Leak Monitoring, Research & Development Advances

Western Regional Gas Conference
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About Heath Consultants Incorporated

• Established in 1933
• 3\textsuperscript{rd} generation family/ woman owned
• Over 1,400 employees
• Manufacturer of leak detection and locating products
• Provide contract field service, leak detection, locating, corrosion and meter services
Personal Monitors

- LEL
- Carbon Monoxide
- Hydrogen Sulfide
- Oxygen
- Single Gas
- Multiple Gas
- Automated Calibration Docking Stations
Combustible Gas Indicators

- Confined Space Monitors
- Volume Gas
- Amplified Catalytic Sensors for PPM
- Semi-conductor for track gas / PPM
- Custom Configurable
- Leak / Odor Investigation tool
- Automated Calibration Docking Stations
Gasurveyor 700 Series
Compliance Leak Survey Instruments

- Low level PPM capability
- Volume Gas
- Flame-ionization
- Optical Infrared
- Laser
- Portable
- Vehicle Mounted
EyeCGas® Infrared Imaging Camera
Field Application

Bar Hole

Walking Survey

Mobile Survey
RMLD-UAV

- Advanced sUAV suitable for all weather flight
- Auto search, detection, localization and flux quantification
- Methane specific
- Open path bi-static Tunable Diode Laser Absorption Spectroscopy
Portable Standoff Near-IR TDLAS for Leak Survey

- Laser beam illuminates a distant surface
- Senses analyte gas between transceiver and illuminated surface
  - **Standoff range ~100 ft with handheld transceiver**
- Scanning laser beam across plume results in rapidly changing analyte gas measurement
  - ~2500 RMLDs™ in use for natural gas leak surveying

Remote Methane Leak Detector (RMLD™)
Commercial product (since 2005)

CO₂ version demonstrated at CCS test site wellhead during maintenance

Open Path Pipeline Monitors

- Permanent laser-based open-path alarms to detect and mitigate small to potentially explosive leaks
  - Wireless, solar-powered
  - Easy installation and alignment
  - Real-time alarm notification
- Operator alert within one minute of urgent leak detection
- Hourly notification of non-urgent leaks, enabling proper operator assessment and response
- Enabled by proven, industry-accepted RMLD™ technology
- CH$_4$ version demonstrated at PGE Livermore CA Training Center
  - 580’ path
  - Months of maintenance-free operation
- CO$_2$ version tested for more than two years at PSI and Illinois-Basin Decatur Project (IBDP) CCS Site

Pipeline under road
PGE Training Facility, Livermore CA
Test Site and Installation

Small neighborhood with controlled leaks within a buried gas distribution pipeline

Path 1 = 180 ft
Path 2 = 190 ft
Path 3 = 580 ft
Remote Emissions Monitor (RMLD-REM)
DP-IR™ Training Simulator

• Virtual leak survey training
• Train leak surveying without live gas
• GPS positioning of the virtual leak
Network of Methane Sensors

- Leverage existing proven AMI network technology with enabling sensor technology

  automated

  reliable

  low cost

  mass market

  networked leak detection device
Vision for Gas AMI System
Layered Gas System Monitoring

- Residential
  - One or more sensor modules placed by meter or indoors
- Distribution system
  - High consequence area monitoring
  - Gate stations
  - Valve enclosures
- Light Industrial
  - Sensor module integrated with a volume corrector or data monitor
- Transmission system
  - High consequence area monitoring
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Methane Sensor Monitor

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MobileGuard
Ultra Sensitive Mobile Monitoring

- High sensitivity sensor
  - Parts per billion (ppb)
  - Instantaneous response

- Mobile Platform
  - Geo-located measurements
  - Survey quickly and efficiently
  - Simple configuration (easy install)

- Leak Detection Software
  - Easy to use interface
  - Real-time plotting of leak Indications
  - Real-time gas discrimination
  - GIS compatible
Development of Next Generation Mobile Monitoring

- Vehicle-mounted sensors have a long history and have been extensively vetted - Developed in 1995 have
- Gone from legacy Cavity Ringdown to OA-ICOS
- Started mobile survey use and perfecting survey methodology since 2010
- Allows for cost-effective surveys of large areas at a rapid pace
- Requires:
  - Manufacturable, easy-to-use gas sensors that do not require researchers
  - Complete sensor suite - sensor, GPS, anemometer, gas inlet...
  - Leak detection software – analysis interpretation, leak aggregation
  - Data presentation user interface
MobileGuard Technology
Patented Off-Axis ICOS (OA-ICOS)

- Patented 4th generation cavity-enhanced technique
- Optical path provides very long pathlength
- Increased dynamic range
- Very robust – exact alignment is not critical, enabling mobile monitoring
- All advantages of conventional TDLAS, with increased sensitivity (ppb) and dynamic range
MobileGuard Solution
MEA for Mobile Monitoring

Mechanical Features

• 19” rack compatible
• 4U High (7”)
• 12 VDC
• Integrated Pump
• Integrated GPS Receiver
• Water Trap
• Humidity Interlock
Vehicle Integration

Methane, location and wind speed are analyzed by the computer to create leak indications.
System Operation

Leak Detection Network – Overview

Car #1
- GPS
- Sonic
- Methane/Ethane Analyzer
- WiFi
- Leak Analysis
- Real-time Visualization
- Serial

Car #54
- GPS
- Sonic
- Methane/Ethane Analyzer
- WiFi
- Leak Analysis
- Real-time Visualization
- Serial

... etc...

Command Center
- Remote Real-time Visualization
- Cloud Storage
- Multi-drive Leak Analysis

4G/LTE Modem
User Interface

Measured Data and Automated Alarms

Real-time Status

Methane Time Chart

Leak Indications List
Drive Reports
Available Formats

PDF
- Printable, static file
- Universally sharable

KMZ/KML
- View in Google Earth
- Import layers into GIS

Proprietary XML
- Machine readable
- Database import
Summary

Benefits

• Proven Performance
• Full featured hardware and software
• Service / Maintenance support and reliability
• Comprehensive solution
• Cost effective
Summary

Competitive Advantages

• Data ownership
• Short warm-up time
• Service, serviceability and stability
QUESTIONS?