Innovations in Gas Monitoring
Sandy Mays
October 2018
Agenda

• Introduction
• Equipment Review – Ventis Pro, Radius BZ1 Area Monitor
• Live Monitoring
• Data Collection
Industrial Scientific Corporation

• 700 employees dedicated to ending death on the job

• Global Headquarters in Pittsburgh, Pennsylvania, United States

• Manufacturing in Pittsburgh (US) and Shanghai (China)

• Sales & Service Operations in US, Canada, Mexico, Brazil, UAE, Qatar, Saudi Arabia (partnered with Zaff), China, Singapore, Indonesia, India, Australia, United Kingdom, France, Germany, Czech Republic, Netherlands, Belgium, Italy, and Poland
Our Mission

Preserving human life on, above and below the earth. Delivering highest quality, best customer service... every transaction, every time.

Our Vision

Industrial Scientific people are dedicating their careers to eliminating death on the job, in this century.
Ventis Pro Series

- Up to 5 gas monitor
- Extensive sensor selection and configuration
- 12, 18, and 24 hour runtime options
- Non-pumped, integral pump, and external pump options
- Customizable user interface
- Man-down and panic alarms
- IP68
- Guaranteed for Life
Radius BZ1

- Up to 7 gases - LEL, CO, CO High Range, CO/H2 low, CO/H2S, H2S, O2, SO2, NO2, HCN, H2, NH3, Cl2, and PID
- 108 dB output at 1 meter
- Non-pumped and pumped
- Up to 7 day runtime
- LENS Wireless (Mesh)
- IP67
- Guaranteed for Life
# Wireless Solutions

<table>
<thead>
<tr>
<th>Applications</th>
<th>Type</th>
<th>Description</th>
<th>Product</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>User and Site Assignment</td>
<td>NFC</td>
<td>Enables two devices to exchange encrypted data over short distances.</td>
<td>Ventis Pro</td>
<td>NFC</td>
</tr>
<tr>
<td>Automatic Site Assignment and Proximity Alarms</td>
<td>BLE</td>
<td>Used to communicate between devices within a short range (5-100m) and doesn’t require Line of Sight</td>
<td>Ventis Pro w/iAssign Beacon</td>
<td>BLE</td>
</tr>
<tr>
<td>Lone Worker Live Monitoring</td>
<td>LENS</td>
<td>Mesh network that focuses on the peer-to-peer level and uses frequency hopping to find the best path of transmission.</td>
<td>Ventis Pro and Radius with LENS</td>
<td>LENS</td>
</tr>
</tbody>
</table>
LENS Wireless Advantages

• No setup or IT assistance needed, works out of the box
• No infrastructure required
• Peer readings provide alarms \textit{and} data
• Longer range communication up to 300 m (~1,000 ft) without sacrificing runtime
  – 100m between Ventis Pro
  – 300m between Radius
LENS Wireless – Ventis Pro and Radius

- Up to 25 monitors can be connected wirelessly in a network
- Range of Ventis Pro to Ventis Pro - 100m (or 5 hops to 500m)
- Range of Radius to Radius - 300m (or 5 hops to 1500m)
Ventis Pro *Connected* to Radius
Peer to Peer

- Bluetooth set to iNet Now + LENS
- LENS
- LENS
- Bluetooth
Using Ventis Pro or Radius instruments combined with an RGX gateway.
Using cellular or Wi-Fi Ventis Pro
Using Ventis Pro or Radius BZ1 instruments combined with a vehicle gateway:
What is Live Monitoring?

Live monitoring enables safety leaders to understand worker and instrument status and alerts in real-time and pinpoint their location.
Why Use Live Monitoring?

- Takes Hours or Days to Learn of Incidents
  - Safety outcomes improve the closer you can get to The Moment
Why Use Live Monitoring?

• Can’t be certain workers are safe or where they are located
  – Lack of situational awareness can drive down safety and productivity
Challenges of Doing Nothing

Worker dies on Dakota Access Pipeline

By Kalsey Stults on Aug 27, 2016 at 4:16 p.m.

"One of the bigs that we've put together is that the individual was working by himself so they weren't working in pairs," he said. "So when the accident happened, who knows how long it was from when he got injured until the foreman found him."
Challenges of Manual Processes

• Extra tasks for workers that pulls them away from core job

• Must have people paying attention, or lack of check in could go unnoticed
  – False alarms can create unnecessary responses
  – Missed alarms can cost a life

• Not timely
Challenges of Buddy Systems

• Inefficient
• Hazards can impact both workers
• Buddies not always available after hours
Challenges with Live Monitoring

• Live monitoring solutions currently on the market are complex
  – Both in getting started, and in ongoing use
Ways to Deploy Live Monitoring

• Local software
  – Instrumets send data to software on a local laptop
  – Only those at, or wired into, the site can view data

• Cloud software
  – Instruments send data to the cloud, no IT needed
  – Displays worker and instrument status and location
  – Anyone with an Internet connection can see data
iNet Now Live Monitoring Software

• Cloud-based
• Sends real-time, customized alerts for gas, panic, and man-down alarms
• Enables supervisors or other safety leaders to continuously monitor worker and instrument status on a map
Worker Uses Gas Detector assigned to them and a Smart Device

Safety Leader Receives Real-Time Alerts via text or email and views the iNet Now Website
Map Shows Workers Status and Location

Worker in Alarm

No Hazards

Lost Connection to Cloud

Instrument Turned Off
Texts/Emails Deliver Real-Time Alerts

**Warning**

Panic Alarm

**USER:**

Kimberly Macia

**LOCATION:**

Map It

**ALARM TYPES:**

Panic Alarm

**SENSORS:**

Normal 20.3 %vol O2

Normal 3.0 %lel C5H12

Normal 1.7 ppm H2S

Normal -5.0 ppm CO

**SMART DEVICE USER:**

Kimberly Macia

**ALARM TIME:**

May 2, 2017 6:39:46 PM GMT-04:00

View →

This message was sent to by Industrial Scientific. To ensure you receive emails from Industrial Scientific, please add alarm@dsci.com to your address book or contact list. You are receiving this email because of alert subscriptions set in Net Control. Visit Net Control to modify your subscriptions.

Alert ID: 3009583776944

1-877-FOR-INET (367-4636) // inetAdmin@dsci.com // Fax: 1-800-766-3383

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T-Mobile
+1 412-201-0021

High Alarm
Kimberly Macia
Low Alarm 19.3 %vol O2
Normal 4.0 %lel C5H12
Normal 2.5 ppm H2S
Normal 0.0 ppm CO

https://google.com/maps?q=40.439727,-80.158165
6:37 PM

Panic Alarm
Kimberly Macia
Normal 20.3 %vol O2
Normal 3.0 %lel C5H12
Normal 1.7 ppm H2S
Normal -5.0 ppm CO

https://google.com/maps?q=40.439648,-80.158165
6:39 PM

Type message

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Alerts Can Be Highly Customized

- Send me iNet Now alerts via text
- Send me iNet Now alerts via email

Subscribe to:

- An instrument alarm occurred during live monitoring
  - Custom Alarm
  - High Alarm (includes all oxygen alarms)
  - Low Alarm
  - Man-down Alarm
  - Panic Alarm
  - STEL Alarm
  - TWA Alarm

- Lost contact with instrument during live monitoring
  - Long term lost
  - Short term lost
Real-Time Alert Records Kept

General Information

Description: Panic Alarm
User: Dave Wagner
Site: DW 5
Equipment SN: 16022VE-001
Alert Time: 7/13/2017 3:24:12 PM
Occurred On: 7/13/2017 3:24:10 PM
Equipment Group: CFD
Sync App User: Dave Wagner

Alert Status

Cleared: Yes
Date Cleared: 7/13/2017 3:26:53 PM
Cleared By: iNet - Auto

Recipients

Email Recipients: sjubeck@indsci.com, dwagner@indsci.com
SMS Recipients: +14123521039, +14124279223

Gas Code Description   Reading   Alarm Type
Oxygen                21.1 %vol

Notes

Add Note
Many Applications of iNet Now

CURRENTLY

• Lone workers
• Mobile worker crews
• In-plant monitoring
• Real-time area monitoring
• e-Permitting
• Many more
Lone Workers

• Work in isolation without supervision
• Can be far away from help
• Examples:
  – Remote pipelines
  – Tank farm
  – Off-peak hours work
Lone Worker Regulations

- USA (OSHA guidance, not regulated)
- Canada (Federal Bill C-45, provincial rules)
- Others
  - Australia
  - France
  - Germany
  - United Kingdom
  - Spain
iNet Now: A Worker-Centric Solution

Real-Time Gas, Panic, Man Down Alerts
Smart Devices for Lone Workers

• Many already carry smartphones
• For workers in classified locations
  – Safety leaders weighing the added benefit of workers in touch vs. risk of non-IS smartphones
  – Risk reduced if worker using a gas detector with an LEL sensor
  – Some cases available to make smartphones IS for Division 2/Zone 2
  – Note: no IS smartphones work with iNet Now (*yet*)
Mobile Work Crews

• Small teams that work outside of facilities, isolated from the core team of industrial workers
• Similar challenges to lone workers, but can at least watch each others’ back (if they stay connected)
  – Remote locations
  – Urban settings
  – Inspections
  – Confined spaces
LENS Wireless with iNet Now

Connect LENS Wireless groups up 6 instruments in size to iNet Now, provided one is a Ventis Pro within Bluetooth range of a smart device gateway.

Live monitoring
Confined Space Entry
Customized SMS/email alerts, as well as the iNet Now Web application with its live map, get the right information to the right people so they can:

- Understand the hazard at a glance
- Know where workers are
- Initiate emergency response, if needed
- Review, investigate, and document alert details

Summary:

Takes Hours or Days to Learn of Incidents
Can’t be certain workers are safe or where they are located
Live monitoring solutions currently on the market are complex
Data Collection with iNet Control
iNet Control Features & Benefits

- **Fleet Management**: Are your instruments working properly?
- **Hazard Management**: What are your people being exposed to?
- **People Management**: Are your instruments being used properly?
Fleet Management

iNet Control tells you that your instruments are working properly through:

• **Event Schedules** for bump testing and calibration to ensure your instruments are tested and calibrated when they are supposed to be.

• **Automatic firmware updates** that ensure your operating systems are up to date.

• **Instrument settings verification and update** when docked to ensure your units are configured properly.

• **History of bump/calibration certificates** ensuring you have complete documentation when you need it.

• **Emailed alerts** indicating sensors that have marginal sensitivity or have failed their last calibration.

• **Calibration gas monitoring** with auto replenishment so that calibration gas is available every time it is needed.
iNet Control tells you that your instruments are being used properly through:

- **Instrument user assignments** and history so you know who has what instrument when and where.
- **Emailed alerts** to let you know when an instrument has been
  - Used without being bump tested or calibrated
  - Turned off during a critical alarm event
  - Has critical settings changed by the user
- **Complete datalog** documenting when instruments are used and how users respond during dangerous gas exposure incidents.
- **Documented history of instrument** bump test and calibration indicating practices of individual users.
Hazard Management

iNet Control tells you what people are exposed to in the field through:

- **Emailed alerts** detailing each gas alarm event
- **Recurring, scheduled alarm summary reports** which highlight all instrument alarm events
- **Documentation of all alarm events** detailing:
  - Gas type
  - Alarm duration
  - Peak gas concentration
  - Average gas concentration
  - Instrument
  - Instrument user
  - Instrument location
- **Detailed history** showing all gas reading data by instrument and user
Questions?