

# Dangers of Confined Spaces

By Mike Lucas, Wastewater Technician

I know what you are thinking; here we go with yet another session on confined space safety. Following the tragic loss of one of our fellow Nebraska public servants in the line of duty I have received numerous calls regarding gas monitors and enclosed space entry safety policies. I personally know of three other near misses and reportedly a couple of other deaths involving confined spaces in Nebraska in this year alone.

This year in my one-day wastewater training classes I have addressed the dangers of hydrogen sulfide and confined spaces. So for those of you who have already heard some of this I don't apologize, consider it a refresher course.

We should all have a **formal and enforced** safety program for confined spaces.

It should include at a minimum:

- ✓ What are the confined spaces?
- ✓ What steps are to be taken prior to any entry, including testing, lock out/tag out and documentation?
- ✓ What retrieval and testing equipment is required to be on site, such as harness, lifeline, tripod and lifting equipment?
- ✓ Who is qualified to enter and who is also qualified to be the observer/assistant?

Testing should always be required prior to entry. Four gas monitors are available for +/- \$1,000.00. Ask yourself, "What is a life worth?" You should have strong internal pumps and a long hose allowing for remote testing. You should monitor for oxygen deficiencies <19.5%, hydrogen sulfide, carbon monoxide and combustible gases (LEL). Explosive gases can include gasoline, propane, hydrogen sulfide and oxygen enrichment of 23.5% or more. These monitors should be kept charged and need to be regularly calibrated. You should continuously monitor for changing conditions within that confined space when it is occupied. **Always believe the monitor if the alarm goes off indicating a hazardous environment.** If flammable, toxic or oxygen deficient conditions are determined to be present your plan should indicate what steps are to be taken. The plan should include what steps the trained assistant is to take if there is an emergency. In some numbers that I saw, 1100 cases of confined space deaths were reported in one year with 25% of them being rescuers and onlookers.

Let's talk about hydrogen sulfide gas which is always a hazard in wastewater systems.

#### Hydrogen Sulfide Gas:

- Colorless
- Rotten egg odor @ low concentrations. ½ of the population can smell it as low as 8 ppb in air, >90% can smell it @ 50 ppb, at higher concentrations generally above 150 ppm it deadens the sense of smell (facultative fatigue).
- Slightly heavier than air
- Has been found to migrate into surface soils and ground water
- Results from bacterial breakdown of organic matter in the absence of oxygen
- Can move quickly over a great distance
- Occurs in sewer line low spots, long force mains especially with low flow and frozen over lagoons
- Combined with water it becomes hydro sulfuric acid (very corrosive)
- 300-400 ppm = health hazard
- 750 ppm < 7 minutes = unconsciousness
- 1000 ppm = one breath - unconscious, 2 breaths - death

As operators we must inform the decision makers of the dangers that we are exposed to. I will help you in any way that I can. We also must remember that they can provide us all of the training and safety equipment necessary but it is our responsibility to utilize it each day personally and to see that our fellow workers do the same. One person's carelessness can endanger the lives of others. None of us have a job worth dying for.

**Please decide to be safe.**