuable production.

In addition, new Environmental Protection Agency (EPA) regulations require operators in the US to begin capturing VOC emissions through the use of "green completions" equipment to reduce VOC (NGL) emissions. Lack of compliance may result in fines or well shut-in until the location can be brought into compliance. To address these challenges, the operator decided to conduct a trial with the Cameron ECO² VOC emissions reduction system.

ECO² production system prevented flashing of NGLs

Cameron developed the ECO² system for a proactive approach to solving both production loss and emission issues. With the ECO² system, oil, gas, and water are separated and accurately measured through a three-phase separator. After measurement, the oil is sent to a stabilizer where the VOCs are controlled, contained, and injected into a pipeline or storage container.

The system allows the operator to reduce vaporization of the VOCs. By keeping the NGLs entrained in the oil, the operator is able to accurately measure the well's production in a single-phase instead of a multiphase (foam) form. This aids in balancing royalty payments with the sales at the Lease Activated Crude Transfer (LACT) point.

Cameron personnel logged the production through the CrossStream integrated production unit. Using a proprietary process, the CrossStream unit kept oil production in a liquid state across the Coriolis meter for single-phase measurement, which was logged in a PLC/data logging device.



The ECO² system included a CrossStream integrated production unit, a modular oil stabilizer, and an electrical power generator.

CASE STUDY: Operator recovers 95.66% of oil and reduces emissions to near zero, Niobrara Shale

This measurement process avoided the flashing of NGLs across the measurement point and provided an accurate representation of production.

Operator significantly reduced oil shrinkage and emissions

By using a higher operating pressure and temperature, the stabilizer reduced emissions to near zero at the tank. The NGLs (VOCs) were sent from the stabilizer to the compressor to be sold downstream through the gas pipeline. This increased the value of the natural gas that was otherwise being sold at a lower cost, by increasing the energy content of the gas.

Application of the ECO² system eliminated tank shrinkage, recovering an average of 95.66% of oil from the stabilizer. Measurement accuracy reached allocation limits of $\pm 3\%$.

Following the success of the ECO² system trial in the Niobrara Shale, the operator plans to use the system in other shale plays, including the Marcellus.



Vaporization was controlled by keeping high-gravity oil under pressure, thereby capturing more hydrocarbons and reducing emissions to near zero at the tank. The VOCs were sent from the stabilizer to the compressor to be sold downstream through the gas pipeline, increasing the energy content of the gas, and consequently its economic value.

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