KATHAIROS

WHITEPAPER

Nitrogen Backup to Instrument Air for Critical Services:

14-hour pneumatic power takeover, $90,000 avoided production loss, $85 of nitrogen utilized in Haynesville

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TITLE

Nitrogen Backup to Instrument Air for Critical Services: 14-hour pneumatic power takeover, $90,000 avoided production loss, $85 of nitrogen utilized

CUSTOMER

E&P operator in Haynesville Shale

SITE TYPE

New multi-well pad with high production rates

APPLICATION

Kathairos nitrogen system serving as backup to existing instrument air compressor package to provide necessary power to all pneumatic controls

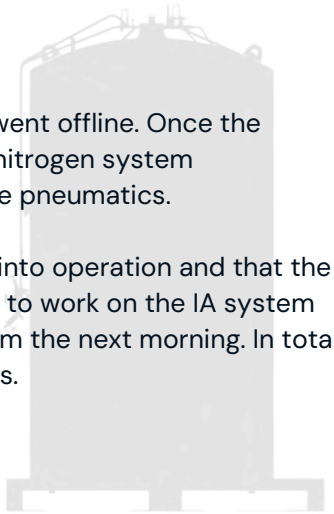
Scenario

A major US exploration and production company operating in the Haynesville Shale in western Louisiana had previously invested capital to purchase instrument air (IA) compressor packages to power the pneumatic control systems on a series of new greenfield pads with high daily production rates.

Due to the criticality of keeping the production flowing and potential concerns on the reliability of the instrument air systems, a single 3000L Kathairos liquid nitrogen tank was installed as a 'hot backup' to the IA system.

The nitrogen tank was connected downstream of the IA system buffer tank, and if the pressure were to drop below a set point of approximately 100psi, the nitrogen system would automatically take over, providing the well pad pneumatics with dry nitrogen gas and avoiding any downtime or loss of production.

Event



At approximately 6pm on November 25, 2023, the instrument air system went offline. Once the pressure to the pneumatic controls dropped below the pre-set level, the nitrogen system automatically took over, immediately providing the necessary power to the pneumatics.

The production foreman was alerted that the nitrogen system had kicked into operation and that the IA system needed to be checked. The E&P company sent out a night crew to work on the IA system and was able to return the pad to instrument air-powered operation at 8am the next morning. In total, the nitrogen system had been powering the site for approximately 14 hours.

Results and Next Steps

Due to the seamless transition from the air system to nitrogen and resulting avoidance of production shutdown, the operator made the decision to order 20 additional Kathairos nitrogen systems to serve in a similar backup scenario on all high production sites. While these sites already have IA systems in place, the nitrogen tank will serve as an inexpensive and reliable insurance policy.

When not operating, the backup nitrogen systems will be in standby mode, experiencing a natural evaporation rate (NER) of approximately 1% per day, releasing pressure as needed through the pressure maintenance regulator.

Kathairos' dispatch and operations teams ensure that the tank is continuously refilled and that a minimum of 72 hours (3 days) of product is always available. The new tanks ordered were 1500L tanks (a smaller size) and the target refill point is approximately 50%, meaning the tank will always have a minimum 3 full days of operational runtime available. This allowed for a smaller tank to be utilized, thereby reducing monthly rental cost, while remaining large enough to provide the customer with their desired potential runtime. This can be set at 3 days, 5 days, or whatever the customer feels will allow the necessary time to repair the IA system, or, if on grid power, to have the power restored.

Event Specifics

- **Kathairos nitrogen system size: 3000L**
- **Estimated daily production of well pad at hand: ~62 MMSCFD**
- **Avoided production loss: ~36 MMSCFD**
- **Avoided production revenue loss: ~$90,000 (HH Spot Price: $2.64 per MMBtu x 37,000 MMBtu)**
- **Nitrogen consumed during 14 hour window: ~4,600 SCFD**
- **Cost of nitrogen during operation: ~$85**