

# **HYDROGEN SULFIDE**

## **The Human Health Effects of a Toxic Pollutant**

Hydrogen sulfide is recognizable by its distinctive rotten egg odor. Hydrogen sulfide, H<sub>2</sub>S, is formed by the breakdown of organic materials and is typically found near agricultural locations, waste treatment plants and industrial sites.

Many sources of hydrogen sulfide exist in North Carolina: intensive swine operations, paper and pulp mills, asphalt plants, slaughterhouses and rendering plants, municipal waste landfills, and sewage treatment plants. Hydrogen sulfide is one of the most common toxic air pollutants. In North Carolina alone about 12 million pounds of this toxic gas are released into the air annually. (1)

The NC Division of Air Quality estimates that the typical hot-mix asphalt plant emits hydrogen sulfide at 0.7 pounds/hour. (2) There are about 140 asphalt plants located across the state, and about 3,600 plants in the United States.

**“H<sub>2</sub>S poisons the brain, and the poisoning is irreversible”**

Kaye Kilburn, Ph.D., University of Southern California School of Medicine

Recent medical research reveals that permanent central nervous system damage may occur at levels of H<sub>2</sub>S exposure found at common industrial facilities such as intensive livestock operations and asphalt industry sites. (3)

Dr. Neil Carman, former Texas environmental official and clean air director for the Lone Star Chapter of the Sierra Club, states that hydrogen sulfide is similar to cyanide in toxicity. (4) He cites studies which found that H<sub>2</sub>S interferes with a cell's ability to use oxygen (5, 6).

### **Low Concentrations of Hydrogen Sulfide Can Cause Lasting Damage**

Lower levels of hydrogen sulfide are now known to cause serious health effects. The NC Scientific Advisory Board reports that “symptoms such as headache, nausea and eye and throat irritation” are found in communities with ambient levels “as low as 7 to 10 parts per billion” associated with periodic fluctuations at higher levels. (7) The province of Alberta, Canada has adopted a 10 parts per billion (ppb) standard for hydrogen sulfide.

California evaluated hydrogen sulfide effects on children and found that that state's one hour standard of 30 parts per billion was too high. They found chronic exposure to 8 ppb caused observable effects on sensitive body tissues. California's experts concluded, “neither of these two benchmark levels should be exceeded by the properly averaged concentration.” (8)

According to Dr. Carman, “Demonstrable symptoms of chronic exposure include pronounced deficits in balance and reaction time, as well as such ailments as dizziness, insomnia, and overpowering fatigue.” (4)

## The Danger to Children From Exposure to Hydrogen Sulfide

“The effects of toxic pollution such as H<sub>2</sub>S on growing children is recognized by experts as particularly severe. Dr. Carman explains, “Children are more vulnerable than adults to hydrogen sulfide, first because they breathe more rapidly, taking in significantly more pollution per pound of body weight than do adults. A resting infant, for example, inhales twice as much, relative to its size, as does a resting adult. Second, national data show that children spend an average of about 50% more time outdoors than adults. Third, children are three times more active while outdoors than, engaged in sports and other vigorous activities; this increased activity raises breathing rates and significantly increases inhalation and in some cases swallowing of pollutants. Fourth, children are particularly to toxic substances because their bodies are immature and rapidly growing. Fifth, children are in their prime learning years and H<sub>2</sub>S exposure causes brain damage. The impairment of mental faculties in a child amounts to a lifetime of harm.” (4)

*“Public health scientists now recognize that hydrogen sulfide is a potent neurotoxin, and that chronic exposure to even low ambient levels causes irreversible damage to the brain and central nervous system. Children are among the most susceptible to this poison gas. It is unacceptable for communities to have to continue suffering the ill effects of H<sub>2</sub>S when the technology to control H<sub>2</sub>S emissions is available and affordable.”*

Neil Carman, Ph.D.

### Symbols and abbreviations

H<sub>2</sub>S: chemical symbol for hydrogen sulfide

ppb: parts per billion

ppm: parts per million

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