

ALASKA TOP HAZARDOUS AIR POLLUTANTS

ARSENIC COMPOUNDS

#4

[Non Cancer Endpoint](#)

ARSINE

#5

[Non Cancer Endpoint](#)

INORGANIC ARSENIC

Class A Carcinogen

Reference Concentration

- Arsenic Compounds - 0.00003 mg/m³ for developmental effects - rats (from California Environmental Protection Agency)
- Arsine - 0.00005 mg/m³ for blood cell effects - rodents

Inhalation Unit Risk Estimate for Cancer

- Inorganic Arsenic - 0.0043 (µg/m³)⁻¹ for lung cancer - humans and animals

Inventory Estimates of Arsenic Compounds (including arsine)

Community	Ranking by Mass	Total Emitted (tons per year)*	Top Sources
Anchorage	41 of 71	0.134	wastewater facilities, military
Fairbanks	31 of 58	1.258	military, residential heating with oil, mining, power generation
Juneau	39 of 52	0.032	wastewater facilities , waste incineration, residential heating with oil

Total of 3 Communities	1.424
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* The mass emission rates are based on input data that may or may not be accurate. The reader should not consider the inventory accurate to three decimal places (one thousandth of a ton). The use of three decimal places allows us to acknowledge small quantities of pollutants rather than showing the emission rate as zero.

Arsenic Compound (including arsine) Sources Expected in Alaska

vehicles	locomotives	boats and ships
asphalt plants	open burning	residential heating-oil and natural gas
airports	hospitals	power generators
wastewater facilities	military bases	used oil combustion
mines	refineries	incineration
waste incineration		

Potential Occupational Exposure to Arsenic Compounds (including arsine)

wood preservation	microelectronics (arsine)	superconductors (arsine)
alloy production	herbicide (minimal)	glassware production

Arsenic Compound (including arsine) Emission Inventory Improvements

- Update emission factors for locomotives
- Update emission factors for asphalt plants, open burning and used oil combustion
- Update emission factors for area source and point source facilities

Arsenic Compound Health Effects

Low level (<0.02 mg/m³): No data indicates cancer from exposures below 0.013 mg/m³. Some evidence of still births occurring at low level exposures.

Medium level (0.02 - 0.5 mg/m³): Long term exposures to 0.05 mg/m³ and above may lead to increased lung cancer. Exposure of pregnant rats to 0.26 mg/m³ for 4 hours per day during four days in the middle of the gestation period reduced fetus weight. In general, 0.2 mg/m³ not considered dangerous to workers for non-cancer effects, though some evidence exists for dermatitis, irritation of nose, and swelling of eyes and throat.

High level (0.5-100 mg/m³): No evidence of lethality from short term exposures to this range of concentrations. However, long term illness may result. Human data limited.

Cancer ranking: Like many metals, arsenic exists in different chemical states which have differing toxicities to humans. The EPA classifies inorganic arsenic as a Group A carcinogen for lung cancer. Group A carcinogens are

considered known human carcinogen, like cigarette smoke or benzene. EPA estimates a 4.3×10^{-3} (approximately 1 in 250) increase in lifetime risk of lung cancer (and possibly other cancers) for every one $\mu\text{g}/\text{m}^3$ of continuous arsenic exposure over a lifetime.

Arsine Compound Health Effects

Low level (<0.5 ppm): Health effects not well defined.

Medium level (0.5 - 3 ppm): Exposures to 0.5 ppm can be dangerous. Odor threshold is 0.5 ppm.

High level (3-10 ppm): Can cause symptoms within a few hours. Symptoms include headache, fever, dyspnea, tachycardia, abdominal pain, nausea, vomiting, jaundice, and anemia.

Very high levels (> 10 ppm): A half-hour exposure to 25 - 50 ppm can be lethal. 10 ppm exposures have caused delirium, coma, and death. 250 ppm is instantly lethal.

Cancer ranking: EPA has not classified arsine for carcinogenicity.