Updated Leak Detection & Location Technology

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About Heath Consultants Incorporated

- Established in 1933
- 3rd generation family/ woman owned
- Over 1,700 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
Field Application

Bar Hole

Walking Survey

Mobile Survey
RMLD-CS and RMLD-LS
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
Small neighborhood with controlled leaks within a buried gas distribution pipeline
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
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
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
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 4\textsuperscript{th} 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

- Off-Axis ICOS Analyzer (Methane/Ethane)
- GPS (Location)
- Sonic Anemometer (Wind Speed/Direction)
- Computing (Leak Detection Software)

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
- Field Technician
  - Leak Analysis
  - Real-time Visualization
- WiFi
- 4G/LTE Modem

... (dots)

Car #54
- GPS
- Sonic
- Methane/Ethane Analyzer
- Field Technician
  - Leak Analysis
  - Real-time Visualization
- WiFi
- 4G/LTE Modem

Command Center
- Remote Real-time Visualization
- Cloud Storage
- Multi-drive Leak Analysis
HEATH CONSULTANTS
Your Safety...Our Commitment
User Interface - Map Display

Graphically displays survey route, survey area and leak indication.
Expanded View of Leak Locations

- **Three** distinct methane leak sources
  - Factory (could be using city landfill gas)
  - Landfill
  - Natural Gas Leak

- Simplified leak detection algorithm
- Use ethane measurements to identify natural gas leaks
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

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<aggregateRecord>
  <id>LEAKTOOL_09212016_22513</id>
  <displayName>#0-a</displayName>
  <detection>
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    <longitude>-121.914429751</longitude>
  </detection>
</aggregateRecord>
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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?