

# MBAA Safety Toolbox Talk



## Biogas Safety

Biogas recovery is typically a safe and effective way to make use of the byproducts from anaerobic digestion and produce usable energy. While accidents due to biogas are rare, they are very serious when they do occur and will likely result in serious damage to equipment or worse - people. That's why it's everyone's job to prevent accidents and stop them before anyone gets hurt.

### WHAT IS BIOGAS?

Biogas is a byproduct of anaerobic digesters and is composed of 50-70% methane with the other 30-50% carbon dioxide (CO<sub>2</sub>). Biogas also contains trace amounts of ammonia and hydrogen sulfide (H<sub>2</sub>S). Methane and CO<sub>2</sub> are both lighter than air, odorless and can't be detected without a gas monitor. Hydrogen sulfide, however, will sink to floor level and smells like rotten eggs, allowing it to be detected by someone without a meter. Biogas is also typically saturated with water which can condense upon cooling in the piping and cause blockage of flow and corrosion.

### HAZARDS

The most obvious and pertinent hazard concerning methane and H<sub>2</sub>S is that they are flammable gases. When mixed at a 5-15% concentration with air, methane can cause explosive conditions. In the digester or in conveyance piping, biogas should not contain any oxygen, therefore the risk of an explosion is lower. If oxygen gets into system (pulling of air through vents), or the biogas leaks out of system into ambient air (worn gaskets, valves left open, etc.), this can create an explosive mixture.

The other hazard that biogas systems create is asphyxiation through displacement of oxygen or exposure to hydrogen sulfide which can cause

paralysis and death at higher concentrations (>150 ppm).

### PREVENTION

The best way to prevent accidents is through regular maintenance, testing and monitoring of system to detect leaks or entrainment of air.

Proper meters (four gas type), ventilation and confined space entry procedures should be used when working in areas that could contain or have contained biogas.

Any work performed near biogas piping should be done with clothing that will not cause static electricity and tools that are non-spark. Proper purging with inert gas should be used for any maintenance activities.

Most of all; if something does not feel right then stop and evaluate the situation before proceeding.

### THINGS TO LOOK OUT FOR:

- 'Rotten Egg' or "skunk" Smell – A sign of biogas in the air
- Freezing – Can lead to a blockage in the pipe, bursting, or failure of monitoring instruments and safety valves
- Condensation – proper drainage required or will block flow
- High Pressure - risk of overpressurization
- Low Pressure – pulling of a vacuum
- Spark sources near piping and vents – Can ignite surrounding biogas
- Corrosion – Can lead to small leaks and cause blockages
- Any safety devices/valves not in working condition or open – these should be inspected and cleaned at least once a year

- Leaks – system should be walked with a meter daily
- If you find it hard to breathe or irritation of mucus membranes, that can be a sign of biogas build-up
- If you see or smell something, say something.

### SAFE PRACTICES NEAR AND AROUND BIOGAS VENTS AND PIPES:

- Use non-electric, spark-proof tools
- Be mindful that static electricity can create sparks and ignite gases – PVC pipe and polyester clothes are common materials that create static electricity
- Don't smoke or use lighters
- Don't use flame torches to defrost/solder piping or for any other reason
- Be mindful of using any motors or equipment that could cause a spark or a fire – proper rated equipment and seal-offs required.
- Ensure all caps are replaced, vents and valves are returned to the proper position before moving on to the next task
- Have properly calibrated gas monitors on at all times
- Don't ignore alarms
- Know where safety devices are such as fire extinguishers and emergency exits
- Use proper ventilation and confined space entry procedures

### REFERENCE

[Critical Path Engineering Solutions](http://www.mbaa.com/brewresources/brewsafety)

If you have any questions regarding this, please see your supervisor or manager or a member of the Safety Committee.

**FOR MORE INFORMATION ON BREWERY SAFETY, PLEASE VISIT THE MBAA BREWERY SAFETY WEBSITE AT:**  
<http://www.mbaa.com/brewresources/brewsafety>