

ALASKA TOP HAZARDOUS AIR POLLUTANTS

BENZENE

Class A Carcinogen

Inhalation Unit Risk Estimate for Cancer

- Benzene - 0.000022 - 0.000078 ($\mu\text{g}/\text{m}^3$)⁻¹ for leukemia - humans

Inventory Estimates for Benzene

| Community | Ranking by Mass | Total Emitted (tons per year) | Top Sources |
|------------------------|-----------------|-------------------------------|--|
| Anchorage | 3 of 71 | 186 | Mobile sources: motor vehicles |
| Fairbanks | 4 of 58 | 107 | Mobile sources: motor vehicles |
| Juneau | 3 of 52 | 77 | Mobile and nonroad sources: aircraft, logging equipment, outboards |
| Total of 3 Communities | | 370 | |

Benzene Sources Expected in Alaska

| | | |
|--|-----------------------|---------------------------|
| vehicles | painting activities | power generators |
| boats and ships | aircraft | airports |
| locomotives | wastewater facilities | asphalt plants and paving |
| off-road equipment like construction equipment and chainsaws | military bases | hospitals |
| wood stoves | incinerators | service stations |
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| refineries and bulk terminals | consumer products like automotive care and sealant products | |
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Potential Occupational Exposure to Benzene

| | | |
|----------------------------|---|--|
| use of motor fuels | solvent for fats, waxes, resins, oils, inks, paints, plastics, and rubber | extraction of oils from seeds and nuts |
| photogravure printing | detergents manufacture | explosives production |
| pharmaceutical manufacture | dyestuff manufacture | |

Benzene Emission Inventory Improvements

- Measure activity levels for marine sources, especially in Juneau
- Refine non-road sources such as chainsaws
- Refine off-road assessments such as locomotives, if possible
- Refine evaporative emissions from fuel storage, loading and dispensation
- Benzene not included in some diesel fired boilers, heaters, and turbines sources

Benzene Health Effects

Low level (<50 ppm): Chromosomal alterations for 8 hr exposures at 2-3 ppm for up to 24 years. Evidence of low white and red blood cell counts. Evidence of increased deaths from suicide, leukemia and other cancers with 2-25 ppm 8 hour exposures over 33 years. Odor threshold around 1.5 ppm. Reported symptoms of dizziness, sore throat, and headache for occupationally exposed (33-60 ppm time weighted average over 7 hours/day).

High level(50-10000): Significant increase in acute leukemia after mean 3-14 years exposure to 200-700 ppm. Significant increase in lung cancer. Life threatening at 7500 ppm. 1500 ppm for an hour produces symptoms such as short term memory loss, drowsiness, dizziness, headaches, unconsciousness.

Very High level(>10000 ppm): Fatal within 20 minutes.

NOTE: Smokers exhale nearly 10 times the amount of benzene than non-smokers.

Cancer ranking: The EPA classifies benzene as a Group A carcinogen for lung cancer. Group A carcinogens are considered known human carcinogens, like cigarette smoke. There is a 2.2×10^{-6} to 7.8×10^{-6} (approximately 1 in 500,000 to 1 in 250,000) increase in lifetime risk of leukemia for every one $\mu\text{g}/\text{m}^3$ of continuous benzene exposure over a lifetime.