

TOWN OF ERIE AIR QUALITY ASSESSMENT

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BACKGROUND

- NOAA 2011 Air Chemistry at the Boulder Atmospheric Observatory: Nitrogen, Aerosol Composition and Halogens on a Tall Tower (NACHTT)
 - BAO tower air quality representative of Front Range region
 - Light alkane VOCs higher at BAO than TX and CA
 - “Propane and other light alkanes were not likely coming from an urban source.”

PINYON ENVIRONMENTAL SCOPE

- Present toxicological information for:
 - Benzene
 - Propane
- Present ASTDR and EPA health risk guidelines
- Discuss NOAA study results relative to the health risk guidelines

BENZENE

- **Natural sources**
 - Gas emissions – volcanoes, forest fires
 - Crude oil

- **Man-made sources**
 - Vehicle exhaust
 - Tobacco smoke
 - Industrial emissions
 - Limited household products

BENZENE

- **Acute Health Effects – high concentration, short duration**
 - Dizziness, rapid heart rate, headaches, CNS effects
 - 700 to 3,000 ppm
 - Death – 10,000 to 20,000 ppm
- **Chronic health effects – low concentration, long duration**
 - Noncancerous
 - Cancer causing (carcinogenic)

EPA HEALTH RISK GUIDELINES, NONCANCEROUS

- **Integrated Risk Information System (IRIS)**
 - Human health assessment program
 - Evaluates information on health effects from environmental exposures
- **Inhalation Reference Concentration (RfC)**
 - Exposure at or below which noncancerous adverse health effect is not likely to occur

The RfC is not a direct estimator of risk, but rather a reference point to gauge the potential for health effects.

At lifetime exposures increasingly greater than the reference exposure level, the potential for adverse health effects increases.

US DEPT. OF HEALTH & HUMAN SERVICES

RISK GUIDELINES

- **The Agency for Toxic Substances and Disease Registry (ASTDR)**
 - Mission – prevent harm to human health from exposure to hazardous substances
- **Minimal Risk Levels (MRLs)**
 - Estimate of daily exposure at or below which is unlikely to pose a measurable risk of harmful, noncancerous health effects
 - Different MRLs for specified time periods
 - Acute
 - Intermediate
 - Chronic

NONCANCEROUS MRLs AND RfC FOR BENZENE

ASTDR Minimal Risk Level (MRL)		
	ppm*	ppb**
Acute-duration inhalation exposure (14 days or less)	0.009	9
Intermediate-duration inhalation exposure (15 to 365 days)	0.006	6
Chronic-duration inhalation exposure (greater than 365 days)	0.003	3
IRIS Inhalation Reference Concentration (RfC)		
	ppm	ppb
Chronic-duration inhalation exposure	0.009	9

*ppm, parts of benzene per million parts of air

**ppb, parts of benzene per billion parts of air

EPA HEALTH RISK GUIDELINES, CANCEROUS

- Benzene is a confirmed human carcinogen
 - Acute nonlymphocytic leukemia
- Unit risks – used to estimate risk of cancer associated with exposure
- Expressed as risk levels
 - 1 in 10,000
 - 1 in 100,000
 - 1 in 1,000,000

A risk of 1 in a million... a likelihood that one person, out of one million equally exposed people would contract cancer if exposed continuously (24 hrs per day) to the specific concentration over 70 years.

BENZENE – CARCINOGEN RISK LEVELS

Risk Level

Air Concentration

1 in 10,000

4 to 14 ppb (0.004 to 0.014 ppm)

1 in 100,000

0.4 to 1.4 ppb (0.0004 to 0.0014 ppm)

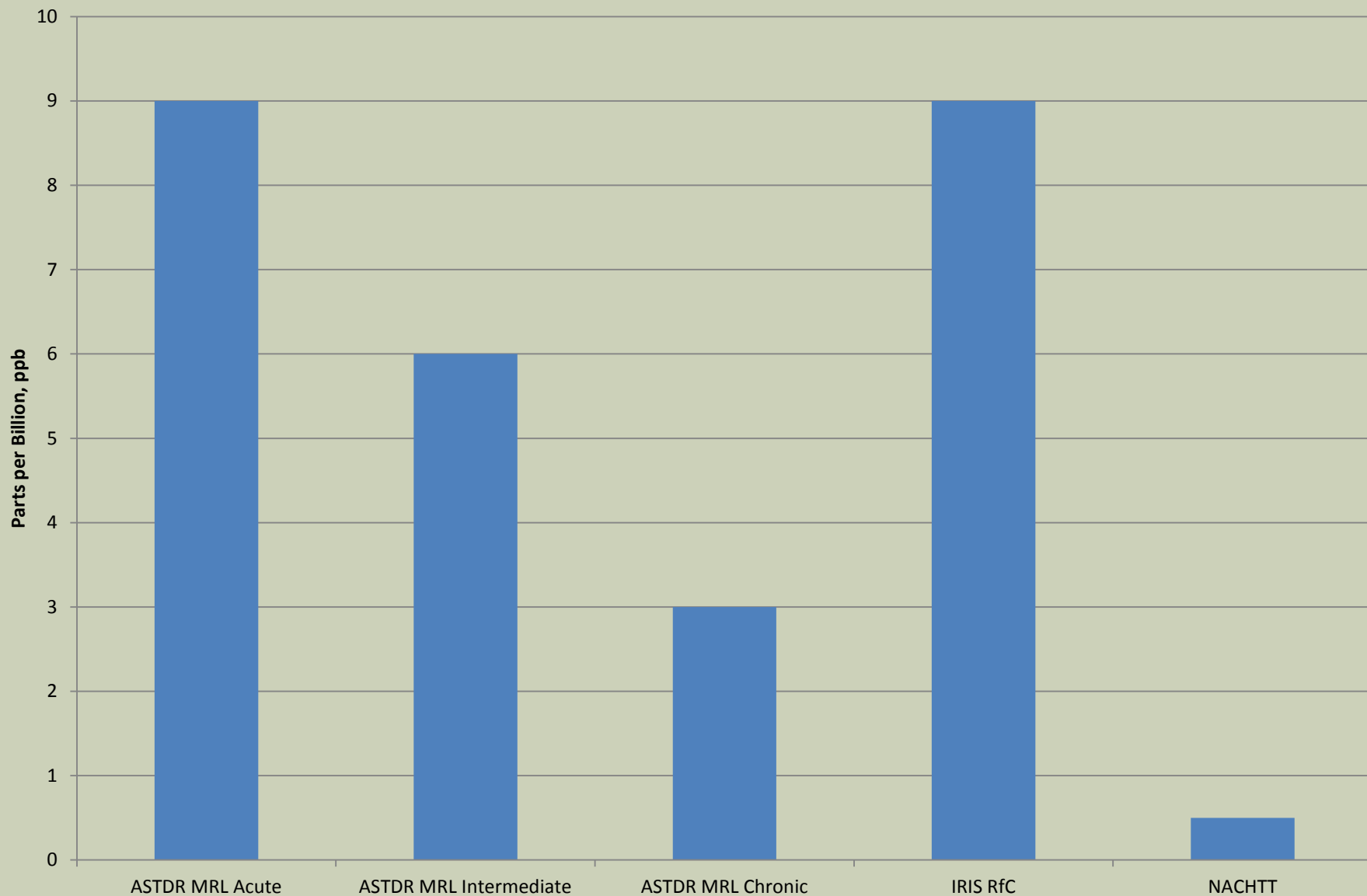
1 in 1,000,000

0.04 to 0.14 ppb (0.00004 to 0.00014 ppm)

NOAA NACHTT STUDY

- **Limitations**
 - Air chemistry study
 - Not a human health study
- **Contaminant concentrations not measured in Erie**
 - Unknown if reported concentrations Erie residents' inhalation exposures

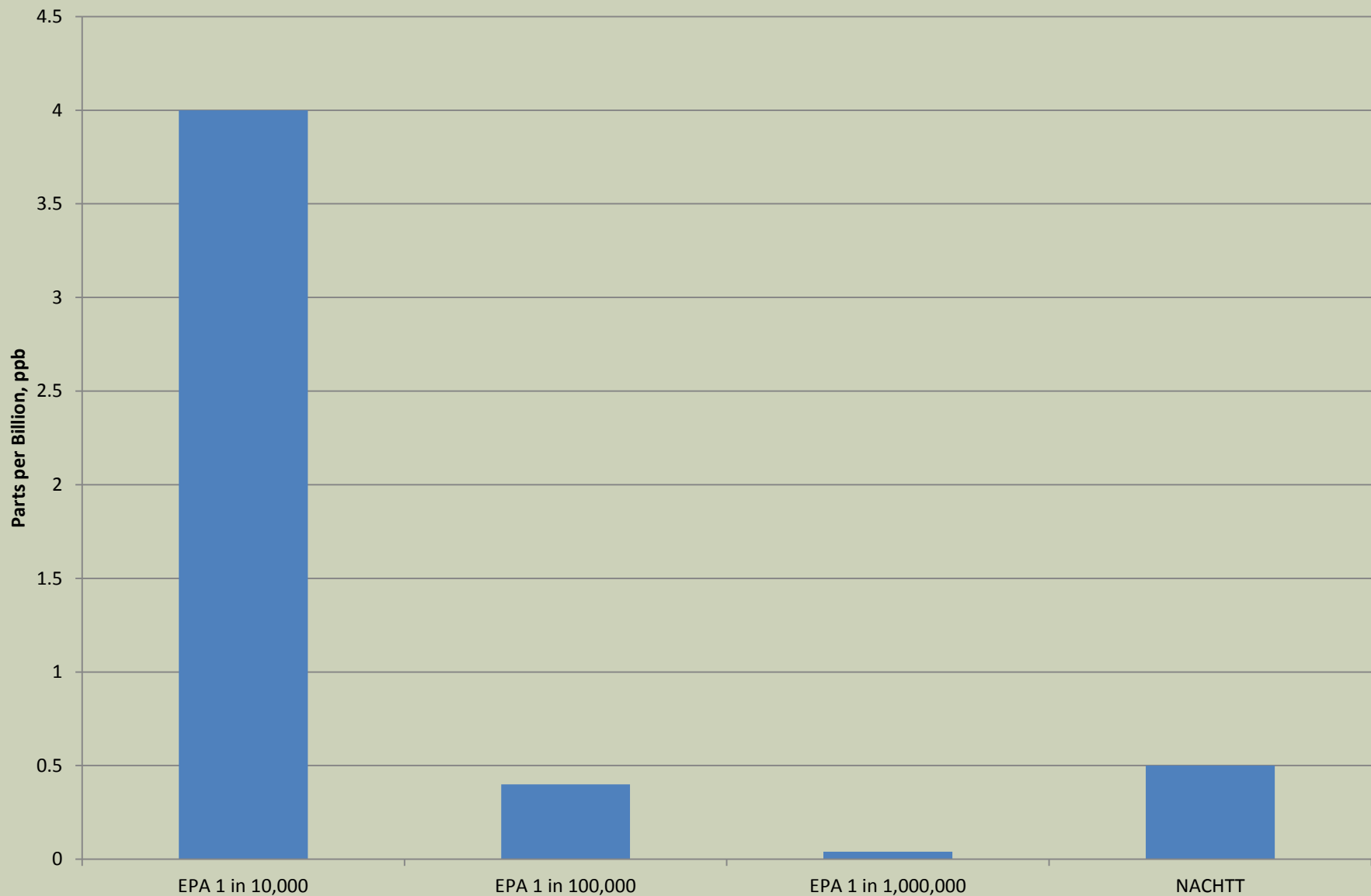
Comparison of NACHTT Benzene Average Mixing Ratio Concentration* to Noncancerous Health Risk Estimates



NONCANCEROUS RISK STATEMENT

- Risk of Erie residents experiencing an adverse health effect over an entire lifetime exposure to the NOAA reported benzene concentration is low.

Comparison of NACHTT Benzene Average Mixing Ratio Concentration* to EPA's Lifetime Cancer Risk Estimates



CARCINOGENIC RISK STATEMENT

- If Erie residents were to continuously breathe air containing the NOAA reported benzene concentration over an entire lifetime, the risk of cancer would be on the order of **1** in **100,000**.

EPA states that the results of risk estimates should not be used as a measure of whether risks are acceptable.

Rather, they should be used to focus or target more refined measurement or assessment.

PROPANE

- **Natural sources**
 - Natural gas Crude oil
- **Man-made sources**
 - Fuel-fired equipment (gasoline, diesel, gas, oil)
 - Vehicle exhaust
 - Numerous household products
 - Heaters
 - Grills
 - Furnaces
 - Propellant

PROPANE

- **Acute Health Effects – high concentration, short duration**
 - Simple asphyxiant
 - CNS effects

- **Chronic health effects – low concentration, long duration**
 - None observed below 1000 ppm

EXPOSURE GUIDELINES

- **Integrated Risk Information System (IRIS)**
 - No information
- **ASTDR**
 - No information
- **Occupational health exposure limits**
 - 1000 ppm
- **NOAA reported propane concentration**
 - 0.115 ppm (115 ppb)

Comparison of NACHTT Toluene and Xylene Average Mixing Ratio Concentration to Noncancerous Health Risk Estimates

