

# SILO GAS

**Be sure to:** *Established Command - Assign a Safety Officer - Establish communications - Formulate a plan and a backup plan - Plan an exit or escape plan*

## DEFINITIONS

A number of toxic gases and toxic levels of Carbon Dioxide are produced in silos during product fermentation or stabilization as well as during fires. These gases can cause serious health and sometimes fatal consequences without proper protection and management. Typical gases produced during fermentation are carbon dioxide, nitrous oxide, nitrogen dioxide, and nitrogen tetroxide. Carbon monoxide can reach dangerous levels during silo fire situations

## GENERAL HAZARDS AND CONCERNS

- Fermentation of feed products begins as soon as the product is blown into the silo and generally lasts for a period of 2-3 weeks. During this time, high amounts of carbon dioxide are produced as well as a family of toxic gases referred to as Oxides of Nitrogen (nitrous oxide, nitrogen dioxide and nitrogen tetroxide). All of these products are heavier than air meaning that higher levels of these gases will be found at the silage surface during this 2-3 week period. When entry is made into the silo soon after filling, low oxygen levels caused by high carbon dioxide will cause an increase in respiration. If oxides of nitrogen are present even at lower levels, these toxic gases will enter the bloodstream through this increased respiration. Nitrogen Dioxide (the most typical silo gas) exposure can have serious health effects that can occur days after an exposure.

## SUGGESTED OPERATIONAL STEPS

- From the filling platform at the top of the silo (conventional silo) or top hatch (oxygen limiting silo) take gradual atmospheric readings (top and middle of head space and at silage surface). This is important information for effective treatment of exposure. Haz-mat team should be dispatched to help determine if nitrogen dioxide is present as typical fire company four gas monitors cannot detect this toxic gas.
- Ventilate silo head space. This can normally be done with the silo blower if the head space (space above the silage surface to top of silo) is 12 feet or less. With head space over 12 feet, ventilation with a drop tube is recommended.
- Assure feed room and livestock area at base of silo is well ventilated as contaminate gases will descend the silo chute of conventional silos.
- Rescue from a silo is a technical high angle and confined space procedure. Dispatch local resources: technical rescue team; aerial or other resource to serve as a high anchor point.
- Anyone exposed to silo gas should be strongly encouraged to be evaluated by medical personnel that are familiar with silo gas even if they feel better as the effects of exposure can exhibit hours or days later.