Trusted Partner of Utilities Everywhere

Advanced Leak Detection (ALD)

Presentation to:

Western Region Gas Conference

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Director Products and Strategy

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Southern Cross – Field Services

- Gas Field Services
- Electric Field Services
- Locate Field Services
- Water Field Services
- Construction Services
- Professional Services

Agenda

AMLD Platform Overview

- Introduction to Southern Cross
- Solution Set – Leak Detection and Emissions Quantification
- AMLD Platform and Analytics
- Methodology and Survey Process
- Benefits and Applications

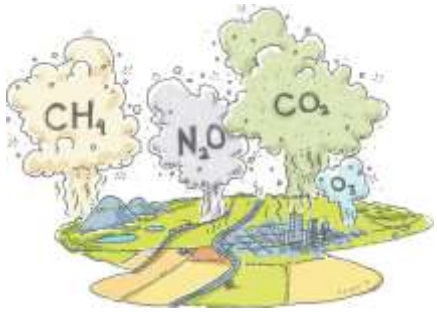
AMLD Operational Insights – What to Expect

- Planning the Leak Survey Process
- Driving and Data Collection
- Generating Actionable Outputs (Analytics)
- Investigations (Field Work)
- Reporting and Documentation

Changing Regulatory Environment

- Intense Regulatory Environment globally

- PIPES ACT 2020 - Regulations that encourage the study and use of commercially available ALD technologies to implement Leak Detection, Quantification, Repair & Inspection and Maintenance Plans



- Environmental Awareness - globally, investors and consumers focused on ESG objectives of all companies - expect more ”Green” and a path to net-zero

- Data Intensive Measurement Environment
  (can’t measure it – can’t manage it)

Technological Innovation - Fast

- Much has changed in the last short few years:
  - Laser based handhelds with GPS and Bluetooth
  - From ppm sensing capabilities to ppb sensing capabilities
  - From Airborne to cost effective Drone based surveys
  - Satellite surveys and Hyperspectral Imaging and Analytics
- Data Analytics and Visualization have begun to play an even bigger role. Machine Learning and AI is becoming a reality
- Much more will come in the next 1-2 years with continuous and fixed monitoring using all kinds of technologies with analytics and ML

New technologies and digital tools - accelerate, scale, and optimize methane reduction programs quickly and efficiently

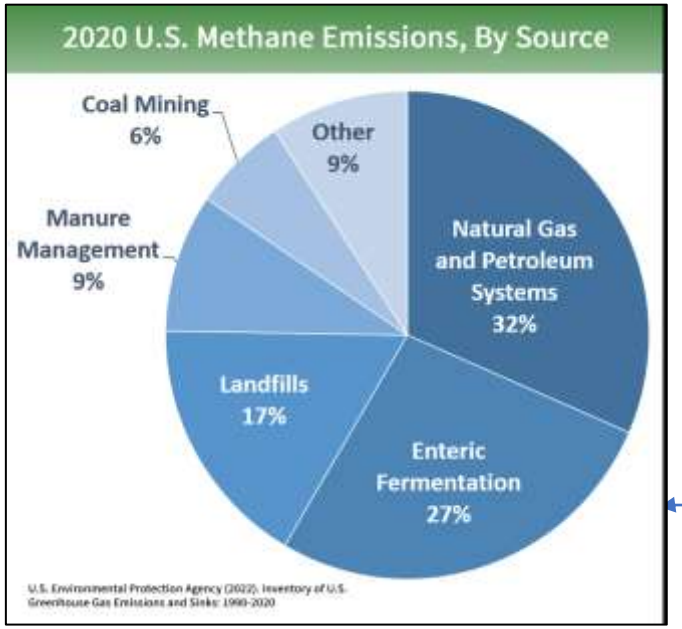


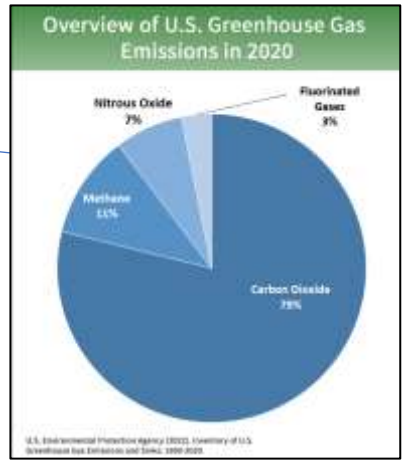





Why Worry about Methane?

- Methane is a major component of natural gas -- about 95%.
- Methane (CH_4) is a potent greenhouse gas (GHG) and represents about 10% percent of all anthropogenic GHG emissions.
- Methane has the capability to trap about 86 times more heat in the atmosphere more immediately over the first 20 years than carbon dioxide (CO_2).





Reducing methane emissions:

- **Easiest and fastest way to reducing overall GHG emissions in the short term**
- **Provides pipeline and gas infrastructure safety**
- **Protects people and property**
- **Enables environmental stewardship - reach your ESG goals faster**

Leak Detection Solution Set – Southern Cross Approach

SC Preferred Equipment

- Irwin laser based handheld leak survey unit
- Multi-Gas and personal safety handheld units
- Partner solutions
- Mobile survey unit fitted with preferred equipment



Client-Required Equipment

- Remote laser solutions
- Other approved survey equipment (Airborne platforms)
- Client Software




AMLD Solutions (Advanced Mobile Leak Detection and EQ Platform)

- Extended range high sensitivity sensors combined with data analytics
- Additional investigation for pinpointing
- Emissions Quantification
- Quality assurance

SC Software

- Tracking of workforce
- Validated performance against GIS data
- Leak tracking and quantification


AMLD Platform

Gas Sensor Hardware

- Ethane/Methane detection
- Mid-IR Absorption Technology
- Parts-per-billion (ppb) sensitivity from Aeris Technologies

Wind Sensor

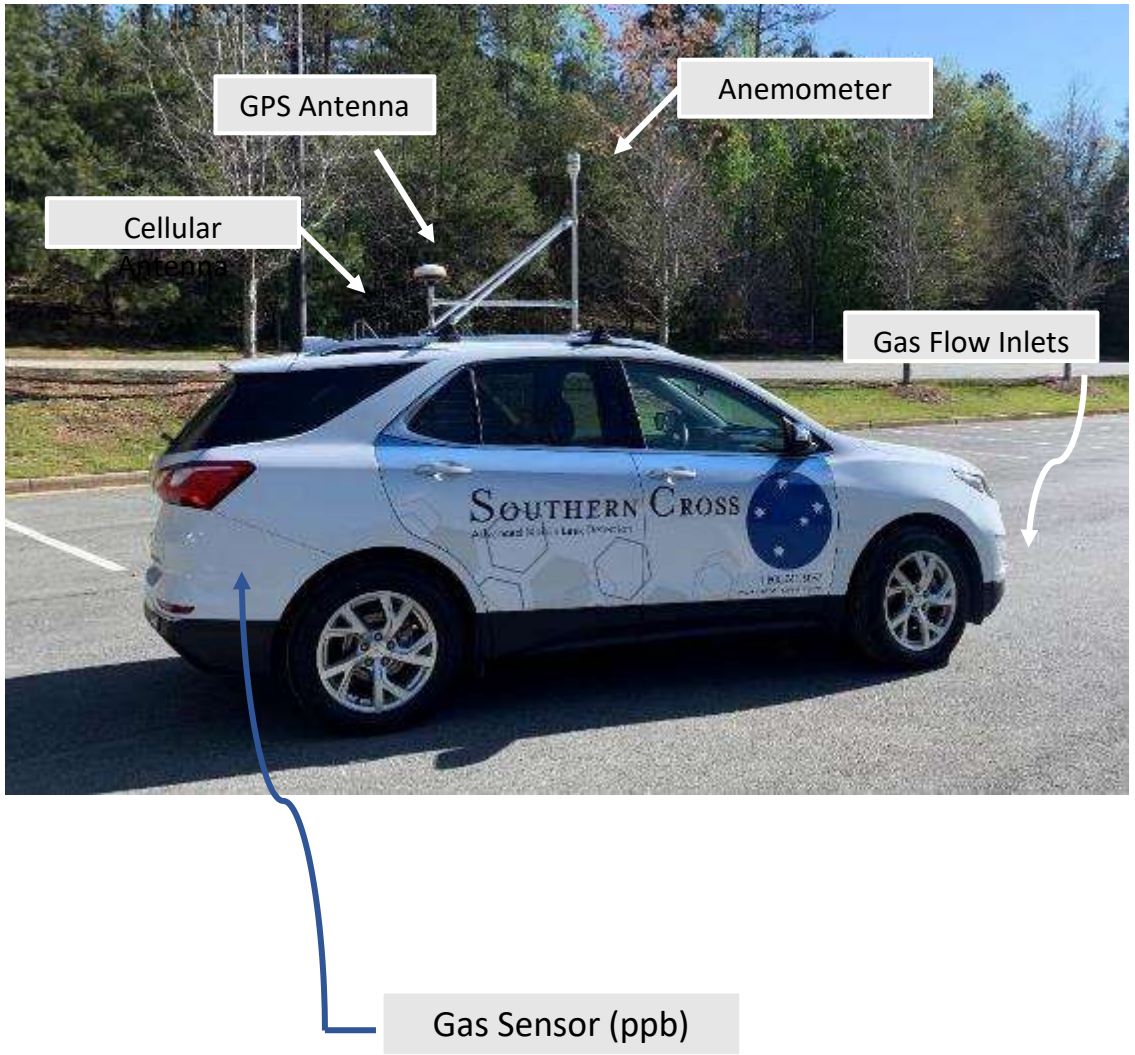
- Sonic Anemometer
- Vehicle-corrected wind direction

GPS Sensor

- High-precision location information embedded to all data

Auxiliary Systems

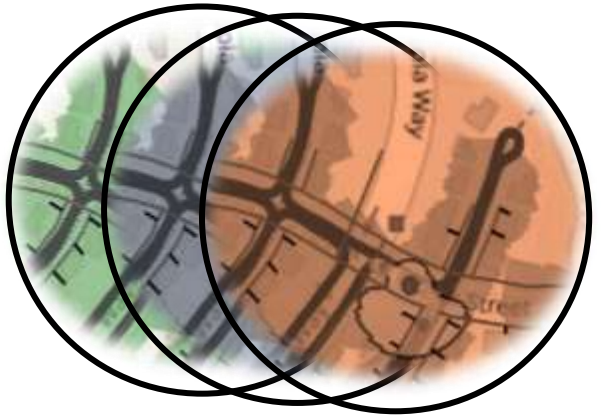
- Wireless modem for prompt data upload to the cloud
- Auxiliary power system for independent operation from vehicle systems
- In-car Driver tablet

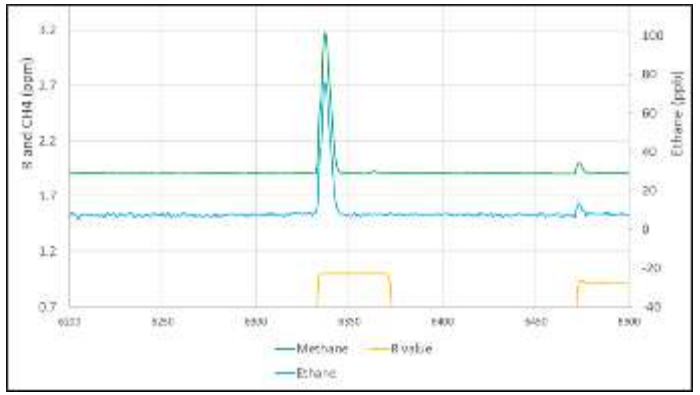


SOUTHERN CROSS

AMLD Analytics

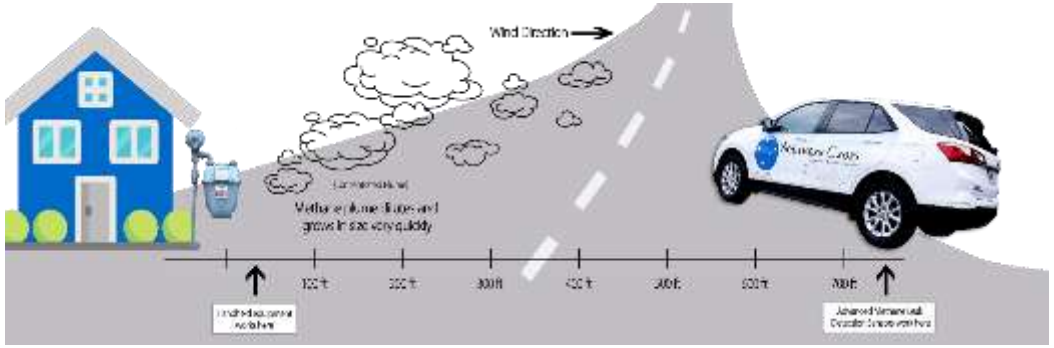
- Ability to combine data from multiple drives
- Generate Leak Indications GPS Coordinates from Individual clusters of gas
- Technician dispatching system for further investigation and confirm presence of leak
- Indications can be prioritized by
  - Magnitude of gas,
  - Frequency of detection, etc.
  - Probability of Natural Gas (source discrimination)
  - Confidence score
  - Emissions Quantification
  - Ranking





Implications - High Sensitivity Analyzer + Advanced Analytics?

- **Highest Probability of finding Leaks**:
  - Using sensors that are 1000 times more sensitive than traditional handheld sensors
  - Confirming the presence or an absence of a methane leak up to distance of several hundred feet.



- **Paradigm Shift in Leak Survey**:
  - Traditional approach - walk all services from meter to meter. 90% of the time there are no leaks,
  - AMLD platform can survey large swaths of the natural gas infrastructure and confirm presence or absence of methane
  - Dispatch technicians only to areas where presence of leak is found

- **Digital Records and Reporting**:
  - Digital representation of the potential emissions in terms of spatial data (Latitude/Longitude)

AMLD Methodology

DATA CAPTURE

First, driving survey data is collected. Driving is the most efficient means of data collection
(CH_4 levels, GPS, Wind Speed/Direction)

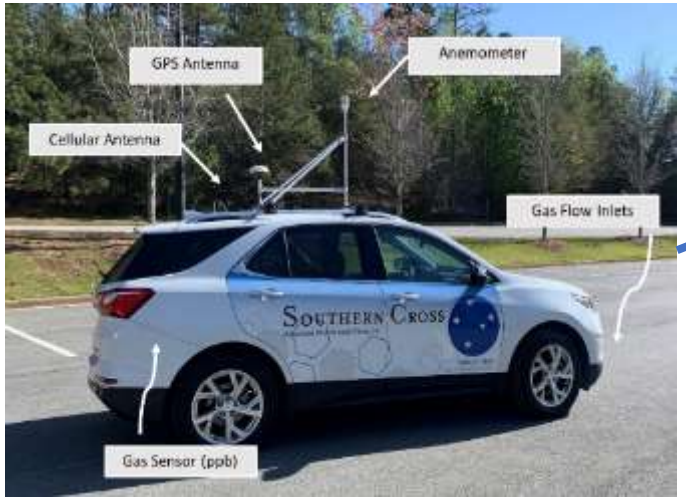
DATA ANALYTICS

Raw data from multiple drives are analyzed and consolidated using algorithms and data analytics.
Source identification is derived
Actionable Insights generated

DECISION & EXECUTION

Work Orders are then generated embedded with information such as location of the detected emission, gas amplitude, gaps in coverage, etc
Data and insights used for multiple purposes

One Survey – Multiple Use Cases

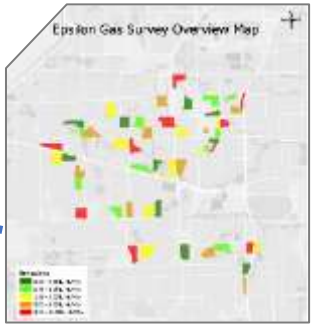


Data Collection

Cloud Storage And Analytics

Methane / Ethane
GPS / GIS
Wind
Atmosphere Condition
Speed/Direction
Vehicle Speed
Technician Profile

Compliance Survey



Emissions Quantification

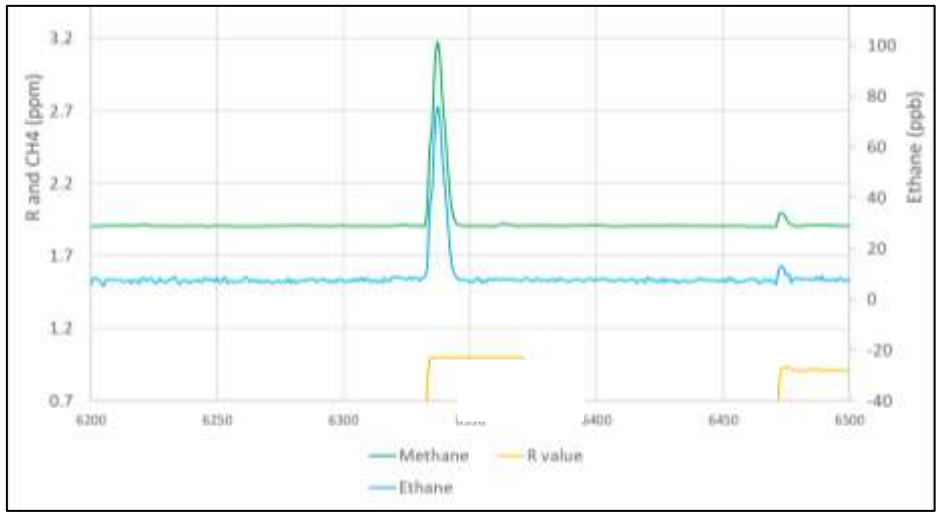
"High" Emitters Program

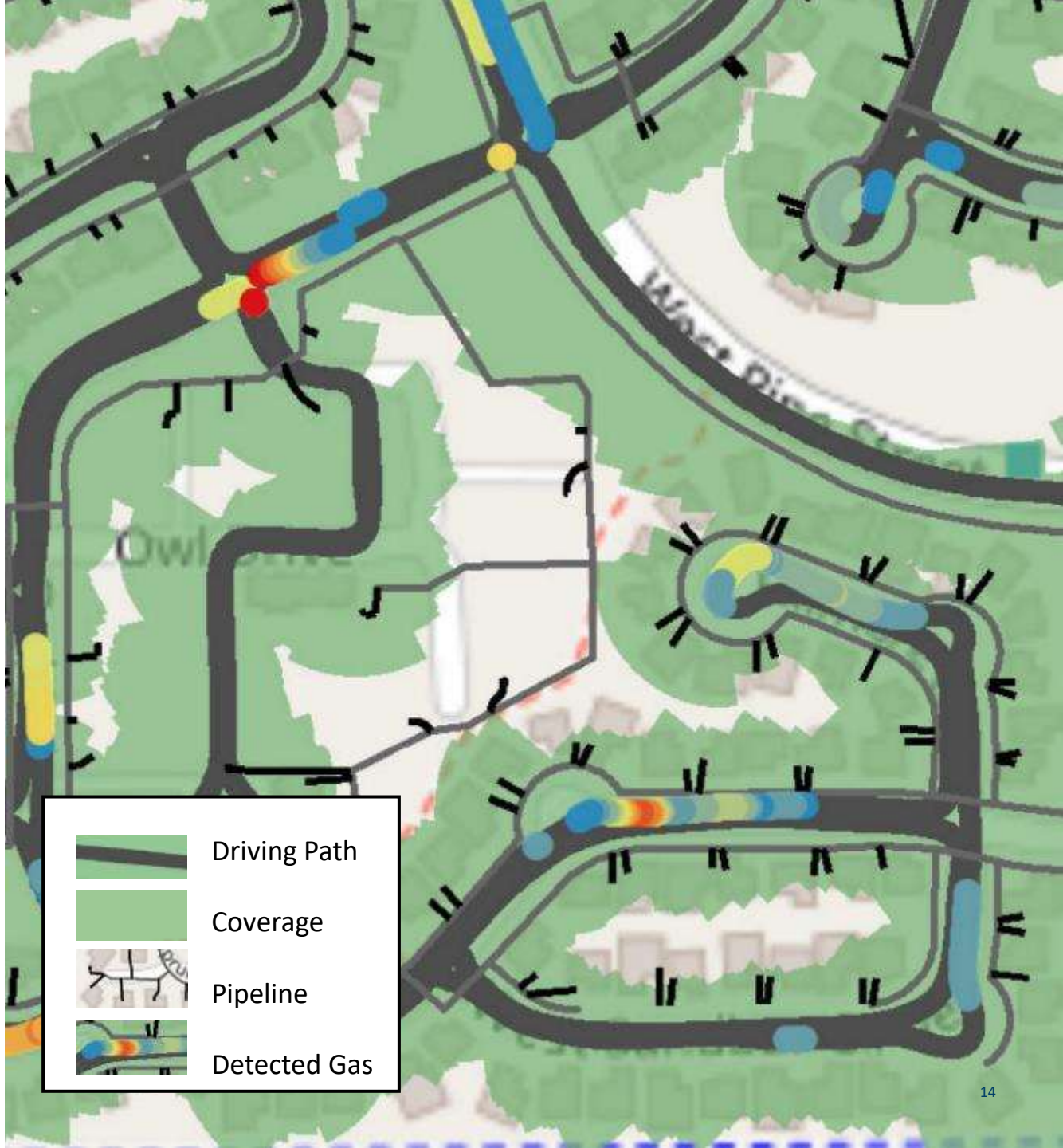
Driving and Data Collection

- Vehicle drives all roads in the area with assets
- Via the wind, the vehicle is able to detect leaks some distance off the road
- Detection limited only by access to leak and wind behavior
- Vehicle makes **Multiple passes** over multiple days
- *Strength:* via multiple passes, the survey increases the likelihood of detection
- Driving performed at night

Data Analytics

- Gas sensor data is analyzed for elevations in Natural Gas against background methane.
- Analysis considers environmental data
- Natural Gas versus ‘Swamp Gas’
- Key outputs:
  - Leak Indications Search Areas (Lat/Lon)
  - Covered Assets with no gas found
  - Coverage
  - Gaps





(1) Coverage with No Gas Found

- Analytics confirms the **absence** of gas
- These areas do not need any further investigation activities
- Assets can be marked – “No Gas Found”
- Typically, 85% to 90% of area is covered

(2) Coverage with Leak Indications – Gas found

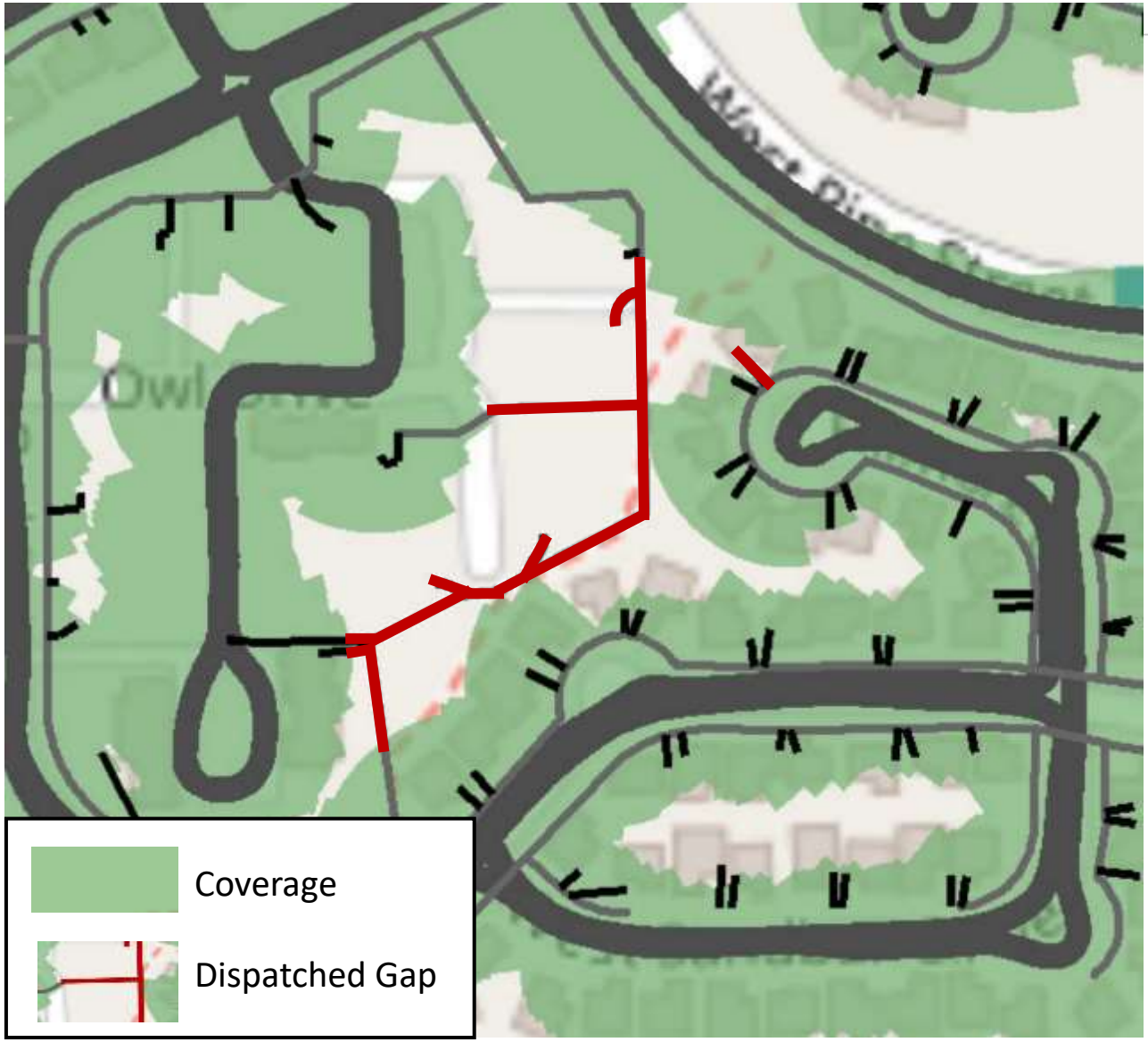
- Individual clusters of gas are dispatched as Indications
- Technician dispatched for further investigation and confirm presence of leak and grade the leak
- Indications can be prioritized by
  - Magnitude of gas,
  - Frequency of detection, etc.
  - Probability of Natural Gas (source discrimination)
  - Confidence score
  - Emissions Quantification
  - Ranking

(3) Coverage and Gaps

- Gaps - Any assets or portions or the target area not covered by AMLD

- Gaps
  - not able to drive in the area-private road/construction or road closures
  - unfavorable environmental conditions such as wind speed and direction
  - Terrain

- Any assets or portions or the target area not covered by the vehicle are dispatched for traditional investigation as a Gaps



Summary – Three Basic Outputs

1. **Coverage – No Gas found**
   - No further activities in this area
   - Typically, 85% to 90% of area is covered

2. **Coverage with Leak Indications – Gas found**
   - Technician dispatched to investigate and confirm the leaks

3. **Not Covered – Gaps**
   - Technician dispatched to survey the area
   - Typically, 10% to 15% of the area depends

- **Field work then consists of:**
  - Dispatching technician to investigating the Leak Indications, confirming presence of leaks and grading the leaks
  - Dispatch technician to surveying the Gaps for any leaks

- **Entire area is now surveyed**
  - (100% complete)

1

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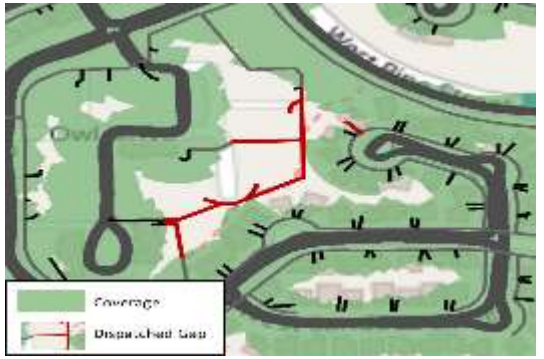


Many Applications and Uses of AMLD Technology

Regulatory
Compliance Survey

Pre-Event &
Public Safety Audits

DIMP Assessment
Management

Disaster Recover Surveys

Environmental & Emissions
Reduction programs

Frost Patrol

Pre & Post
Quality Construction Audits

Auditing Traditional
Leak Survey

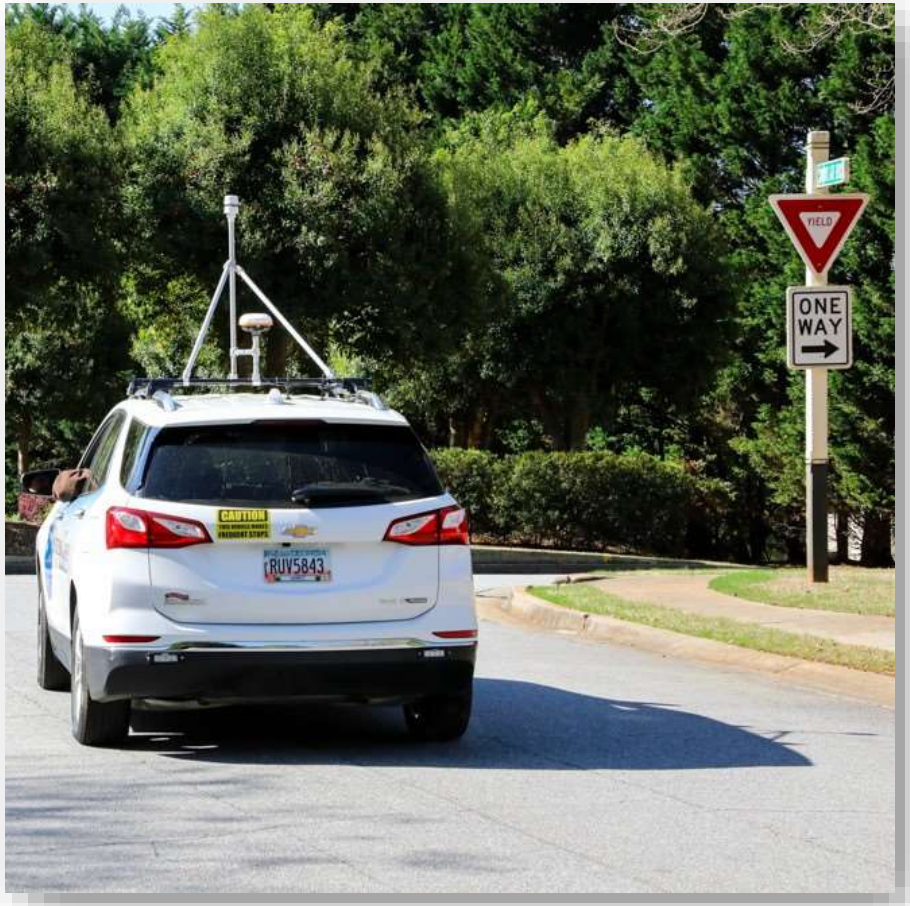
Satellite Tiered System
Leak Survey

AMLD Operational Planning and Insights

1. Planning
2. Pre-Driving Activities
3. Driving and Data Collection
4. Generating Actionable Outputs – Analytics
5. Field Work

Step 1 – Planning

- Define the survey purpose
  - Compliance leak survey, special survey, disaster recovery, environmental / emissions, etc.
- Define how and where the data will be utilized
- Prepare for potential of increased leak identification
- Obtain regulatory approvals (if needed)
- Develop processes for prioritizing & responding to leak indications
- Understand GIS accuracy and project impact
- Determine areas to be surveyed
- Develop coverage targets
- Schedule / Timing
- Logistical planning
  - Road closures, gated neighborhoods, etc.

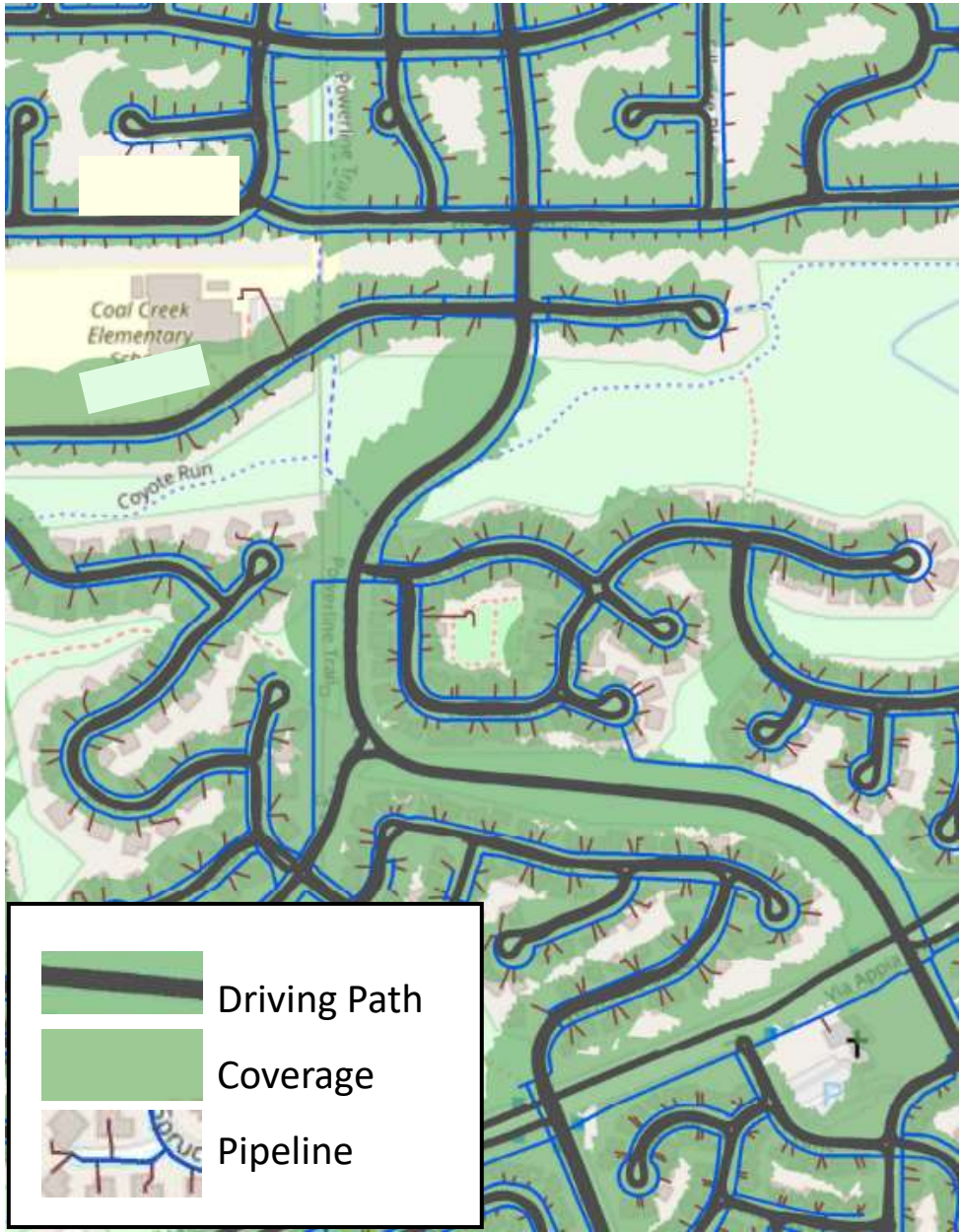


Step 2 - Pre-Driving Activities

- Client provides Southern Cross with areas of interest or asset data to be surveyed
- The region is divided into work-groupings for drive dispatching
- Develop coverage targets
- Schedule / Timing
- Logistical planning
  - Road closures, gated neighborhoods, etc.
- Communicating with proper authorities about night time driving

Step 3 - Driving and Data Collection

- Vehicle drives all roads in the area with assets
- Via the wind, the vehicle is able to detect leaks some distance off the road
- Detection limited only by access to leak and wind behavior
- Vehicle makes **Multiple passes** over multiple days
- *Strength:* via multiple passes, the survey increases the likelihood of detection
- Driving performed at night



Step 4 – Generating Actionable Outputs (Analytics)

THREE Basic Outputs:

1. **No Gas found**
   - No further activities in this area
   - Typically, 85% to 90% of area is covered

2. **Gas found (Leak Indications)**
   - Technician dispatched to investigate indications and confirm the leaks

3. **Gaps (Not Covered)**
   - Technician dispatched to survey the area
   - Typically, 10% to 15% of the area depends

1

2

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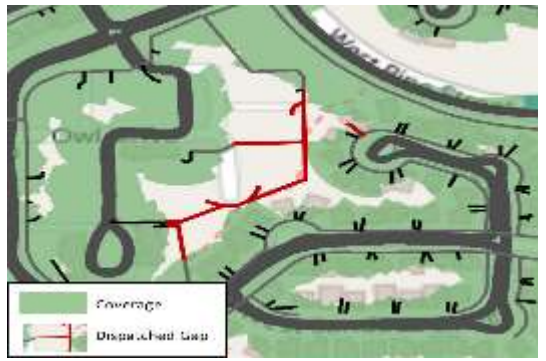


Step 5 - Field Work

- **Dispatch leak survey technician to:**
  - Investigate the leak indications
    - Confirm presence of leaks
    - Grade & pinpoint leaks
    - Record results – document in system of record
  - Survey gaps
    - Traditional walking Survey
    - Grade & pinpoint leaks
    - Record results – document in system of record

Conclusions

- New and advanced leak detection and emissions quantification technologies will be required to meet an economy-wide 2050 net-zero target
  - AMLD with advanced software analytics can be used TODAY as part of overall advanced LDAR solution set and provides opportunities to detect and reduce emissions quickly and cost-effectively
    - Leak Detection Surveys
    - Identify “High Emitters”
    - Supplementary data for pipe replacement and repair program
    - Identify and Rank pipe segments for Risk Mitigation

- Using AMLD as part of an outsourced service - helps avoidance of large capital investments in this advanced technology.

Southern Cross offers:

Full Compliance Leak Survey

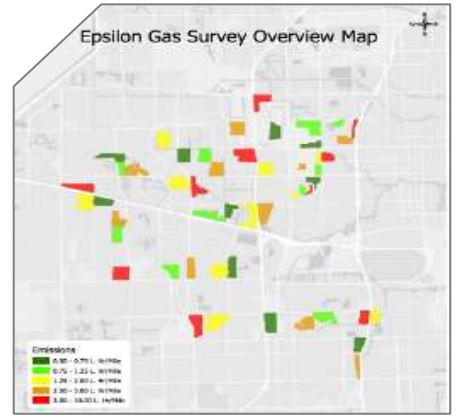
- Use ALL appropriate technology platforms including AMLD to complete leak survey on time and budget using our own qualified technicians

Indication (Pinpointing) Survey

- Use AMLD Technology to survey the entire network
- Provide actionable data - GIS leak indications locations and gaps areas
- Utility conducts their own investigations from supplied data

Emission Quantification Survey

- Use AMLD Technology platform to survey entire network
- Provide estimated emissions flow rates and rankings (optional –leak locations)
- Utility takes appropriate risk mitigation actions from supplied data



Supply Qualified and Experienced Technicians

- Qualified and experienced drivers to operate other AMLD type platforms
- Qualified technicians for follow-up leak indications investigations

Thank You

Southern Cross – Field Services

Gas Field Services	Gas field services including, leak detection, AMLD, pipeline integrity services, emissions quantification (EQ), meter exchanges & relights
Electric Field Services	Electric field services including, AMR & AMI meter exchanges, maintenance support, and safety & auditing
Locate Field Services	Multitude of locate field services for gas, electric, and water utilities including single and multiple tickets. State of the art equipment and GPS enable fleet vehicles
Water Field Services	Water field services including, turn on/shut off, water meters exchange, lid replacements and qualified meter reading services
Construction Services	**S**everal types construction services including gas main installation/replacement, cathodic protection services, regulator and gate station installations

Safety

Customer Focus

Partnership

Quality

Integrity

Technology