



# EARTHVIEW

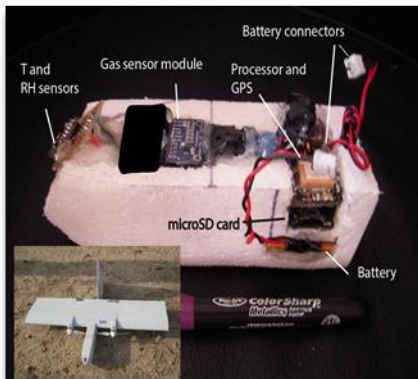
## **GROWTH AND INNOVATIONS IN EMISSIONS MONITORING**

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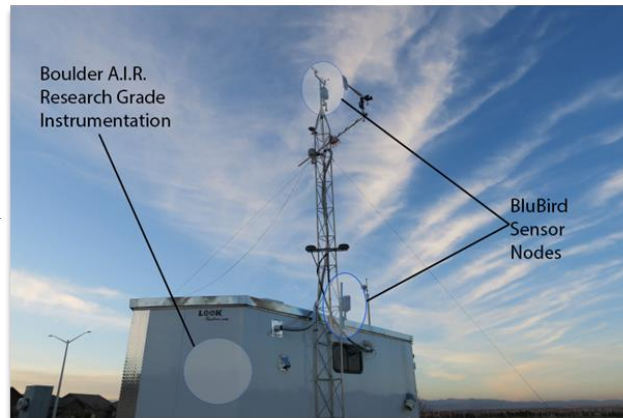
**TIPRO Annual Conference  
March 29<sup>th</sup> 2022**



- Founded: Fall 2019
- Energy Technology company focused on helping our industry reduce methane emissions
- 10 Employees
- HQ in Denver, CO with field support throughout the USA



“Jack Kelby” Version



Prototype Testing and Validation



First Units Deployed to Active Production Facility ( March 2021)



Today- Units deployed throughout USA. 70+



# EARTHVIEW TEAM



Jim Maslanik, PhD  
Chief Scientist

Pioneering Arctic Research Scientist with Univ. of Colorado, Boulder & CIRES\*. 40 Years of Environmental research experience. Leading innovator in small sensor technologies

\*(CIRES) Cooperative  
Institute for Research in  
Environmental Sciences



Bear Givhan  
Chief Executive Officer

Entrepreneur, commercial pilot & scientist with extensive environmental monitoring experience. Success in leading diverse environmental monitoring projects in US, Canada, Mexico and Alaska.  
B.A. Geology – CU Boulder.



Duncan Brandt  
Chief Technology Officer

Long history of innovative creations. Has worked for NASA, Sparkfun, Healthy Harvest and numerous other startups as a engineer, tech support and designer. Electrical Engineering & Computer Science, CU Boulder. Founder Dbboards.com



Matthew Barnes  
VP-Ops

Deep upstream oil and gas field service experience in various operational, management & training engineering roles. B.S. Petroleum Engineering - Texas Tech University



John Reed  
Advisor

Co-Founder,  
MP, Tech  
Wildcatters  
Founder, Azalea Ventures



# The Problems

## Environmental Risk

- Methane and VOC leaks at production and midstream facilities
- Methane is a much more potent gas than CO<sub>2</sub>

## Operational Inefficiencies

- OGI Inspections
- Methane is a valuable commodity

## Increasing Federal Regulations

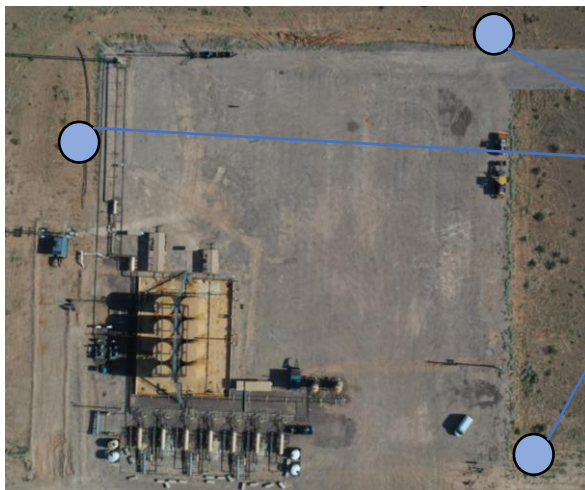
- New EPA methane rules
- Methane is a valuable commodity



# The BluBird Platform – *The Solution*

Continuous Methane and VOC Monitoring

## Field Deployed Hardware



## Raw Data Processing

### Field Data

Methane Sensor Data  
VOC Data  
Climate Data

Proprietary Earthview  
Algorithms

Processed Data

## Analysis

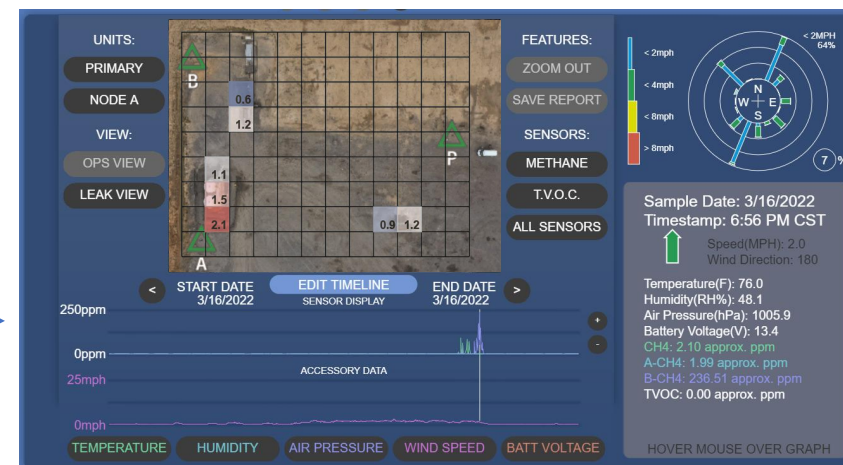
### Processed Data

Methane Sensor Data  
VOC Data  
Climate Data

Proprietary Earthview  
Software

Actionable & Historical  
Data

## Actionable Data



## Historical Insights

- **Reporting**
- **Correlation**
- **Root Cause Analysis**
- **Environmental Performance Tracking**
- **Gas Saved**
- **Environmental Risk Averted**

**Data Out** - ESG reporting,  
Audits, Certifications etc.





# BluBird Platform

*In the Field*

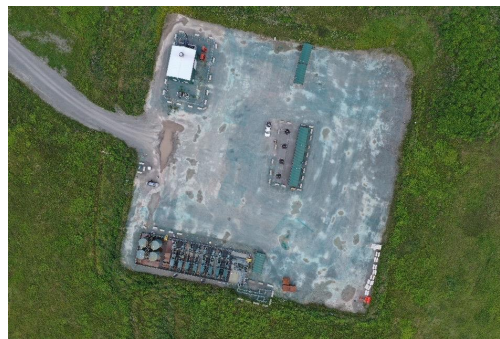


**N. Texas**  
Basin: Barnett



**Colorado**  
Basins: DJ, Piceance  
VOC Monitoring

*Required by Colorado  
regulations, CDPHE*



**Pennsylvania**  
Basin: Marcellus  
Methane/Nat Gas

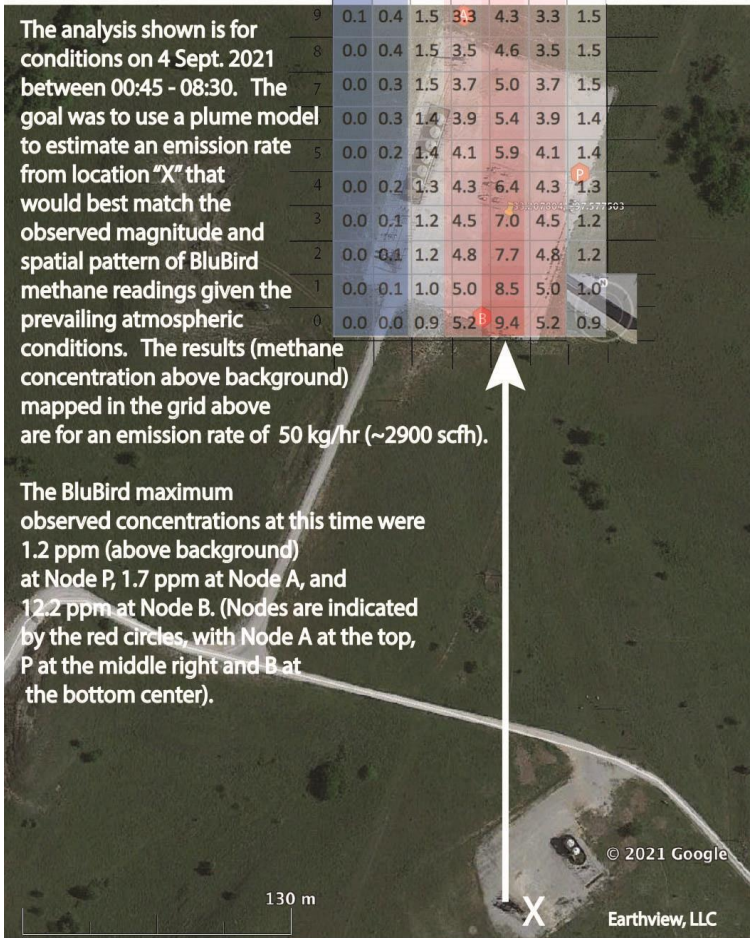


**Texas: Permian**  
Methane/Nat Gas

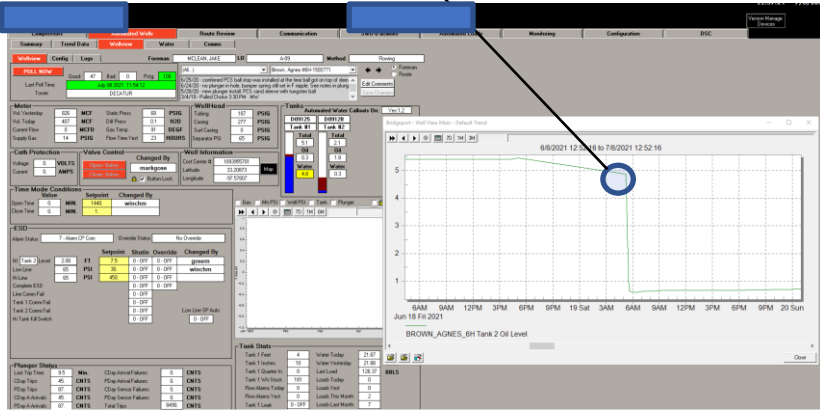


# Highlighted Results

## Off Pad Event

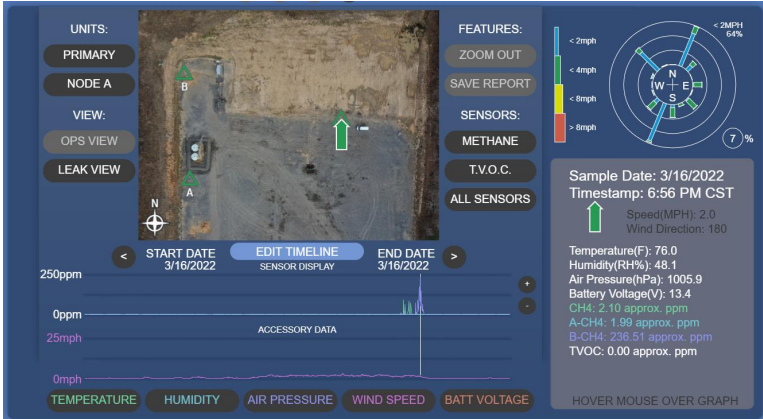


## Oil Load Event



## Stuck Dump Valve

- Fixed in less than 1 hour: Alert – Verification



BluBird Calculated Emission Rate: 4.87 MCF / Hour

Without BluBird...

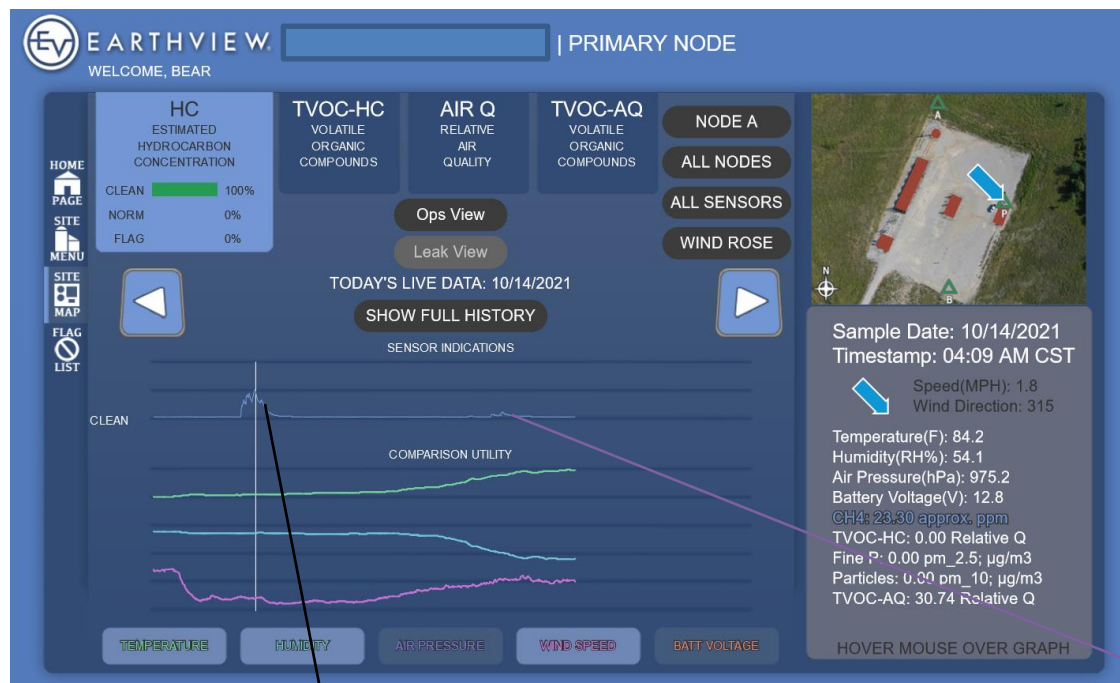
Next Inspection:  
24 hours: 117 MCF **Lost** = \$410.00 **Lost**  
30 days: 3,510 MCF **Lost** = \$12,285.00 **Lost**  
90 days: 10,530 MCF **Lost** = \$36,855.00 **Lost**



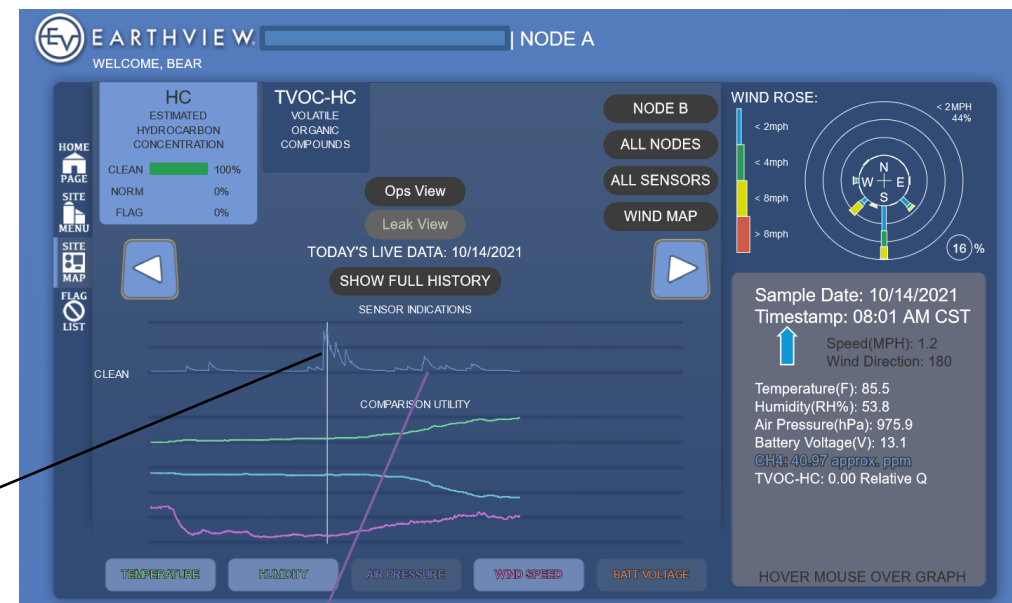


# Three Leaks in 72 hours

## *Caught and Repaired*



Thief Hatch  
left open



1/4" supply line  
nipple broke on the  
compressor.

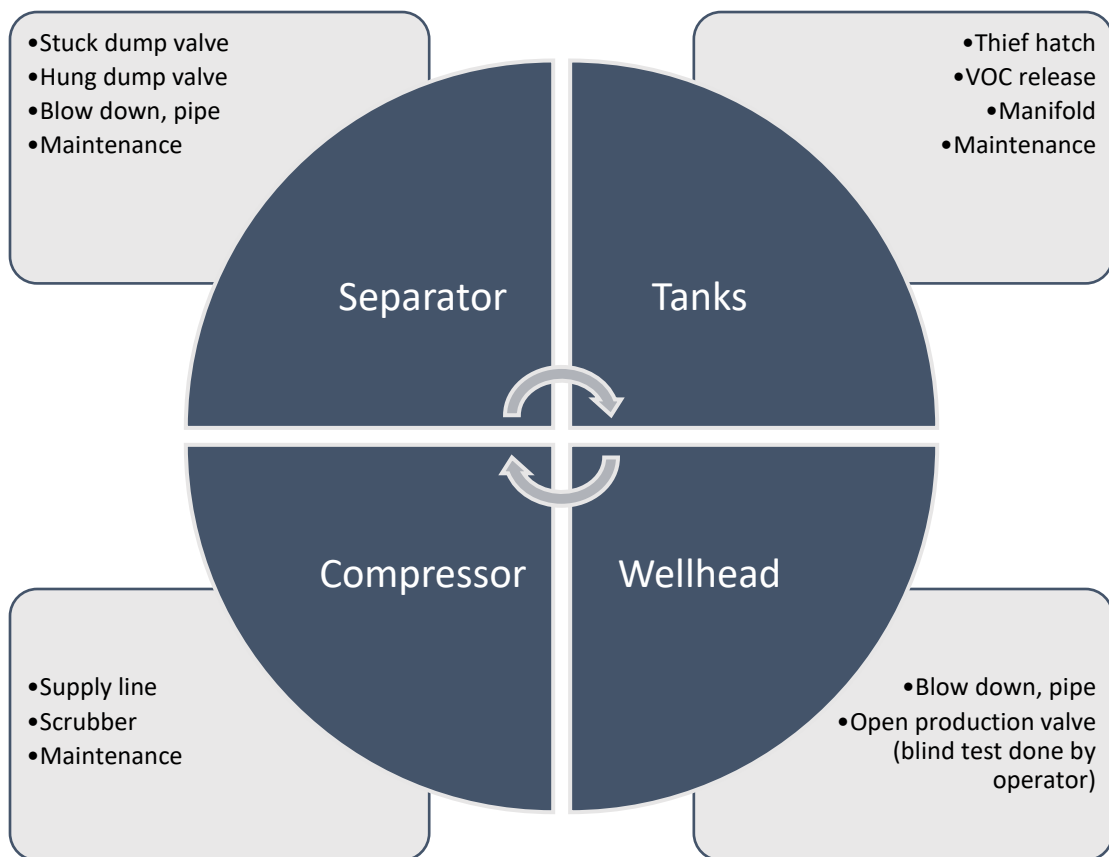


- Third event caught on 10/17, scrubber on compressor determined to also be leaking methane based on reading from the BluBird Sensors





# Results from the Field



| Date            | Location | Nodes         | Identified Source               | Description  |
|-----------------|----------|---------------|---------------------------------|--|
| 4/2/2021        | 11       | P, A          | Separator (stuck dump valve)    | Release of gas came from tanks, roughly 12 hours and repaired at AM on 4/3.  |
| 5/14/2021       | 11       | P, A          | Separator (hung dump valve)     | Multiple hits from morning through early afternoon,  |
| 6/19/2021       | 30       | A             | Tanks (VOC related)             | Confirmed readings, early morning, south winds. Ops shows oil tank level pulled down from 5ft down to 0.5ft.   |
| 7/7/2021        | 32       | P             | Tanks (VOC related)             | Confirmed readings, morning, light & variable winds. Ops shows water tank level pulled down from 5ft to 1.5ft  |
| 7/13/2021       | 32       | P, A          | Wellhead (gas production valve) | Confirmed readings, southwest winds. This was planned release by customer from wellhead to test our sensors.   |
| 8/13-8/16, 8/25 | 50       | P, A          | Tank battery and separators     |  |
| 8/24-9/8        | 30       | B (all nodes) | Separator (hung dump valve)     | Multiple hits on all nodes during window, issues with separator from the location south of monitoring location. Plumes travel and hit all nodes; repaired on 9/8/21. OFF PAD SOURCE Caught |
| 9/13/2021       | 61       | B             | Compressor (maintenance)        | XXX asked and confirmed Node B elevated readings   |
| 10/14/2021      | 30       | P, A, B       | Tanks (open thief hatch)        | Readings overnight from 10/13 that lease operator confirmed was open thief hatch at tanks at roughly 10AM.   |
| 10/14/2021      | 30       | P, A          | Compressor (supply line, 1/4")  | Readings continued into afternoon and lease operator confirmed broken supply line at compressor by early evening, 5PM.   |
| 10/17/2021      | 30       | P, A, B       | Compressor (scrubber)           | Readings on 10/16 and Sun 10/17, lease operator discovered leaking scrubber. Compressor is leased to XXX by vendor, mechanics called for repairs.  |



# PAQS

Pad Analysis and Quantification System (*Patent Pending*)

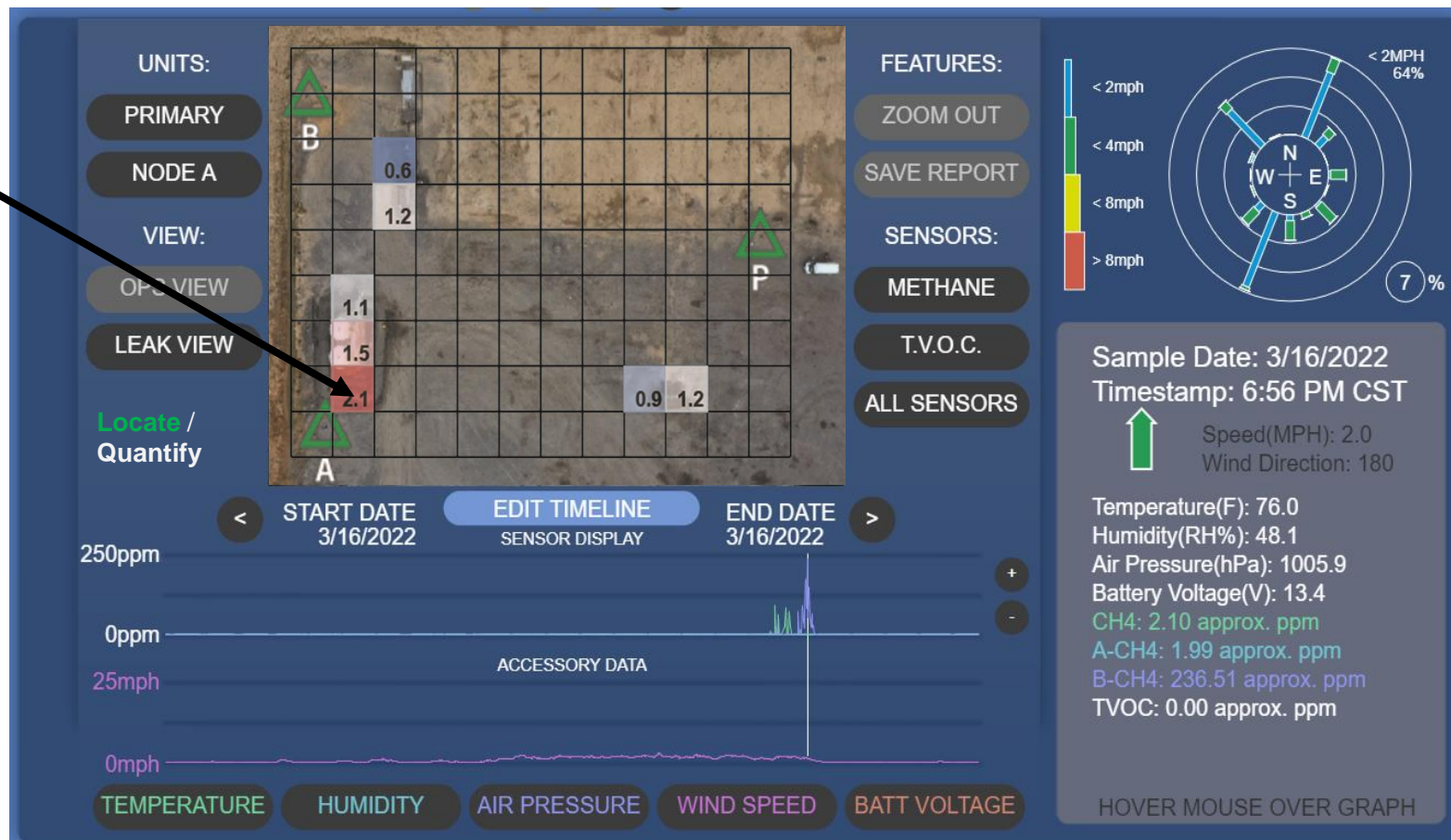
PAQS is the heart of the BluBird Analytics Engine. PAQS is an all encompassing software solution that provides our clients with the most timely and accurate data on methane leak rate and location for the best price.

Confirmed  
Leak  
Location

## PAQS Delivers on Leak

- *Detection*
- *Location*
- *Quantification*

*In real time*







# PAQS

## *In Action*

### Confirmed Leak Location

## Detection

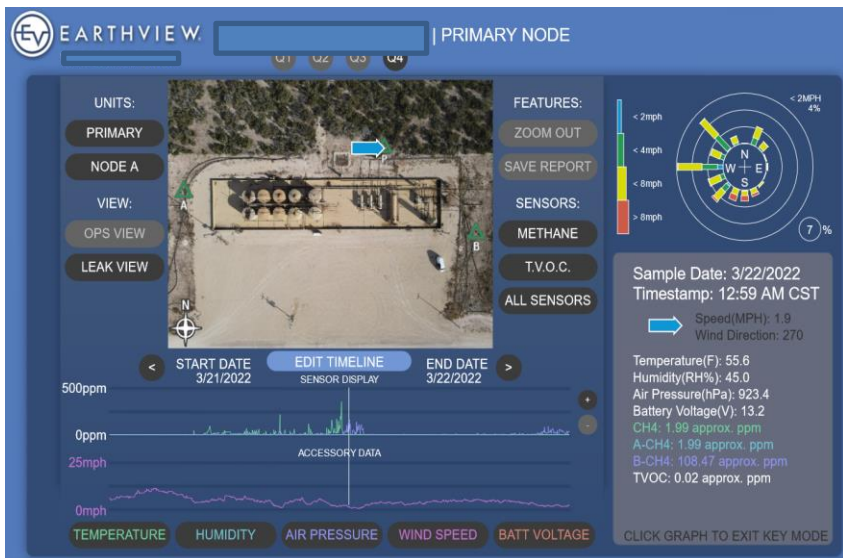


Figure 1: Detection and Alerting – The BluBird Platform alerts the operator via email based on customizable methane emissions thresholds .

## Localization

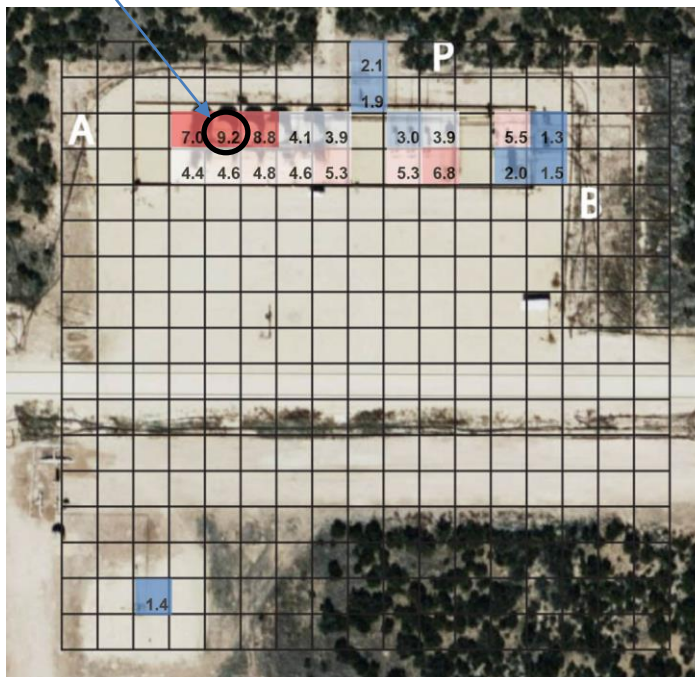


Figure 2: Localization- The highest number is most likely source location grid cell. Advanced software analyzes the data from all nodes to render these maps.

## 1.2 MCF / Hour

## Quantification

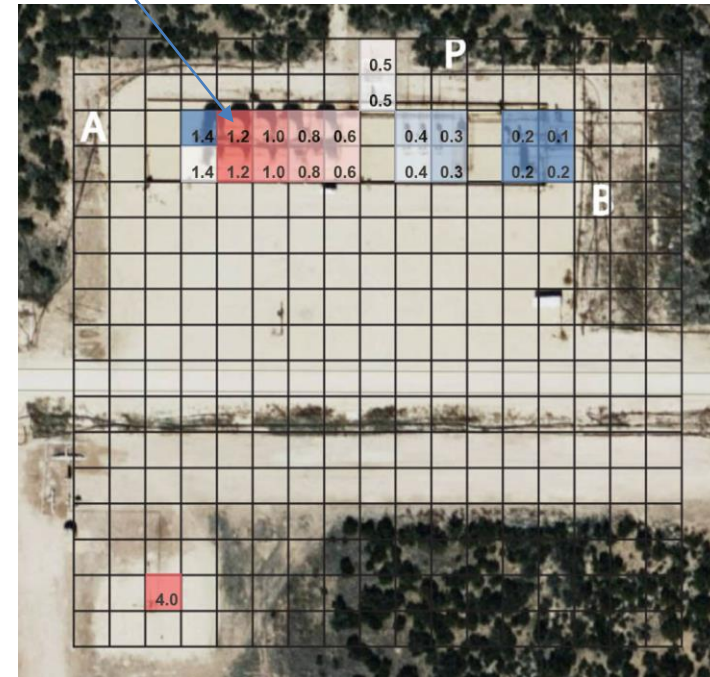
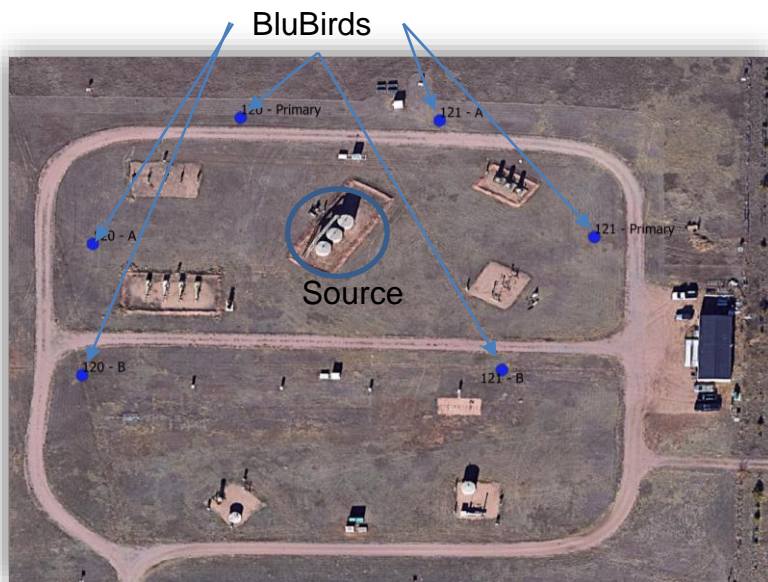


Figure 3: Quantification: The above figure shows the emission rate if the source were to be located in selected grid cell. (MCF / Hour Natural Gas)



## Setup



The BluBird Platform deployed to METEC in early January for 5 days with 4 total days of random methane releases by METEC staff.

The goals of the is testing were simple:

1. What is the minimum detectable emission rate?
2. What is BluBird's practical detection limit of change in CH<sub>4</sub> concentration?
3. Can BluBird accurately quantify emission?
4. Verify Field Performance

# METEC Testing

## January 2022



## Deployment

## Results Snap Shot

Full whitepaper available

1. The results suggest that BluBird can detect a natural gas emission rate of at least **1 kg/hr** from a source that is 20' high and 130' from the sensors. There are strong indications that BluBird is seeing rates as low as 0.25 kg/hr. Testing is currently underway.
2. In this test, a CH<sub>4</sub> increase above background of at least 0.3 ppm is detectable in our analysis.
3. The full results suggest that BluBird can quantify emission rates with good accuracy.
4. From these data, the BluBird system shows the ability to detect fine changes in CH<sub>4</sub> concentrations under field conditions, including the ability to account for changes in background air conditions.

**About METEC:** METEC or the Methane Emissions Technology Evaluation Center provides crucial testing and validation for CEM Systems. For more information, please visit:

<https://energy.colostate.edu/metec/>





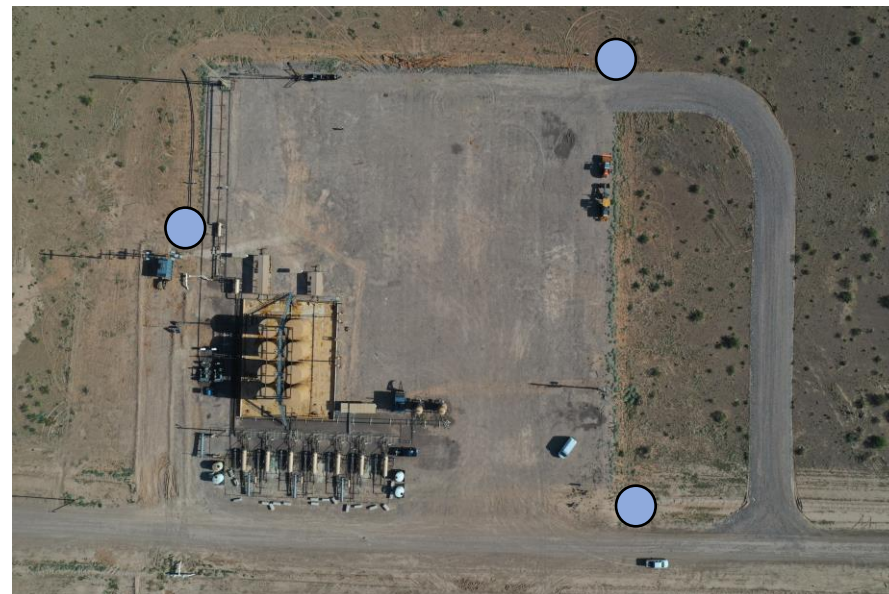
# BluBird Platform

*Built for Purpose to fit your program*



## **Pennsylvania**

Marcellus  
4 BluBirds



## **Texas**

Permian  
3 BluBirds

***Typical Layout: 3-4 BluBirds***  
***Possible Layouts: 1-8 BluBirds***

***The number of BluBird nodes is  
recommended based on the facility  
size and monitoring goals.***



# BluBird Helps Operators Solve...

## Environmental

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- Increase Environmental Performance
- Be ahead in an **increasingly regulated** operating environment
- Achieve dominate ESG positioning
- Fix leaks, save money, reduce emissions

## Increase Operational Efficiency

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- Streamline LDAR inspections – *Spend less time saving more gas.*
- Safety Benefits
- Increase real time awareness

## Use Applications

- Enhanced LDAR (methane monitoring)
- Pre/Early Production Monitoring (Colorado)
- Regional Air Quality Monitoring
- Shut-in/P&A Well Monitoring



# The Abandoned Well Problem

- Over 3 million abandoned wells are scattered throughout the United States
- It is estimated that the majority of these wells are very old and were never properly plugged
- EPA Estimates that at least **280 metric tons** of **methane** is released per year, though the study acknowledged there is limited data.
- This equates to **8 million MT CO2 E per year** due to the potency of methane





# EARTHVIEW

Thank You

Bear Givhan

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Q & A