



Evaluation of Former Leaking Underground Storage Tanks at the Fleet Maintenance Facility Denver, CO

March 2009

The City requested assistance from the Colorado Cooperative Program for Environmental Health Assessments (CCPEHA) to identify any potential public health implications to workers resulting from current and future exposures to the plume of gasoline that extends under the Fleet Maintenance Facility and recommend actions to reduce the exposure, if necessary.

Site Background

The site is currently operated by the City as a satellite fleet maintenance and fueling facility as well as for storage of various street maintenance and solid waste motor equipment. The City's Division of Fleet Maintenance is responsible for the maintenance, repair, specification, rental, retirement, and support of more than 1,700 pieces of equipment. The facility was originally constructed in approximately 1957. A subsurface investigation, completed in early 1995, indicated that a release of gasoline had occurred from an underground storage tank (UST), and that both soil and groundwater had been contaminated. A contractor to the City is currently conducting cleanup of the contamination originating from the leaking UST on site. The remaining site-related concerns include the potential for benzene exposure via vapor intrusion into the Fleet Maintenance Facility impacting City staff.

What is vapor intrusion? Vapor intrusion is a way that chemicals in soil or groundwater can get into indoor air. Sometimes, chemicals are spilled on the ground at a factory or leak from an underground storage tank. These chemicals can seep down into the soil and groundwater. Some chemicals can also travel through soil as vapors. These vapors may then move up through the soil and into nearby buildings, contaminating indoor air. Vapor intrusion is similar to how radon, a naturally occurring radioactive gas, can enter a home through cracks in the foundation. Vapor intrusion is uncommon, but should be considered whenever there is a known source of soil or groundwater contamination nearby.

What did CCPEHA find in the Health Consultation?

- Based on the potential for theoretical cancer risks for current exposures to benzene, the indoor air quality inside the Fleet Maintenance Facility poses:
 - A public health hazard for workers at a high activity level
 - No apparent public health hazard for workers at a low activity level.
- Short-term and chronic noncancer hazards from benzene exposure inside the Fleet Maintenance Facility are likely to cause some concern for current exposures.
- There is an indeterminate public health hazard for past and future exposures inside the Fleet Maintenance Facility as indoor air data are not available.
- There is no apparent public health hazard to future trench or utility workers potentially exposed to VOC-contaminated soil vapors

What's next?

- CCPEHA will collaborate with the City to conduct health education and outreach activities, as requested.
- CCPEHA will review any additional data upon request.

Where can I find this health consultation?

An electronic copy of the consultation can be found at: <http://www.cdphe.state.co.us/dc/ehs/healthconsult.html>. To request a free copy of the health consultation, or for more information, please call Shannon Rossiter, MPH at 303-692-2617.

FREQUENTLY ASKED QUESTIONS:

Health Consultations and Volatile Organic Compounds

What is a health consultation? A Health Consultation is a way for the Colorado Department of Public Health and Environment to respond quickly to a need for health information on toxic substances and to make recommendations for actions to protect the public's health. Health Consultations may consider: 1. The levels (or "concentrations") of hazardous substances; 2. If and how people might be exposed to contamination (through "exposure pathways" such as breathing air, drinking or contacting water, contacting or eating soil, or eating food); 3. The harm the substances might cause to people (or the contaminants' "toxicity"); 4. If and how working or living nearby might affect people's health; and 5. Other dangers to people, such as unsafe buildings, abandoned mine shafts, or other physical hazards.

What are the Agency For Toxic Substances and Disease Registry (ATSDR) public health hazard categories?

- **A public health hazard:** ATSDR defines a public health hazard as sites where evaluation of available relevant information suggests that, under site-specific conditions of exposure, long-term exposures to site-specific contaminants have had, are having, or are likely to have in the future, an adverse impact on human health that requires one or more public health interventions.
- **No apparent public health hazard:** ATSDR uses this category for sites where human exposure to contaminated media may be occurring, may have occurred in the past, and/or may occur in the future, but the exposure is not expected to cause any adverse health effects.
- **An indeterminate public health hazard:** ATSDR defines an indeterminate public health hazard as a situation in which critical data are insufficient with regard to extent of exposure. This represents a professional judgment that critical data are missing and ATSDR has judged the data are insufficient to support a decision. This categorization does not necessarily imply all data are incomplete, but that some additional data are required to support a decision

Why is there an indeterminate public health hazard here? We do not have any sampling data prior to 2007. Therefore, the length of time a person could have been exposed to contaminated indoor air is unknown, and the historical concentration of contaminants in the indoor air is unknown. Similarly, we do not have any sampling data after 2007. Therefore, although we expect the level of contaminants to decrease as site remediation continues, the future concentration of contaminants is unknown.

Are there other uncertainties associated with these findings? The findings of this health consultation are limited by the inability to distinguish indoor sources of benzene or gasoline from those that may be a result of vapor intrusion, and minimal knowledge of the existing air exchange system in the Fleet Maintenance Facility. We know that workers inside the Fleet Maintenance Facility are exposed to gasoline as part of their normal duties. This known indoor exposure to benzene and other VOCs in gasoline is separate from exposure due to vapor intrusion and could periodically exposes workers to significantly higher than ambient concentrations of VOCs.

What are Volatile Organic Compounds (VOCs)? Volatile Organic Chemicals (VOCs) are carbon-containing compounds that evaporate easily from water into air at normal air temperatures. VOCs are contained in a wide variety of commercial, industrial and residential products including fuel oils, gasoline, solvents, cleaners and degreasers, paints, inks, dyes, refrigerants and pesticides. People are most commonly exposed to VOCs through the air, in food, through skin contact, and potentially in drinking water supplies.

How do VOCs get into groundwater? Most VOCs found in the environment result from human activity. When VOCs are spilled or improperly disposed of, a portion will evaporate, but some will soak into the ground. In soil, VOCs may be carried deeper by rain, water or snow melt and eventually reach the groundwater table.

What is groundwater? Groundwater is water that occurs below the Earth's surface at depths where all the open spaces in the soil, sediment, or rock are completely filled with water. All groundwater originates with and is replenished by precipitation. Groundwater will eventually come back to the surface, discharging to streams, springs, lakes, or the oceans, to complete the hydrologic cycle.

How do the site's contaminants affect human health?

Benzene: Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. Benzene is widely used in the United States. Benzene is a natural part of crude oil, gasoline, and cigarette smoke. Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death. The major effect of benzene from long-term exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection. The Department of Health and Human Services (DHHS) has determined that benzene is a known carcinogen. Long-term exposure to high levels of benzene in the air can cause leukemia, particularly acute myelogenous leukemia, often referred to as AML. This is a cancer of the bloodforming organs.