

# NDIC Phase 1 Final Report

## Blue Rock Solutions LLC dba Blue Comply

### Purpose

The objective of this project is to develop and test battery-operated, fully networked IIoT Methane Sensor Apparatus (IMSA) for typical storage tank thief hatches found throughout oil and gas production facilities. This shall increase the reliability of gas monitoring, shorten response time for repairs and help with the public's perception of the environmental impacts by reducing emissions.

### Work Accomplished

During this project the electronics, hardware, firmware, and software for this product were developed for the first generation IMSA methane detection device for thief hatches on oil storage tanks. An initial batch of devices were manufactured for testing at an independent 3rd party testing facility called METEC (Methane Emissions Technology Evaluation Center) at Colorado State University. Calibration testing for temperature and gas composition was done at the Mechanical Engineering department of North Dakota State University. Evaluation was done by UL (Underwriter Laboratories) for Class 1, Div 1 and Intrinsically Safe certification. Finally, a production batch of devices were manufactured for deployment at operating sites for pilot projects.

### Results

- A patent for monitoring the interstitial space of a thief hatch for methane gas was awarded by the USPTO
- 3 Month Blind testing at METEC's mock facility for controlled releases was completed that showed the devices can detect various amounts of methane gas emissions from storage tanks and potentially other sources in a timely manner
- Slight changes will need to be made to electronics before final UL testing and certification for intrinsically safe IECEx rating – this rating will allow us to bring down the cost of components dramatically and further cost justification for this device
- Groundwork has been laid for executing pilot project(s) on production sites

### Potential Applications

This device has the potential to monitor methane emissions and thief hatch latch position on storage tanks. This technology will give the tools necessary to oil producers to help with leak detection and repair (LDAR) and comply with GHG emission reporting requirements.

### Deliverables

- **Device Design and Components**
  - Developed/Sourced explosion-proof components: IR gas sensor, component housing, lithium battery, electronics, and cellular antenna
- **Data Acquisition**
  - Communicates over cellular network to Blue Comply dashboard
- **Fully-functional Prototypes**
  - Manufactured 25 devices for internal testing, field testing, and pilot projects
- **Pilot Program**
  - Completed METEC blind-test & collaborated with various oil/gas producers to develop pilot project plans
- **Required Listings from NRTL**
  - Evaluation was performed by UL with action items for certification
- **Rapid Detection of Leaks**
  - Performs detection within minutes of a 30 minute to 12 hour polling periods
- **Vendor Selection**
  - Established relationships with vendors for component selection and design

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**Appendix**

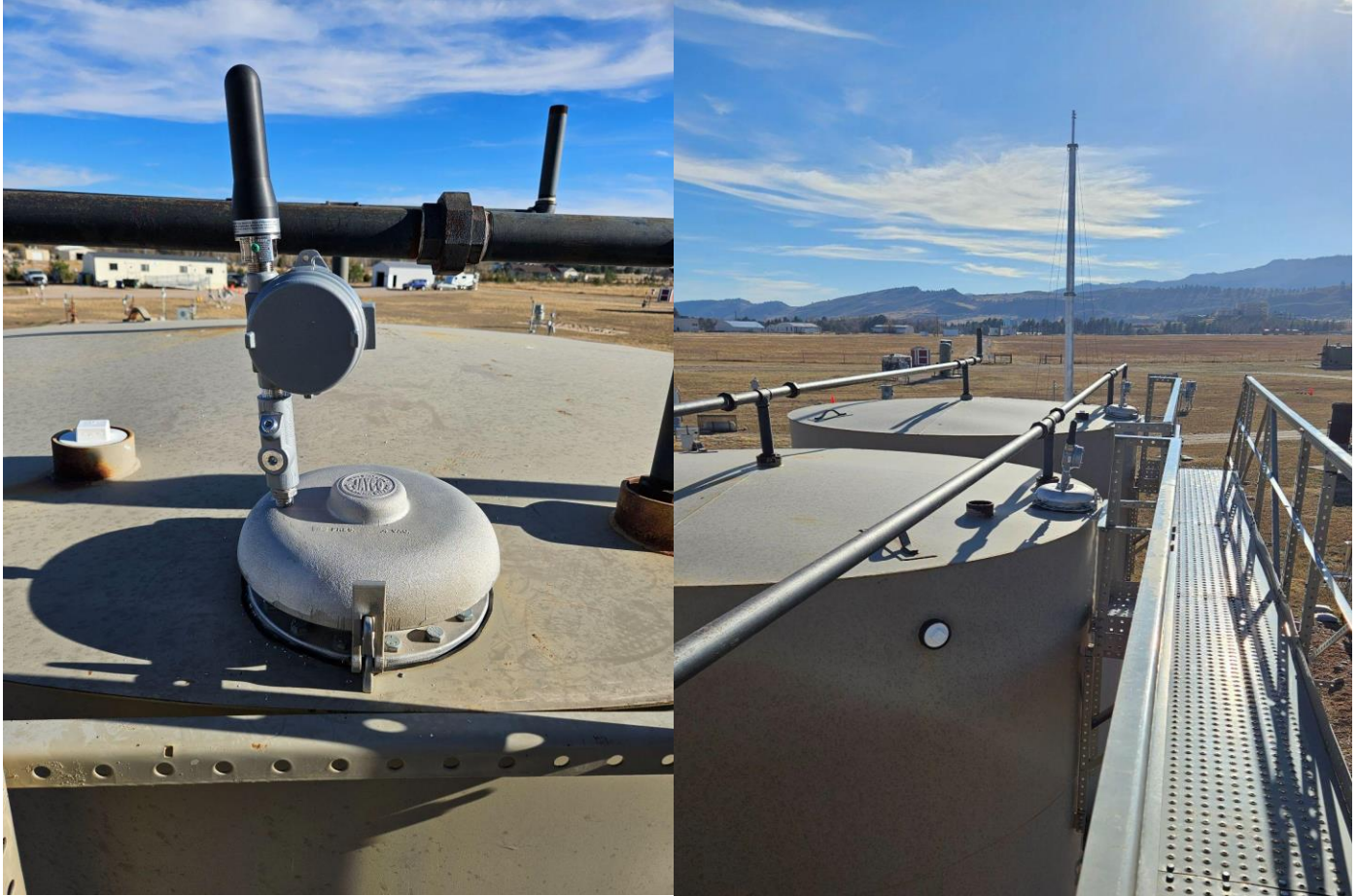


Figure 1: IMSA device(s) mounted on a typical thief hatch cover on top of an oil storage tank(s) at METEC's mock facility in Colorado.