EMERGENCY RESPONSE PLANNING GUIDELINE

AMMONIA

(2014)

ERPG–3: ERPG–3: 1,500 ppm (1,050 mg/m$^3$)

ERPG–2: 150 ppm (105 mg/m$^3$)

ERPG–1: 25 ppm (17.5 mg/m$^3$)

I. IDENTIFICATION

Chemical Name: Ammonia

Synonyms: Anhydrous ammonia

CAS Number: 7664–41–7

Molecular Formula: NH$_3$

Structural Formula:

H
|   |
N — H
|   |
H

VI. RECOMMENDED ERPGS AND RATIONALES

ERPG–3: 1,500 ppm (1,070 mg/m$^3$)

It is believed that nearly all individuals could be exposed to 1,500 ppm for up to 1 hr without experiencing or developing life-threatening health effects. The 1-hr LC$_{50}$ for the more susceptible male rats ranged from 7,300 to 17,716 ppm$^{(4,43)}$. The highest nonlethal level for 1 hr in rats was 6,210 ppm$^{(7)}$ and the LC$_{01}$ was 6,991 ppm$^{(43)}$. In addition, in rats, guinea pigs, rabbits, dogs, and monkeys exposed to 1,110 ppm (770 mg/m$^3$) 8 hr/day, 5 days/week for 6 weeks, there were no deaths.$^{(16)}$ A factor of 3 below the calculated LC$_{01}$ of 6,991 ppm suggests an ERPG-3 of 1,500 ppm will not result in lethality, even in sensitive individuals.
B. ERPG–2: 150 ppm (105 mg/m$^3$)

It is believed that 150 ppm is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hr without experiencing or developing irreversible or other serious adverse health effects or symptoms that could impair an individual’s ability to take protective action. Ammonia at this concentration has a strong odor and is likely to cause some eye and upper respiratory sensations and/or irritation,\(^{(18,19,22,24)}\) especially in susceptible and unconditioned populations. The RD$_{50}$ of 541 ppm\(^{(37)}\) in rats and the point of departure for serious health effects due to ammonia is 500 ppm\(^{(43)}\). However, much lower concentrations are readily perceived and may affect the ability to escape the exposure. Human subjects repeatedly exposed to 100 ppm for 5 weeks developed only slight eye irritation\(^{(24)}\) and no changes in respiratory function were observed in human subjects exposed to 140 ppm for 2 hr.\(^{(22)}\) Unconditioned subjects did not experience lacrimatration at this level as only one of five could smell ammonia at 140 ppm; however uninured volunteers could not withstand the two-hour exposure.\(^{(7)}\) Thus, the ERPG-2 level is set at 150 ppm to assure the ability to escape from the exposure.

C. ERPG–1: 25 ppm (17.5 mg/m$^3$)

It is believed that 25 ppm is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hr without experiencing or developing effects other than mild, transient health effects or without perceiving a clearly defined objectionable odor. The odor detection level for ammonia is 1 ppm\(^{(33,39,40,41,42)}\). Nothing more than mild eye, nose, throat, or respiratory tract irritation was noted in exposures to 25-50 ppm for at least 10 minutes.\(^{(19,20,22)}\) Moderate throat and chest irritation was reported at 50 ppm for 1 hour, but at 25 ppm for 3 hours only mild chest irritation, urge to cough, and nausea were reported. The odor of ammonia is expected to be detectable at an ERPG-1 of 25 ppm but no adverse effects are anticipated.

**History of Ammonia ERPG**

First published in 1988:
- ERPG-1 25 ppm; ERPG-2 200 ppm; ERPG-3 1,000 ppm

Updated and republished in 2000:
- ERPG-1 25 ppm; ERPG-2 150 ppm; ERPG-3 750 ppm

Updated and republished in 2013:
- ERPG-1 25 ppm; ERPG-2 150 ppm; ERPG-3 1,000 ppm

**VII. REFERENCES**


34. NAS/COT Subcommittee for AEGLs Interim Acute Exposure Guideline Levels (AEGLs): Ammonia (CAS Reg. No. 7664-41-7) May 2002. www.epa.gov/oppt/aegl/


