

CRUDE OIL HEALTH HAZARDS

Crude oil is a mixture of dozens of chemicals, some benign and others highly toxic. Health hazard evaluations usually focus on benzene*, toluene*, xylene, and ethylbenzene* ("BTEX"), due to their recognized adverse health effects. These effects vary based on individual exposure conditions and susceptibility. Peer-reviewed medical studies have shown BTEX can cause a wide range of harm, including damage to the lungs, hormonal controls, fetal development, nervous system, liver, kidneys, cardiovascular system, reproductive system, genetic material (DNA), immune system and skin. Benzene, the most extensively studied, is known to cause cancer. (**Proposition 65 listed chemicals, as listed at <https://www.p65warnings.ca.gov/chemicals>*)

Whether someone experiences any health effects and the types that occur depends on their exposure, including the frequency and length, amounts, exposure routes (ingestion, inhalation, skin), and other factors. Health effects also depend on an individual's susceptibility, determined by pre-existing health conditions, age, genetics, exposures to other similar-acting hazards, and other factors. Children, pregnant women and the elderly are often considered more susceptible than healthy adults. Those with pre-existing conditions in the systems listed above are also at higher risk (e.g., those with ADHD, Asperger's and other neurological challenges may have their conditions exacerbated).

The health effects of crude oil exposure may occur rapidly, but some can be delayed, occurring months or years after exposure. Examples of rapid onset effects include skin irritation from touching contaminated material, respiratory difficulty after inhaling contaminated air, upset stomach after ingesting contaminated water (e.g., from swimming in it or drinking it) and neurological problems (e.g., difficulty concentrating) after exposure through any route. Examples of chronic effects include prolonged difficulty breathing, hormonal disruption that can manifest as infertility, memory loss due to neurological damage, and cancer (e.g. leukemia, lymphoma).

Although BTEX are always present in crude oil, their concentrations vary, complicating efforts to evaluate risk. The occurrence and levels of dozens of other chemicals in crude oil also vary and can cause additional health effects or increase the severity of those caused by BTEX. For example, some crude oil contains elevated levels of mercury. Mercury is a potent neurotoxin and fetal toxin. When it is combined with BTEX, it increases the likelihood of nervous system harm and birth defects.

Given the risk of health damage posed by exposure to crude oil, minimizing the potential for exposure is the best way to reduce health risks. As the Orange County California health department stated in their 10/5/2021 Health Advisory, even if you don't see an oil sheen on water, contaminants may be present. Likewise, low levels of air contamination may not be recognized by smell. The safest approach is to avoid areas where contamination is reported and materials from those areas (e.g., tar balls).

This summary was prepared by Drs. Michael Harbut and Kathleen Burns in the interest of public health and is online at www.sciencecorps.org/crudeoil.pdf (*bios and contact information*). No part of this constitutes medical advice. Questions from physicians may be directed to Dr. Michael Harbut. The information is based on numerous peer-reviewed studies searchable at: <https://www.ncbi.nlm.nih.gov/pmc/advanced/> It is also available in many health hazard reports from state, national and international agencies (e.g. EPA, WHO). Quotes with attribution can be used by nonprofit organizations and news outlets. Use by other for-profit entities requires written permission of the authors.