United States Environmental Protection Agency | Office of Water 4601 | EPA 811-F-95-002f- T October 1995

National Primary Drinking Water Regulations

Nitrates and Nitrites

Chemical/ Physical Properties

CAS Number: Nitrate ion: 14797-55-8; Nitrite ion: 14797-65-0

Color/ Form/Odor: Domestic fertilizer grade ammonium or potassium nitrates are in prilled (beaded) or crystalline forms, usually coated with an anti-caking agent and adsorbed fuel oil.

Solubilities: Nitrates and nitrites are highly soluble in water

Soil sorption coefficient: N/A

Bioconcentration Factor: N/A

Trade Names/Synonyms:

Potassium salt: Potnit, Hitec, Niter, Nitrate of potash, Saltpeter.

Ammonium salt: German or Norway saltpeter, Varioform I, Merco or Herco prills, Nitram.

Drinking Water Standards (in mg/L)

	MCLG	MCL	HAL(10 day)
Nitrate:	10	10	10
Nitrite:	1	1	1
Total (Nitrate+Nitrite)	10	10	10

Health Effects Summary

Acute: Excessive levels of nitrate in drinking water have caused serious illness and sometimes death. The serious illness in infants is due to the conversion of nitrate to nitrite by the body, which can interfere with the oxygen-carrying capacity of the child's blood. This can be an acute condition in which health deteriorates rapidly over a period of days. Symptoms include shortness of breath and blueness of the skin.

Drinking water levels which are considered "safe" for short-term exposures: For a 10-kg (22 lb.) child consuming 1 liter of water per day, a ten-day exposure to 10 mg/L total nitrate/nitrite.

Chronic: Effects of chronic exposure to high levels of nitrate/nitrite include diuresis, increased starchy deposits and hemorrhaging of the spleen.

Cancer: There is inadequate evidence to state whether or not nitrates or nitrites have the potential to cause cancer from lifetime exposures in drinking water.

Usage Patterns

Most nitrogenous materials in natural waters tend to be converted to nitrate, so all sources of combined nitrogen, particularly organic nitrogen and ammonia,

Toxic Release Inventory - Releases to Water and Land: 1987 to 1993

	Water	Land
TOTALS (in pounds)	59,014,378	53,134,805
Top Fifteen States*		
GA	12,114,253	12,028,585
CA	0	21,840,999
AL	3,463,097	6,014,674
LA	8,778,237	2,250
MO	6,985,890	206,181
MS	6,952,387	0
KS	5,140,000	877,095
VA	5,091,764	0
NV	0	4,977,482
FL	1,056,560	1,835,736
AR	1,206,610	1,058,294
MD	1,802,219	138,819
IA	1,500,340	132,042
OK	1,436,348	14,199
UT	0	1,045,400
Major Industries*		
Nitrogenous fertilizer	41,584,611	8,607,376
Misc. Ind. inorganics	4,113,312	29,676,919
Misc. Metal ores	0	5,764,976
Misc. Ind. organics	5,091,764	0
Fertilizer mixing	480,000	4,554,916
Explosives	850,921	1,297,590
Paper mills	1,727,061	0
Pulp mills	1,321,500	3,350
Canned foods	0	1,056,794
Phosphate fertilizers	1,000,000	0

* State/Industry totals only include facilities with releases greater than 10,000 lbs.

should be considered as potential nitrate sources. Primary sources of organic nitrates include human sewage and livestock manure, especially from feedlots.

The primary inorganic nitrates which may contaminate drinking water are potassium nitrate and ammonium nitrate. Potassium nitrates are used mainly as fertilizers (85%), with the remainder in heat transfer salts, glass and ceramics, and in matches and fireworks. Ammonium nitrates are used as fertilizers (84%) and in explosives and blasting agents (16%).

Release Patterns

The major environmental releases of inorganic sources of nitrates are due to the use of fertilizers.

According to the Toxics Release Inventory, releases to water and land totalled over 112 million pounds from 1991 through 1993. The largest releases of inorganic nitrates occurred in Georgia and California.

Environmental Fate

Due to its high solubility and weak retention by soil, nitrates are very mobile in soil, moving at approximately the same rate as water, and has a high potential to migrate to ground water. Because it does not volatilize, nitrate/nitrite is likely to remain in water until consumed by plants or other organisms. Ammonium nitrate will be taken up by bacteria. Nitrate is more persistent in water than the ammonium ion. Nitrate degradation is fastest in anaerobic conditions.

Other Regulatory Information

Monitoring:

For Ground Water Sources:

Initial Frequency-	Nitrate: 1 sample annually
	Nitrite: 1 sample during first 3-year compliance period
Repeat Frequency-	Nitrate: 1 sample annually
	Nitrite: determined by State

For Surface Water Sources:

Initial Frequency-	Nitrate: 1 sample each quarter
	Nitrite: 1 sample during first 3-year compliance period
Repeat Frequency-	Nitrate: 1 sample annually
	Nitrite: determined by State

Triggers - If detect at > 5 mg/L nitrate, sample quarterly.
If detect at > 0.5 mg/L nitrite, sample quarterly.
If detect total nitrate + nitrite > 5 mg/L, sample quarterly

Analysis:

Reference Source	Method Numbers
EPA 600/4-79-020	353.1; 353.2; 353.3; 300.0; 354.1
Standard Methods	418C; 418F
ASTM	D3867-85A; D3867-85B

Treatment

Best Available Technologies

Ion exchange; Reverse osmosis; Electrodialysis (nitrate only)

For Additional Information:

- EPA can provide further regulatory and other general information:
  - EPA Safe Drinking Water Hotline - 800/426-4791
- Other sources of toxicological and environmental fate data include:
  - Toxic Substance Control Act Information Line - 202/554-1404
  - Toxics Release Inventory, National Library of Medicine - 301/496-6531
  - Agency for Toxic Substances and Disease Registry - 404/639-6000