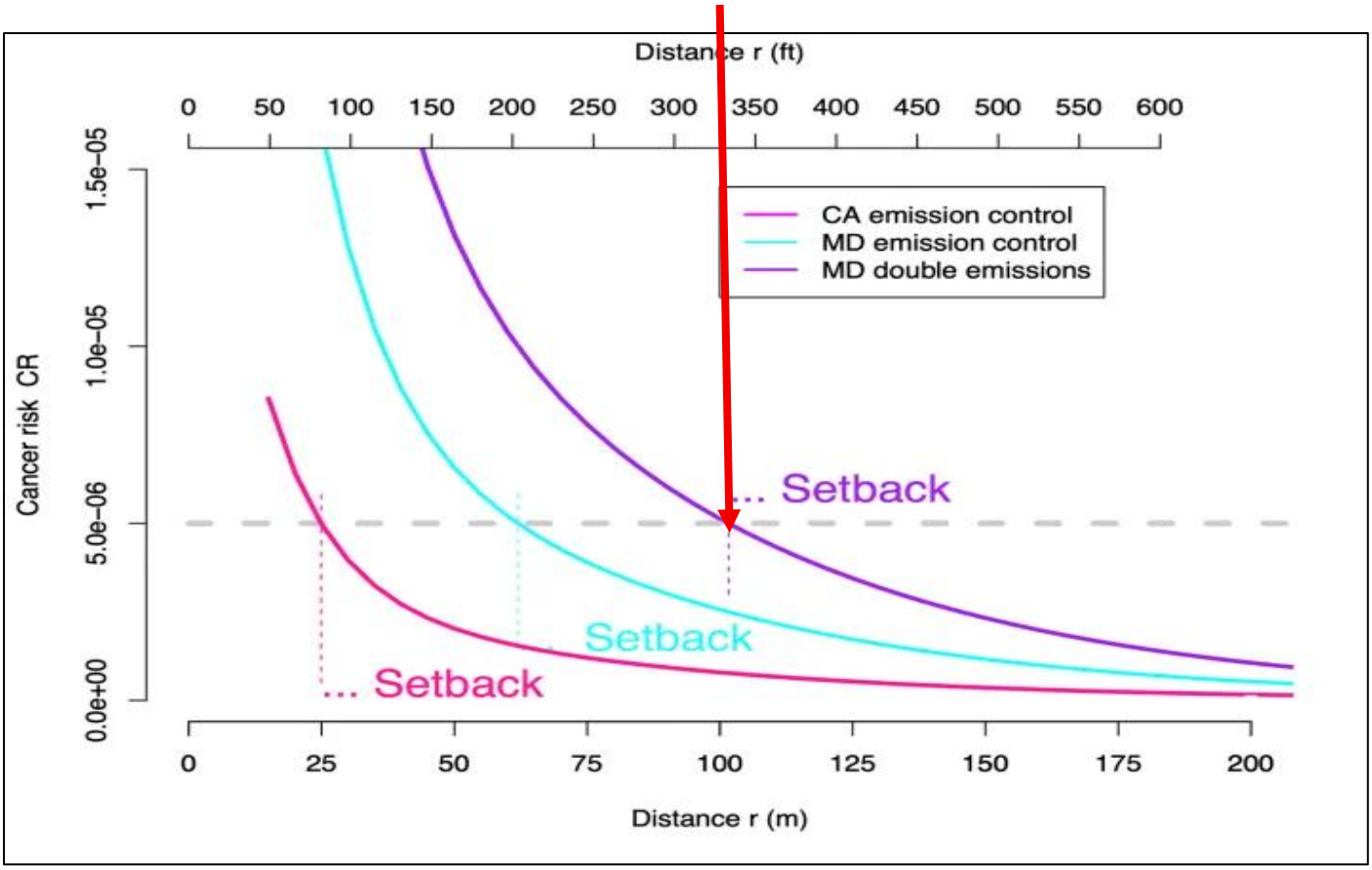
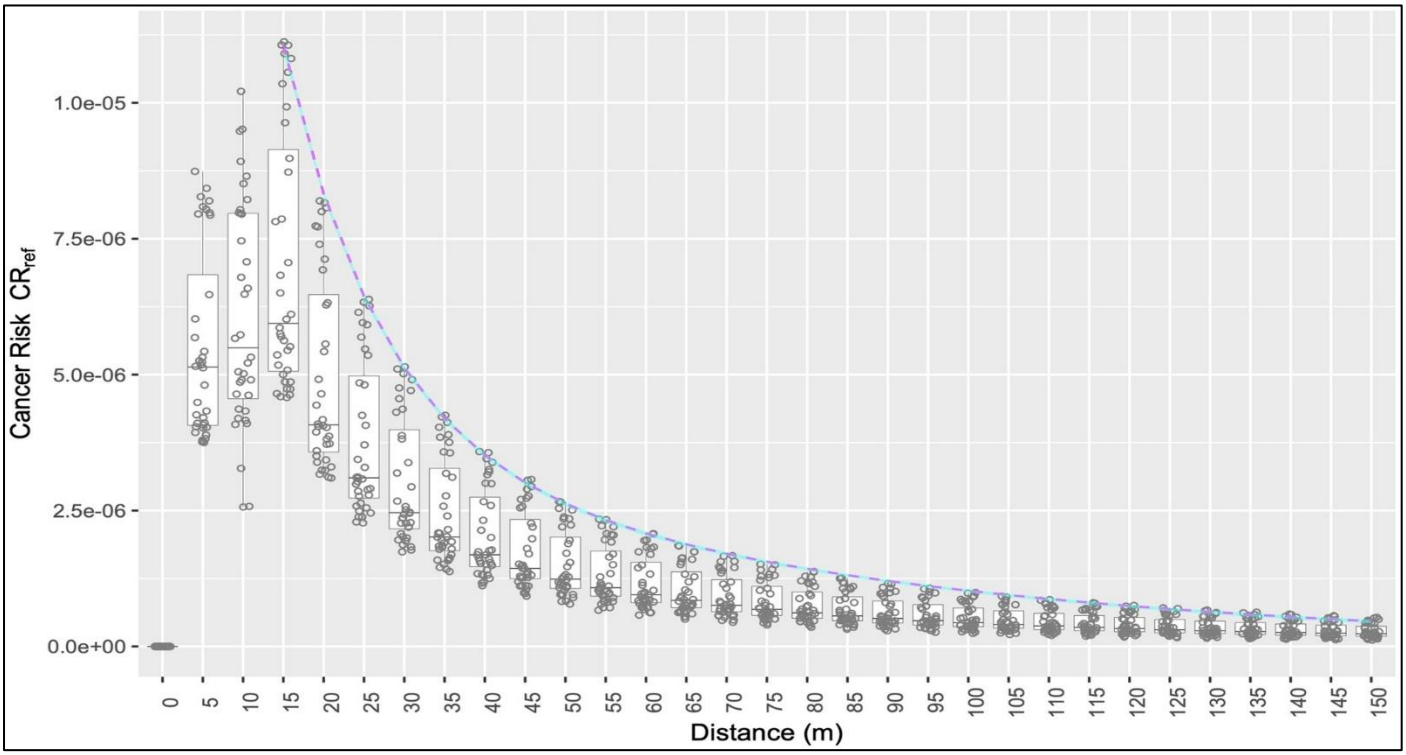
EXHIBIT 4
LOCATION OF OAK MEADOW ELEMENTARY SCHOOL AND COSTCO GAS STATION

Underestimated Emissions: A Study from ScienceDirect.com found that gasoline station vent pipes can emit 10 times more volatile organic compounds (VOCs) than commonly used in regulatory estimations, making current **300-foot setback regulations potentially inadequate, according to Lab Manager.**



https://www.frontiersin.org/journals/environmental-health/articles/10.3389/fenvh.2023.1214376/full
Distance & setbacks



Noxious fumes from gas stations near schools, particularly benzene and VOCs, pose significant health risks, including headaches, nausea, respiratory irritation, and increased cancer risks. Studies indicate gasoline vent pipes emit far more toxins than previously thought, frequently exceeding safe, mandated distances from children, who are highly susceptible.
Lab Manager +4

Key Health Impacts on Students

- **Respiratory and Neurological Issues:** Breathing gasoline vapor causes headaches, dizziness, and throat irritation. Chronic exposure to high levels of gasoline vapors can cause long-term harm to the nervous system.
- **Childhood Leukemia Risk:** Research suggests an association between childhood leukemia and residential or school proximity to gasoline stations, primarily due to exposure to benzene, a known carcinogen.
- **Asthma Development:** Exposure to gasoline fumes and vehicle exhaust can contribute to the development of asthma.

National Institutes of Health (.gov) +5

Environmental and Safety Factors

- **Underestimated Emissions:** A Study from ScienceDirect.com found that gasoline station vent pipes can emit 10 times more volatile organic compounds (VOCs) than commonly used in regulatory estimations, making current 300-foot setback regulations potentially inadequate, according to Lab Manager.
- **Carcinogenic Exposure:** Gasoline vapor contains benzene, classified as a Group 1 human carcinogen, notes the AIHA.
- **Additional Pollutants:** Gas stations contribute to ground-level ozone and produce other hazardous fumes from leaks and spills.

Lab Manager +3

Vulnerable Populations

- Children, alongside the elderly and pregnant women, are particularly vulnerable to these chemical vapors because their bodies are still developing.

AQMD (.gov)

Recommendations and Precautions

- **Setback Regulations:** Air quality guidelines often recommend that schools not be located directly adjacent to gas stations.
- **Improved Ventilation:** Better ventilation systems and air filtration at schools near refueling sites can reduce interior exposure, as noted in this ScienceDirect article.
- **Monitoring Vapors:** Regular air quality monitoring can help evaluate the levels of BTEX (benzene, toluene, ethylbenzene, and xylene) near school grounds.

ScienceDirect.com +4

Gas station – noxious fumes
https://www.sciencedirect.com/science/article/abs/pii/S1352231006010831
https://www.sciencedirect.com/science/article/abs/pii/S0048969718337549?via%3Dihub
Gas stations emit significant amounts of toxic fumes, primarily benzene, that can exceed safety levels (REL) at distances exceeding 50 meters, posing cancer risks and short-term health effects for nearby residents and workers. These noxious emissions can cause dizziness, headaches, and in high concentrations, damage the nervous system and increase cancer risks by 340-1800 per 1,000,000 for attendants. Columbia University Mailman School of Public Health +4
Key Findings on Impact of Noxious Fumes
Benzene Exposure Risk: Research shows that toxic benzene levels often exceed regulatory limits (e.g., California's 1-hour REL of 8 ppb) up to 160 meters from stations, particularly during fuel deliveries.
Residential Proximity Concerns: Studies suggest current setback regulations for gas stations may not sufficiently protect nearby residents from harmful fumes.
Health Symptoms and Effects: Inhalation of these vapors (which include formaldehyde and ethylbenzene) can cause dizziness, headaches, and respiratory irritation. Chronic exposure risks include serious nervous system effects and carcinogenicity.
Occupational Dangers: Gas station attendants face significantly higher cancer risks, with one study documenting risks between 340 and 1800 per 1,000,000 employees. Workers are also exposed to risks of genotoxic damage due to chronic gasoline vapor inhalation.
Dispersion and Environmental Impact: Vapors released from underground storage tanks and during vehicle refueling can be exacerbated by meteorological conditions. These fumes contribute to ground-level ozone. Columbia University Mailman School of Public Health +7

Abstract

At gas stations, fuel vapors are released into the atmosphere from storage tanks through vent pipes. Little is known about when releases occur, their magnitude, and their potential health consequences. Our goals were to quantify vent pipe releases and examine exceedance of short-term exposure limits to benzene around gas stations.
At two US gas stations, we measured volumetric vent pipe flow rates and pressure in the storage tank headspace at high temporal resolution for approximately three weeks. Based on the measured vent emission and meteorological data, we performed air dispersion modeling to obtain hourly atmospheric benzene levels. **For the two gas stations, average vent emission factors were 0.17 and 0.21 kg of gasoline per 1000 L dispensed.**
Modeling suggests that at one gas station, a 1-hour Reference Exposure Level (REL) for benzene for the general population (8 ppb) was exceeded only closer than 50 m from the station's center. At the other gas station, the REL was exceeded on two different days and up to 160 m from the center, likely due to non-compliant bulk fuel deliveries. A minimum risk level for intermediate duration (>14–364 days) benzene exposure (6 ppb) was exceeded at the elevation of the vent pipe opening up to 7 and 8 m from the two gas stations. Recorded vent emission factors were >10 times higher than estimates used to derive setback distances for gas stations. Setback distances should be revisited to address temporal variability and pollution controls in vent emissions

https://pmc.ncbi.nlm.nih.gov/articles/PMC7059886/#S21
The California Office of Environmental Health Hazard Assessment one-hour Reference Exposure Level (REL) for benzene—defined as a continuous hour of exposure to the chemical—was exceeded at both gas stations at distances greater than 50 meters. "We found evidence that much more benzene is released by gas stations than previously thought. In addition, even during a relatively short study period, we saw a number of instances in which people could be exposed to the chemical at locations beyond the setback distance of 300 feet,"

https://www.researchgate.net/publication/382363560_Assessing_VOC_emissions_from_different_gas_stations_impacts_variations_and_modeling_fluctuations_of_air_pollutants