CRUDE ACCOUNTABILITY

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A PROFILE OF PETROCHEMICAL EMISSIONS

Volatile Organic Compounds (VOCs)

Benzene, Ethylbenzene, Hexane, Toluene, and Xylene

VOCs are organic chemicals that have a high vapor pressure at room temperature, causing them to evaporate easily into the air. They are often characterized by strong odors and found in emissions during fossil fuel production; they are also used and produced in the manufacture of paints, pharmaceuticals, and refrigerants (EPA).

VOCs are a primary ingredient in the formation of ground-level ozone (O_3) and secondary organic aerosols. When they react with nitrogen oxides (NO_x) in the presence of sunlight, they create photochemical smog, which reduces visibility and damages plant tissues by inhibiting photosynthesis.

In humans, exposure can cause immediate irritation of the eyes, nose, and throat, as well as headaches and loss of coordination. Long-term exposure can be much more severe. Benzene, for instance, is a known human carcinogen linked to leukemia, while other VOCs can cause damage to the liver, kidneys, and central nervous system. Ethylbenzene is a possible human carcinogen and can be released into the air or found in wells near underground fuel storage tanks.

Children are more susceptible because their metabolic systems are less efficient at detoxifying these chemicals. Since many VOCs (i.e., benzene) are heavier than air, they settle closer to the ground where children play. Chronic exposure in early life is linked to an increased risk of childhood asthma and potentially impaired cognitive development.

Hexane is both a naturally occurring and anthropogenic hydrocarbon that is refined from crude oil. Its primary use is as a volatile solvent with major uses in printing, textile manufacturing, and the extraction of vegetable oils from crops such as soybeans (NIH).

Human exposure to hexane occurs mainly through inhalation. Adverse neurological, respiratory, developmental, and reproductive effects are the most important health concerns related to exposure to hexane. Muscle atrophy and decreased body weight are also common. Higher rates of self-reported respiratory symptoms have been observed among workers exposed to hexane, whereas reduced lung function has been reported among children residing near sources of hexane emissions (NIH).

The general population is exposed to very low levels of n-hexane at all times, while those living in urban centers may be exposed to slightly higher levels due to emissions of n-hexane, which are associated with motor fuel. There is currently little information on the carcinogenic potential of hexane (NIH).

In the environment, hexane reacts with nitrogen oxides in the presence of sunlight to form ground level ozone and degrades air quality. When getting into water, hexane disrupts aquatic life, particularly microinvertebrates and juvenile fish. Hexane affects bees and other pollinators, impacting the agricultural sector. Hexane accumulates in poorly drained soils, altering soil microbiota, reducing fertility, and hindering seed germination (Researchgate).

Exposure to toluene can cause nausea and headaches and can affect the nervous system. Symptoms usually stop when exposure ends. Xylene is irritating to the skin, eyes, and respiratory tract. It can cause systemic toxicity by ingestion or inhalation. The most common route of exposure is via inhalation.