



# Managing H<sub>2</sub>S for Odors & Corrosion Control



Presented By:

Becky Haugen

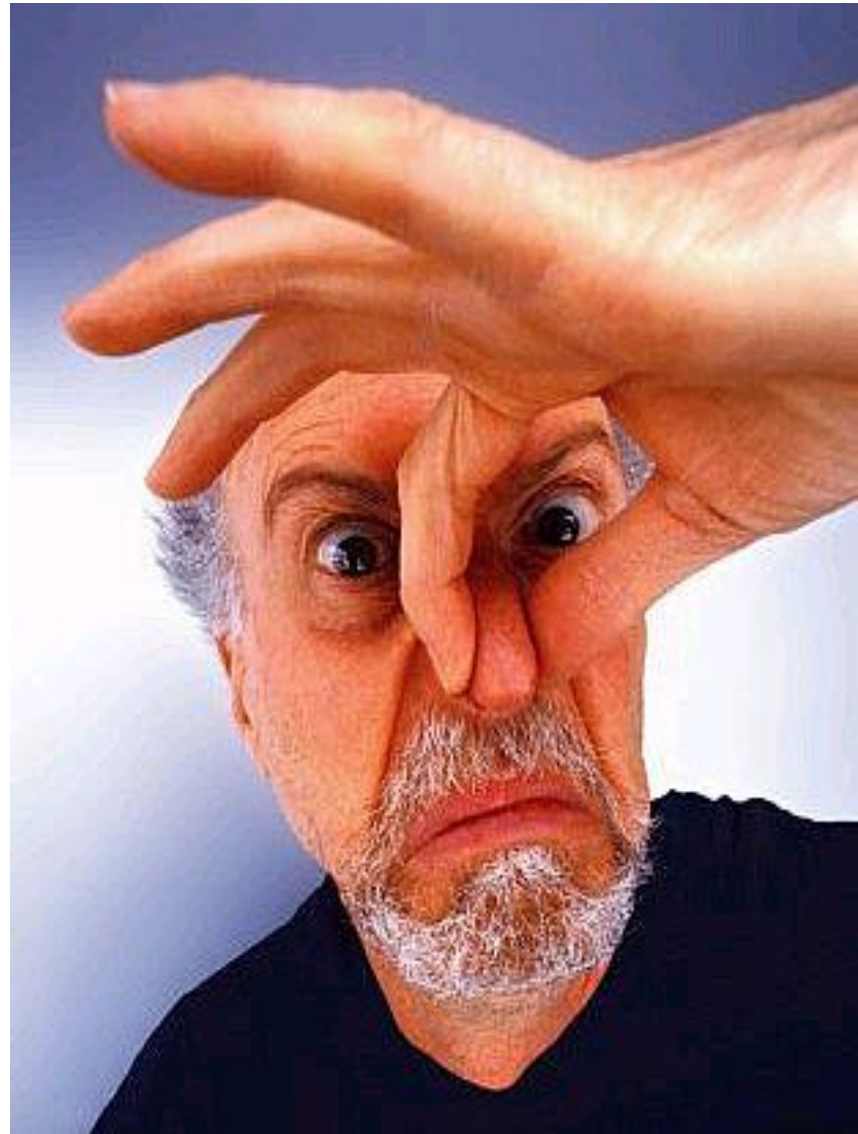
BioLynceus®





## Where Does H<sub>2</sub>S Build-Up

- Lift Stations
- Mechanical Plants:  
All Types
- Collection Lines
- Forced Mains
- Gravity Mains
- Poorly ventilated areas
- Low Flow



Charging for H<sub>2</sub>S



## Definition of H<sub>2</sub>S

- ◆ Chemical/Physical Properties Hydrogen sulfide gas is a naturally occurring chemical (chemical formula H<sub>2</sub>S).
- ◆ The gas has a characteristic rotten egg odor at low concentrations. About half of the population can smell it at concentrations as low as 8 parts per billion (ppb) in air, and more than 90% can smell it at levels of 50 ppb. At higher concentrations, hydrogen sulfide rapidly deadens the sense of smell. For most people, this occurs at approximately 150 ppm.
- ◆ Hydrogen sulfide is heavier than air, and it often settles in low-lying areas where it can accumulate in concentrations that can injure or kill livestock, wildlife, and human beings. Additionally, hydrogen sulfide has been found to migrate into surface soils and groundwater.



Deaths related to H<sub>2</sub>S Exposure

## United States

According to the Annual Report of the American Association of Poison Control Centers' National Poison Data System, 1134 single exposures and **13 fatal outcomes were reported.**<sup>1</sup>

It is very important to realize that **25% of fatalities usually involve rescuers, professionals, or bystanders.**<sup>2</sup>



## Standing in the Street

Shaken Soda Can Effect

Loveland Line

Innocent Bystanders

Lift Station Exposure

6 die from 6000 ppm

Test before you open

Don't stand next to the opening

Know what maintenance is going on above and below you

It is not just H<sub>2</sub>s, it is also Methane, Explosive Compounds and Oxygen!

<https://www.youtube.com/watch?v=7JrCYYLHQPY>





# H<sub>2</sub>S Hydrogen Sulfide Gas Effects

## Hydrogen Sulfide (H<sub>2</sub>S) Gas Effects

Health Effects	H <sub>2</sub> S Levels, ppm	Symptoms
<b>Instant Death</b> 	<b>1000</b>	<b>Immediately fatal</b>
	<b>700</b>	<b>Paralysis of the nervous system.</b>
<b>Extreme to Deadly</b> 	<b>600</b>	Paralyzes the respiratory system. Overcomes victim almost instantaneously. <b>Death after exposure of 30 to 60 minutes.</b> May cause muscle cramps, low blood pressure and unconsciousness after 20 minutes.
	<b>500</b>	
	<b>300</b>	
	<b>250</b>	
<b>Severe to Deadly</b> 	<b>200 - 250</b>	Nervous system depression (headache, dizziness and nausea are symptoms). Prolonged exposure may cause fluid accumulation in the lungs. <b>Fatal in 4 to 8 hours of continuous exposure.</b>
	<b>100 - 150</b>	Loss of smell, stinging of eyes and throat. <b>Fatal after 8 to 48 hours of continuous exposure.</b>
<b>Mild to Moderate</b> 	<b>50</b>	May cause muscle fatigue, inflammation and dryness of nose, throat and tubes leading to the lungs. Exposure for one hour or more at levels above 50ppm can cause severe eye tissue damage. Long-term exposure can cause lung disease.
	<b>30</b>	
	<b>10 - 20</b>	Causes painful eye, nose and throat irritation, headaches, fatigue, irritability, insomnia, gastrointestinal disturbance, loss of appetite, dizziness. <b>LOPEL / 15 STEL</b> Prolonged exposure may cause bronchitis and pneumonia.
<b>None to Tolerable</b> 	<b>4.6</b>	<b>Strong intense odor, but tolerable.</b> Prolonged exposure may deaden the sense of smell.
	<b>0.13</b>	An odor threshold. Odor is unpleasant. Sore eyes.
	<b>0.0086</b>	SRCSD Odor Nuisance Threshold per the Odor Control Master Plan 2003

Pulmonary edema (lungs fill with fluid, foaming in mouth, chemical damage to lungs).

May be fatal in 1 to 4 hours of continuous exposure.

Sickeningly sweet smell noted.



## YOUR DECISION

Article I recently read said, if it smells like rotten eggs, leave the area immediately, **not the best detection method**

My recommendation is that if your mobile/hand held detector alarms, **LEAVE IMMEDIATELY!**

**Oxygen Levels are as Important as H<sub>2</sub>S!**



## Preventing H<sub>2</sub>S Accidents

### ◆ H<sub>2</sub>S Accidents

In wastewater treatment facilities, there is the potential for H<sub>2</sub>S accidents. Some common problem areas and gas monitoring applications include:

#### ◆ H<sub>2</sub>S Sludge De-Watering

Sludge from waste treatment facilities may contain H<sub>2</sub>S and methane gas as well. The sludge is transported through a spiral conveyor into the dewater system where the water is removed.

2 of 3 on Tuesday in  
Scottsdale

2 on Thursday  
In Idaho

#### ◆ Confined Spaces are often trouble spots that have H<sub>2</sub>S

2 on July 2nd  
In Texas

### ◆ Preventing H<sub>2</sub>S Exposure & Accidents

#### ◆ Use Gas Detectors & Monitors

◆ Audit your facility for potential areas of exposure. Implement a Safety Procedure for H<sub>2</sub>S Operations.

#### ◆ Practice Confined Space Procedures

**Hand Held Monitors Need to be  
Mandatory for every utility worker  
or crew**





# Errosion H2S





# Lift Station Corrosion







# Check the Locks





# Engineered Solutions

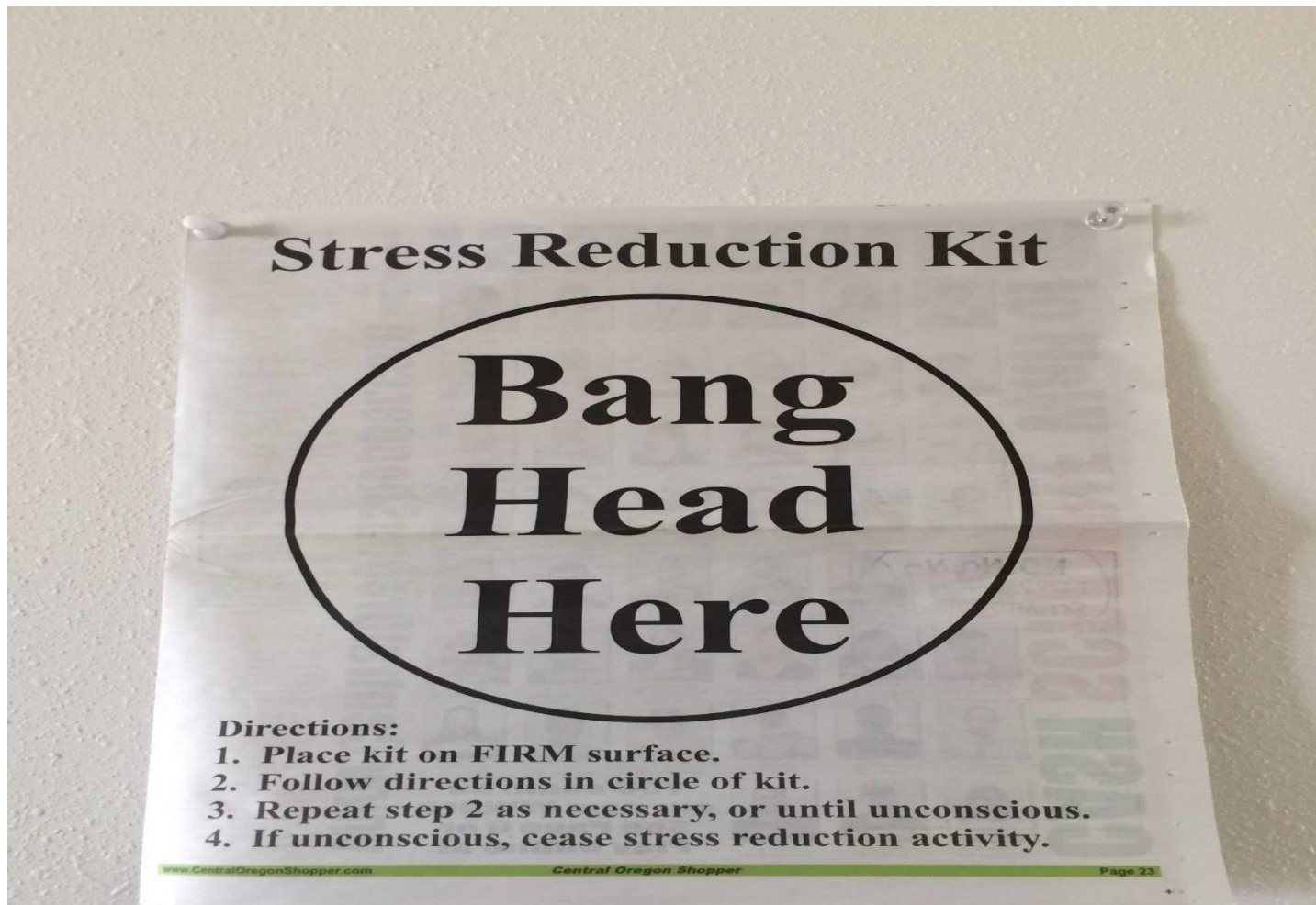






## Warning:

These statements are not approved by OSHA – or any other organization that might matter.





# Reduce Flow – Just add $\text{Ca}(\text{NO}_2)_2$



**PRODUCT NAME:** Calcium Nitrate Solution  
**CHEMICAL NAME:** Calcium Nitrate  $\text{Ca}(\text{NO}_3)_2$   
**CHEMICAL FAMILY:** Inorganic Chemical Solution  
**EPA REG. NO.:** Not applicable

**MSDS Number:** CANO3LIQ-005 MSDS

### COMPOSITION, INFORMATION ON INGREDIENTS

Chemical Ingredients:	Percentage
Calcium Nitrate $\text{Ca}(\text{NO}_3)_2$	48
Water and inert ingredients	52

### HAZARDS

**CAUTION: KEEP OUT OF REACH OF CHILDREN. MA**  
 This product is a clear to clear amber liquid. Primary rou

**Eyes:** Flush eyes with large amount of water for  
**Skin:** Remove all contaminated clothing. Wash  
 seek medical attention. Wash clothing be  
**Ingestion:** If swallowed, do not induce vomiting or  
 medical attention.  
**Inhalation:** Move subject to fresh air. Give artificial  
 medical attention immediately.

**FLAMMABILITY OF THE PRODUCT:**  
**EXTINGUISHING MEDIA:**  
**HAZARDOUS COMBUSTION PRODUCTS:**  
**SPECIAL FIRE FIGHTING PROCEDURES:**

**HAZARDOUS THERMAL DECOMPOSITION:**

**STEPS TO BE TAKEN IF MATERIAL IS RELEASED**  
 Avoid breathing vapors. Absorb and sweep up  
 application according to label use or for disposal.

**CAUTION: Keep spills and cleaning runoff out of**

**HANDLING:** Store in a cool dry place  
**OTHER PRECAUTIONS:** Toxic to fish and oth  
 storage of product.

BioLyne





# Flows Become Stifled





# Chemical Reactions to Nitrate Salts





## Measuring for H<sub>2</sub>S

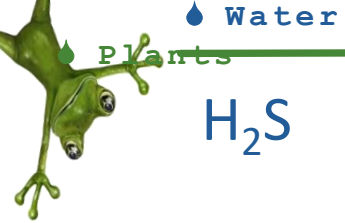
### ODA LOG

Used for longer  
Measurements –  
Preferred over grab  
sampling.



Hand Held – used for  
real-time risk of  
exposure.

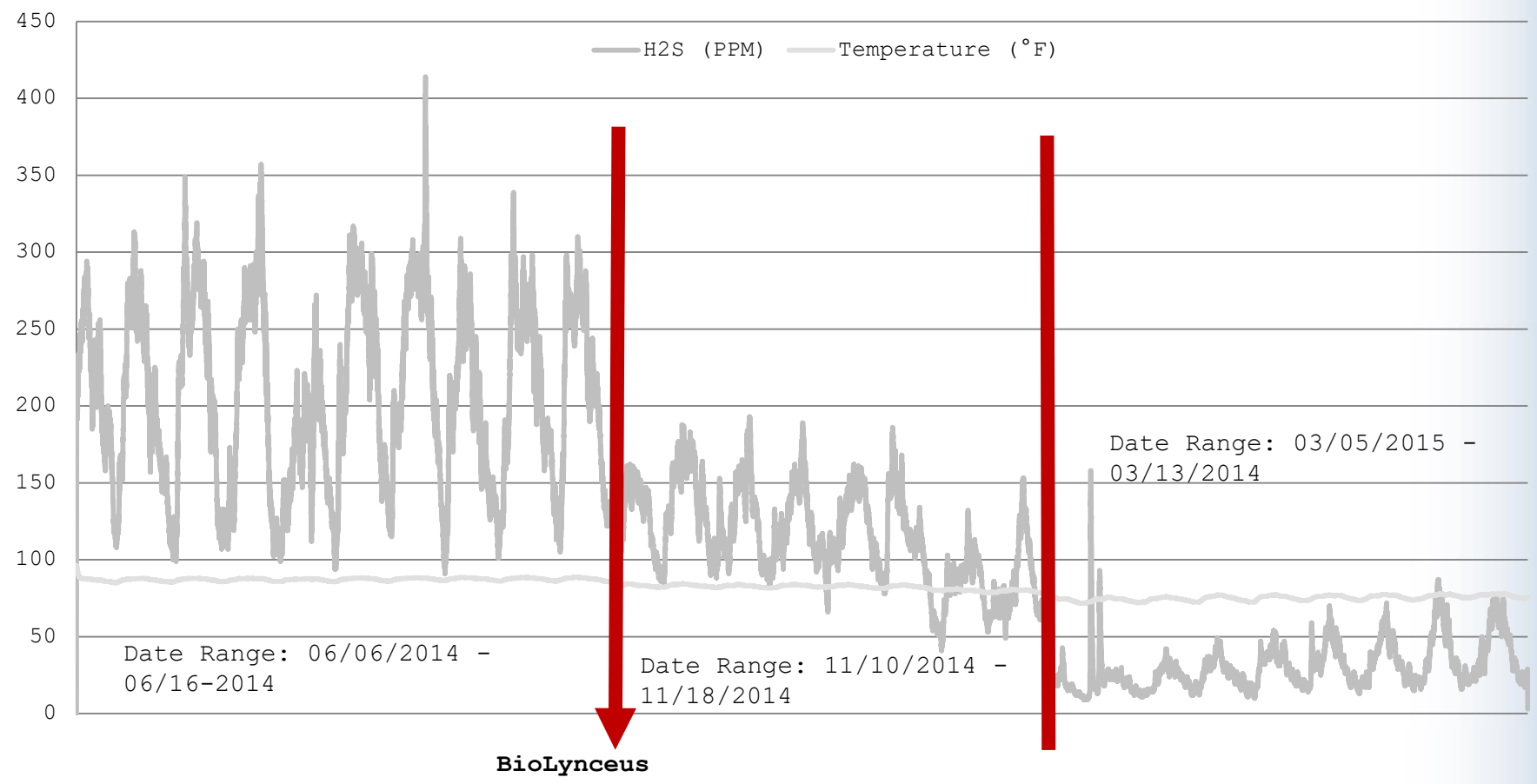




Soil

H<sub>2</sub>S

### Somerton AZ OdaLog Data



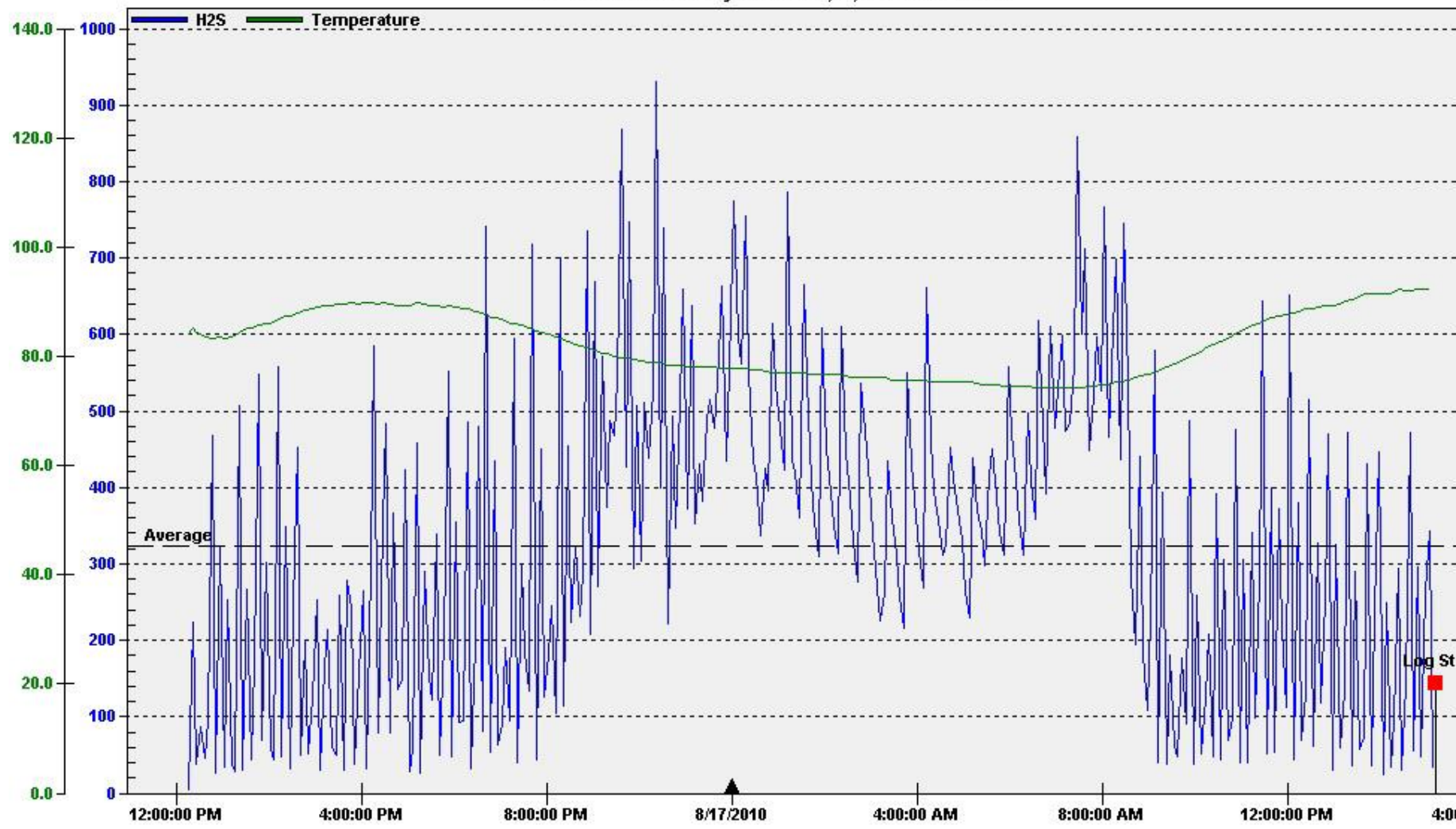




Soil

# Lift Station H2S

## Rolling A Headworks- OdaLog s/n 01001247 Lift 3A 10-8-17 with BioLyneus at L2,SP, and 3A: Session 1



Period Displayed: 8/16/2010 - 8/17/2010 (Oda File: Lift 3A 10-8-17 with BioLyneus at L2,SP, and 3A.oda -- Serial Number: OdaLog Type L2 01001247 Instrument Range 0-1000PPM)

Average 324 ▲ Day Transition Min 4 Max 931 (Use Screen Data Only)





## Choice

# Washington State Operator Refused to Enter Enclosed Space Without a Handheld Detector

The Choice is Always Yours  
The Person Who is Responsible for Your Safety Is?

**YOU!**





## Your Option

**REMEMBER THIS QUOTE!**

**“If, YOU DECIDE NOT TO TEST THE  
ATMOSPHERE, YOU COULD BE MAKING A  
LIFE AND DEATH DECISION”.**



Let's Put this into Perspective

# Occupational Health Guideline for Hydrogen Sulfide (Published 1978)

<http://www.cdc.gov/niosh/docs/81-123/pdfs/0337.pdf>



## Occupational Guidelines

- Substance Identification/Limits
- Effects of Overexposure
- Chemical/Physical Properties
- Monitoring/Measurement
- Respirators
- Personal Protective Equipment
- Common Operations/Controls
- Emergency First Aid Procedures
- Spill & Leak Procedures



## Final Word

According to Water Industries Network (WIN) Costs related to Corrosion equal \$45B /Year. These costs are a combination of operational, maintenance, Financial and Capital.

50% of all operating and maintenance costs may be related to corrosion.

System failures due to corrosion increase with system age.

Major barrier to progress in corrosion management is the absence of complete and up to date information on all water systems.

"Cost of Corrosion and Preventive Strategies in the United States" Nace International, 2000. Data was based on figures from 1998.



# BioLynceus: Environmental Solutions

Thank you.

If we can provide you some additional information please contact:

BioLynceus Environmental Solutions

[Sales@BioLynceus.com](mailto:Sales@BioLynceus.com)

[www.BioLynceus.com](http://www.BioLynceus.com)

Corporate: 888.823-7404