the Energy to Lead

Track Session # 2
Leak Detection
(Gas Distribution)

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by

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Gas Distribution: Leak Survey and Pinpointing

- **Leak Survey**
  - Flame Ionization Detector (FID)
    - Reliable and proven technology
    - Response to hydrocarbons
      - Not specific for methane
    - Significant maintenance cost
    - Response time
- **Leak pinpointing**
  - Combustible Gas Indicator (CIG)
    - Reliable
    - Additional cost

- **Topics**
  - Walking leak survey
  - Leak identification/ownership
  - Remote leak survey

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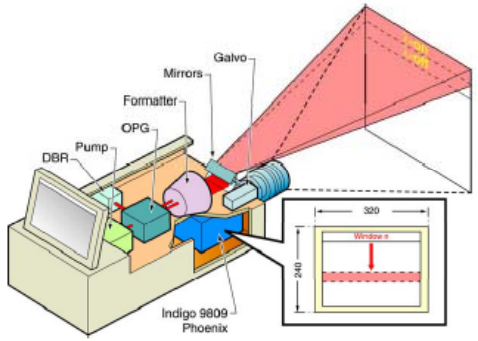
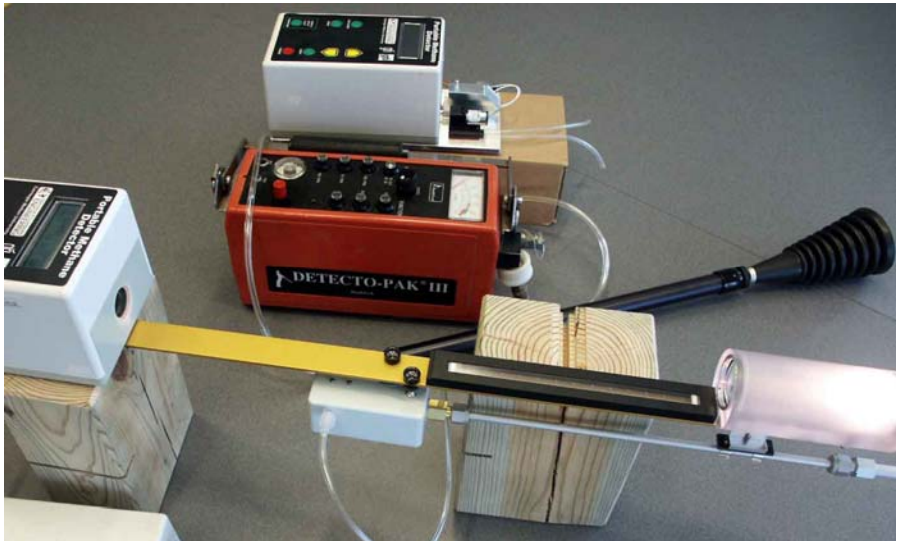
New and Upcoming Technologies

- **Reduce cost and Improve efficiency**
  - Leak survey/pinpointing functions with one instrument
  - Identification of gas leaks - Natural gas vs. other gases (e.g., sewer gas)
  - Remote surveys
    - Leak imaging
    - Leak quantification
  - Intrinsic safety



PMDs versus FID – Test, Size and Weight



PMD being commercialized by Sensit Technologies

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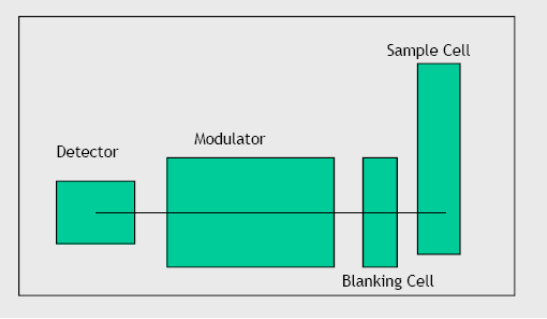
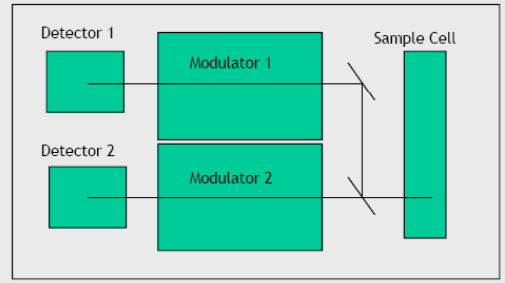
EMD (Ethane Methane Detector) Development

- **Improve PMD for both ethane and methane detection**
  - Leak survey
  - Leak identification/ownership
  - Leak pinpointing

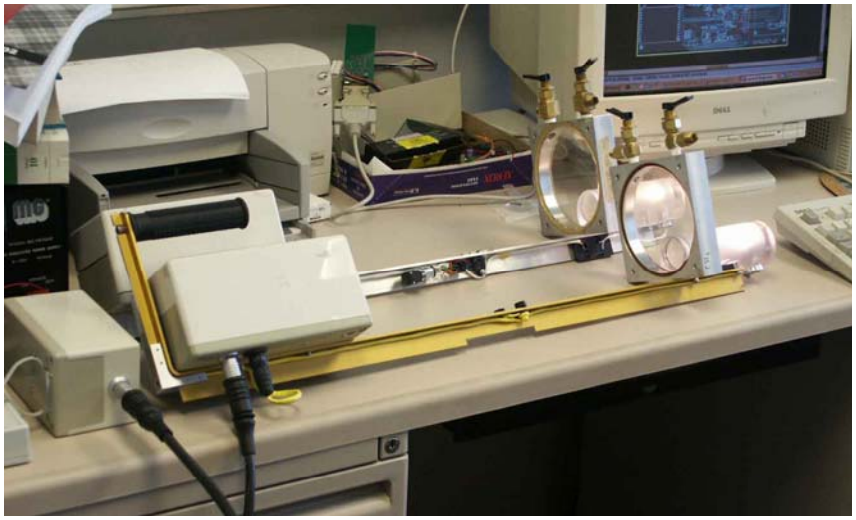


- **Two approaches**
  - Single Modulator
    - Only one gas at a time with blanking cell
  - Dual Modulator
    - Little more complex/expensive
    - Can perform all desired measurements
    - No blanking cell needed
    - Slightly larger



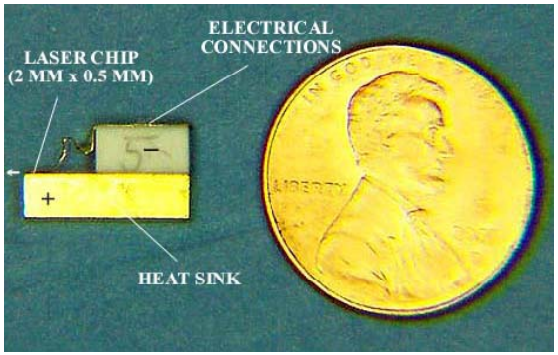
EMD Status

- Laboratory-grade unit tested
  - 200 ppb ethane detection capability
  - No performance deterioration compared to PMD for methane alone
- Determine Single vs. dual modulator approach
  - Develop and test hand-held EMD
    - Laboratory
    - Field



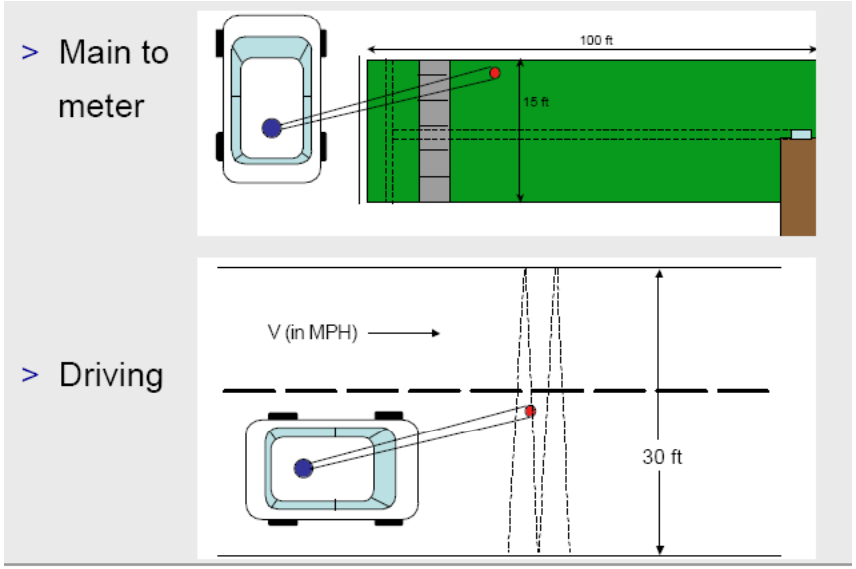
Laser-based Remote Sensing of Gas Distribution Leaks

- Design, build and evaluate a van-mounted, system using semiconductor laser
  - 5-10 ppm-m sensitivity at a distance of 30 m
  - Vehicle motion up to 15 mph, potentially higher
- Objectives
  - Initial system for leak detection
  - Future system for leak detection and imaging



Semiconductor-based Laser System

- Close to fabricating 3.3 micron laser
  - Methane absorption significantly higher than 1.6 micron lasers
- Power level of 15-50 mWatts
  - Thermoelectric vs. liquid nitrogen cooler
  - Capability of CW and pulsed operation
- Other equipment necessary to test system in laboratory are ready
- System tests in late 2009



Conclusions

- Optical-based leak survey system such as PMD developed for walking survey
  - Need for intrinsic/explosion proof safety
- Dual (methane/ethane) detection
  - Initial laboratory-grade device promising
  - Need to finalize approach, develop prototyp and test
- Remote leak survey and imaging
  - Preliminary technology approach defined
  - Requires laser with sensitivity, incorporatio laser into a leak survey system and test the system in the field
- Imaging and ppm level methane leak survey will require light source of 3.3 micron

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Any Questions?