NYSEARCH Strategies

- Improve Safety through development of next generation, low-cost and more reliable methane and mercaptan sensors
- Evaluate SOA technologies that could serve to improve safety and leak detection in distribution sector
- Evaluate and develop technologies that can quantify methane emissions on individual leaks in distribution environments
NYSEARCH/ ANI Methane Sensor

- Develop a new methane sensor based on existing hydrogen sensor technology

- Specifications
  - NG concentration: 0 – 100%
  - LDL in air: 0.25%
  - Response time: 1 sec
  - Accuracy: ±0.1%
  - Resolution: ±0.1%
  - Supply voltage: 5 VDC

- Pre-commercial sensor development and commercialization effort cofunded by PHMSA
Methane Sensor Operating Principle

- Two tuning forks; one exposed to the ambient, the other in vacuum
- Frequency depends on viscosity of gas to be measured
- Pressure compensation
- Temperature stabilized via heating element
Advantages of Methane Sensor

- Low cost, even in small scale production
- Sensor and controller can be very small
- Physical sensor
  - Immune to degradation
  - Immune to poisoning
- No consumables required
- Almost instant response, less than 1 sec
- Does not respond to other hydrocarbons or household and industrial chemicals – no false positives
- Can operate as alarm sensor for methane leak detection, or as analytical instrument
- Meets UL 1484 and 2075/913 standards
Methane Sensor Engineering Prototype

- Engineering prototype produced and tested by NYSEARCH member companies in 2012/2013

Analytical tool engineering prototype:
Sensor kit includes DC power supply, software, sensor with built-in sensor head, and RS-232 cable

Pre-commercial alarm sensor prototype: testing completed
# Features of Sensor Designs “A” and “S”

## Application specific requirements

<table>
<thead>
<tr>
<th></th>
<th>“S” Design</th>
<th>“A” Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Residential - Safety</td>
<td>Industrial - Instrument</td>
</tr>
<tr>
<td>Compliance</td>
<td>UL 1484</td>
<td>UL 2075/913</td>
</tr>
<tr>
<td>Usage</td>
<td>Wall/ceiling mount</td>
<td>Handheld/portable</td>
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<tr>
<td>Power</td>
<td>~120V + backup bat.</td>
<td>~120V + recharg. bat.</td>
</tr>
<tr>
<td>Indication</td>
<td>LED/Sound Alarm</td>
<td>LCD/Sound Alarm</td>
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<tr>
<td>Communication</td>
<td>(RS232)</td>
<td>RS232</td>
</tr>
<tr>
<td>Parameters</td>
<td>Fixed</td>
<td>User selectable</td>
</tr>
<tr>
<td>Other</td>
<td>RH sensor not needed</td>
<td>Micropump is optional</td>
</tr>
</tbody>
</table>

Sensor tested for interference effects from household and industrial chemicals; no false positives
ANI ‘S’ Sensor as Residential Detector

- ‘S’ design could be applied as-is as a residential detector; meets UL standard
- No concerns about using ‘S’ design sensor with similar pre-existing electronic packages from other detector manufacturers
- Commercialization would need to include reliability testing for this application
Current R & D Activities on Methane Sensor

- Phase IIIb – cofunded by PHMSA in 11/13
  - Completed pre-commercial design optimization
  - Conducted discussions with several prospective commercializers
  - Recently completed reliability/interferent testing at contractor’s lab
- Initiating pre-commercial testing with prospective commercializer under NDA
- Decision on needs for additional pilot testing pending
- Expected completion - 2015
Methane Detection for small Unmanned Aerial Systems (sUAS)

- NYSEARCH evaluating sUAS application to incorporate small sensitive methane detector for aerial surveillance; considering JPL device
- sUAS leak detection at “tree top” level survey, agile and semi-autonomous
- Methane to be identified and discriminated; intended to overlay onto gas map, GIS or street map
Questions?

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