## Gas Hazards in Agriculture

Direct-reading gas monitors can alert farmers to life-threatening concentrations of gases on the farm. These monitors are relatively inexpensive and easy to use. Below are guidelines to identify hazards and select sensor types based on potential hazards in your farming operation.

### Gas Hazards in Agriculture

<table>
<thead>
<tr>
<th>Gas</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen Sulfide (H₂S)</td>
<td>2-20 ppm: nausea, headache, dizziness</td>
<td>100-300 ppm: altered breathing, fluid in lung</td>
<td>500-700 ppm: collapse, death</td>
</tr>
<tr>
<td>Methane (CH₄, LEL)</td>
<td>&lt; 0.1% (1000 ppm): not harmful</td>
<td>&lt; 1% (10,000 ppm): no known toxicity</td>
<td>5-15% (50,000 ppm): explosive</td>
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<tr>
<td>Ammonia (NH₃)</td>
<td>5-20 ppm: odor, eye irritation</td>
<td>20-50 ppm: Moderate eye and upper respiratory tract irritation</td>
<td>2500 ppm: chemical pneumonitis, edema, cyanosis, death</td>
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<tr>
<td>Carbon Dioxide (CO₂)</td>
<td>600-2000 ppm: muscle stiffness, drowsiness, poor judgement</td>
<td>5000 ppm: 8-hr maximum</td>
<td>30,000 ppm (3%): increased pulse rate, nausea, mental impairment</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>&lt;9 ppm: comfortable living concentration (35 ppm = 8-hr allowable)</td>
<td>200 ppm: headache, dizziness, nausea in 2 hours</td>
<td>400 ppm: life threatening in 3 hours</td>
</tr>
</tbody>
</table>

### Health Effects

- **Low**: 2-20 ppm: nausea, headache, dizziness
- **Medium**: 100-300 ppm: altered breathing, fluid in lung
- **High**: 500-700 ppm: collapse, death

### Livestock Production

- **Manure Storage**: Under slatted floor, Outside lagoon, pit, or tank
- **Manure Pumping**: Under slatted floor, Outside lagoon, pit, or tank
- **Foaming Manure**: If foaming is present, significant methane risk (see additional materials)
- **Pressure Washing**: Inside building
- **Animal**: Exhaled breath
- **Gas-fired Heaters**: Combustion byproducts
- **Inside Bins**: Out-of-condition grain, Gas-fired dryers
- **Equipment**: Overheated equipment, Smoldering product

### Sensor Types

- **CO₂**
- **H₂S**
- **CO**
- **NH₃**

Children, elderly, pregnant women are at risk at lower CO concentrations. The concentrations are relevant only at “sea level.”

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