

# MSA Five Star 4-Gas Monitor

Air Monitoring  
Instrumentation



# Objectives

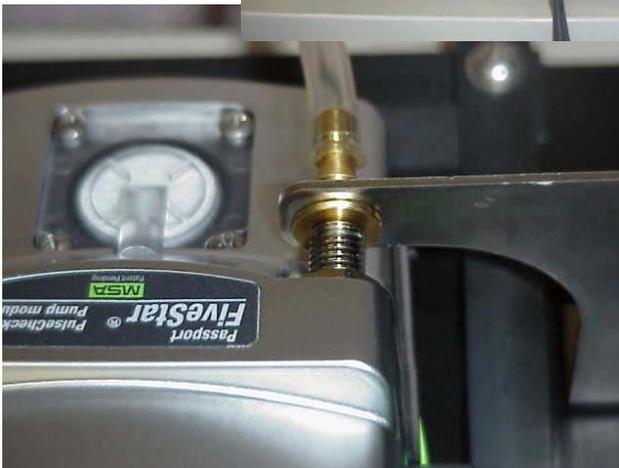
- Discuss instrument calibration procedure, as appropriate.
- Discuss the procedure for instrument use.
- Review appropriate sampling procedures.

# Introducing...

## The MSA FiveStar 4 Gas Monitor



# Instrument Calibration



- Place the instrument into the holder and slide it forward, making sure of a tight connection with the gas delivery fitting.
- Depress the center ON/OFF button.
- When prompted, depress the RUN button on the TIMS.
- Once finished, you will see the prompt saying calibration complete and a PASS – you are free to use the instrument.
- If the calibration FAILS – DO NOT USE the instrument. Notify division/section ES&H personnel immediately.

# Instrument Operation #1

## Turning the Instrument On



Turn the instrument ON by depressing the center ON/OFF button.

One beep will sound and the alarm lights will flash once.

# Instrument Operation #2

## Fresh Air Setup

User will be prompted for Fresh Air Setup?

Select NO (Left *Page* button) if you just removed from the TIMS. NO is also the default response.

Select YES (Right *Reset* button) if in clean air and the TIMS unit has not been used.



# Instrument Operation #3

## Display



# Instrument Operation #4

## Battery Check



Check remaining battery life by depressing the left PAGE button.

Instrument will beep and show remaining battery life as a bar graph, percent remaining and hours remaining.

If the battery is dying, an alarm will sound.

# Instrument Operation #5

## Date and Time

Air monitoring data needs to be recorded pre-entry and at least once per hour during entry.

To check the date and time, press the left PAGE button twice.



# Instrument Operation #6

## Shutdown



Press and hold the ON/OFF button.

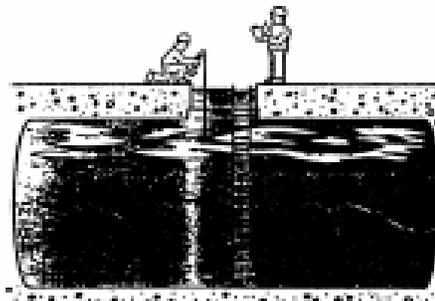
The display will show a countdown.



When the countdown reaches zero, the instrument will be turned off and the user can release the ON/OFF button.

# Atmospheric Testing

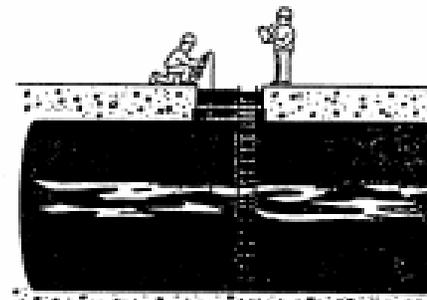
Depending on their weights, hazardous gases could be at the bottom, middle or top of a given confined space. Some gases are heavier than air, others lighter, some the same weight. Therefore, the only safe way to test the atmosphere of a confined space is to sample all levels (top, middle, bottom) at 4 foot intervals with properly CALIBRATED INSTRUMENTS.



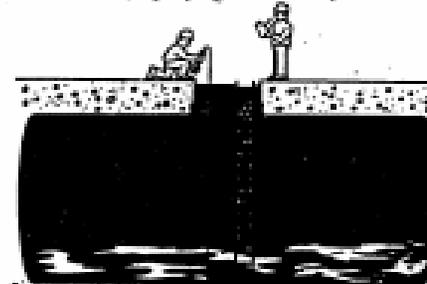
**Methane Combustible Gas**  
(lighter than air)

If toxic gases, combustible gases or oxygen deficiency/enrichment are discovered, the confined space has to be ventilated and retested before any entry is permitted.

12



**Carbon Monoxide (CO)**  
(slightly lighter than air)



**Hydrogen Sulfide (H<sub>2</sub>S)**  
(heavier than air)

Remember to put your trust in a properly calibrated instrument and **not your senses**. You can't see or smell many toxic gases, combustible gases or determine how much oxygen is present without a reliable instrument.

13

# Atmospheric Testing Comparison of Gases

The following gases are **lighter** than air:

Name	Vapor Density (Air=1)
<b>Acetylene</b>	<b>0.9</b>
<b>Ammonia</b>	<b>0.6</b>
<b>Carbon Monoxide</b>	<b>~1.0</b>
Ethylene (Ethene)	~1.0
<b>Helium</b>	<b>0.1</b>
Hydrogen	0.1
Methane	0.6
<b>Nitrogen</b>	<b>~1.0</b>

The following gases are **heavier** than air:

Name	Vapor Density (Air=1)
<b>Argon</b>	<b>1.4</b>
Butane	2.0
Carbon Dioxide	1.5
Chlorine	2.5
<b>Ethane</b>	<b>~1.0</b>
Hexane	3.0
<b>Hydrogen Sulfide</b>	<b>1.2</b>
Methyl Ethyl Ketone	2.5
Methyl Mercaptan	1.7
Nitrogen Dioxide	1.6
Nitrous Oxide	1.5
<b>Oxygen</b>	<b>1.1</b>
<b>Propane</b>	<b>1.6</b>
Propylene	1.5
Sulfur Dioxide	2.2

The gases in bold and larger text are those commonly found at Fermilab.

# LEL Correlation Data Table

	<b>Gas</b>	<b>Methane</b>
<b>G</b>	<b>Acetone</b>	<b>1.7</b>
<b>a</b>	<b>Acetylene</b>	<b>1.3</b>
<b>s</b>	<b>Ammonia</b>	<b>0.8</b>
	<b>Benzene</b>	<b>1.9</b>
	<b>Butane</b>	<b>1.7</b>
	<b>Carbon Monoxide</b>	<b>1.1</b>
<b>B</b>	<b>Dodecane</b>	<b>3.0</b>
<b>e</b>	<b>Ethane</b>	<b>1.3</b>
<b>i</b>	<b>Ethanol</b>	<b>1.5</b>
<b>n</b>	<b>Ethylene</b>	<b>1.3</b>
<b>g</b>	<b>Hexane</b>	<b>2.3</b>
	<b>Hydrogen</b>	<b>1.0</b>
	<b>Isopropanol</b>	<b>1.9</b>
	<b>Methane</b>	<b>1.0</b>
<b>S</b>	<b>Methanol</b>	<b>1.1</b>
<b>a</b>	<b>Pentane</b>	<b>1.9</b>
<b>m</b>	<b>Propane</b>	<b>1.6</b>
<b>p</b>	<b>Styrene</b>	<b>2.2</b>
<b>l</b>	<b>Tolulene</b>	<b>2.1</b>
<b>e</b>	<b>Vinyl Chloride</b>	<b>2.5</b>
<b>d</b>	<b>Xylene</b>	<b>2.5</b>