



Camp Justice: Benzo(a)pyrene in Soil

The Preliminary Public Health Screening Risk Assessment Report, Camp Justice, describes the results of soil samples for benzo(a)pyrene. Benzo(a)pyrene is one compound in a group of over 100 compounds that are called polycyclic aromatic hydrocarbons (PAHs). These compounds are naturally occurring and are also manmade. They are present in numerous materials, including petroleum products, and are also formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco. Because Camp Justice was originally used as an airfield, there were concerns that benzo(a)pyrene and other PAHs may be present in soil due to potential spills of petroleum products, exhaust from aircraft, or other sources. As a result, in October 2015, 60 soil samples were collected throughout the Camp that were analyzed for PAHs. In April 2016, nine additional soil samples were collected near Building AV-34, the location where the highest benzo(a)pyrene concentrations were detected in October 2015. This fact sheet summarizes the October 2015 and April 2016 sampling results.

What is Benzo(a)pyrene?

Benzo(a)pyrene is the most toxic compound in a group of over 100 compounds that are called PAHs. These compounds are naturally occurring and are also manmade and are present in petroleum products, coal tar, crude oil, soot, creosote, roofing tar, and in some medicines. PAHs are also used in manufacturing to make dyes, plastics, and pesticides.

Comparison of October 2015 and April 2016 Results

In October 2015, 60 soil samples were collected throughout the Camp. The highest concentration of benzo(a)pyrene detected in the samples was 8.6 mg/kg and the average concentration was 0.33 mg/kg. All 60 concentrations were similar to typical U.S. Urban Background Concentrations which range from 0.002 mg/kg to 7.9 mg/kg (EPRI 2008). While all of the soil concentrations were similar to background, some did exceed the U. S. Environmental Protection Agency (EPA) Screening Levels (SLs). For example:

- 11 of 60 samples exceeded the SL for a 25-year commercial worker (the EPA SL is 0.29 mg/kg)
- 2 of 60 samples exceeded the SL for a 6-year active duty military worker (the EPA SL is 1.2 mg/kg)
- 1 of 60 samples exceeded the SL for a 3-year active duty military worker (the EPA SL is 2.4 mg/kg)
- 1 of 60 samples exceeded the SL for a 9-month active duty military worker/resident (the EPA SL is 6.7 mg/kg)

The highest concentrations were detected near Building AV-34 (8.6 mg/kg at location M2 and 1.8 mg/kg at location M3). These soil concentrations may be due to minor spills of petroleum products or the asphalt parking lot. Therefore, in April 2016, nine additional soil samples were collected near this building to ensure that concentrations within the area are also consistent with typical background.



	October 2015	April 2016	
Sample Location	Result (mg/kg)	Sample Location	Result (mg/kg)
M2	8.6	M2-1	5.7
		M2-2	9
		M2-3	0.36
		M2-4	1.2
		M2-5	5.1
M3	1.8	M3-1	10
		M3-2	2.3
		M3-3	3.2
		M3-4	16

Concentrations from April 2016 were similar (for location M2) or slightly higher (for a few locations) than the October 2015 results. However, they are consistent with typical U.S. Urban Background Concentrations which range from 0.002 to 7.9 mg/kg.

Note: These results are not unexpected given that the samples were collected adjacent to an asphalt parking lot which is a source of benzo(a)pyrene and other PAHs.

The highest concentration of benzo(a)pyrene detected in the samples was 16 mg/kg and the average concentration was 5.9 mg/kg. As shown in the Figure and Table, those sampling results indicate that the soil concentrations surrounding/near locations M2 and M3 are similar to typical U.S. Urban background.

What Happens to PAHs When They Enter the Environment?

- PAHs enter the environment as a result of incomplete combustion of organic materials, volcanoes, forest fires, burning coal, and automobile exhaust.
- PAHs are not generally volatile, but can occur in air attached to dust particles. Some smaller molecular weight PAH compounds are volatile (e.g., naphthalene) and readily volatilize to air from soil or surface waters.
- PAHs break down in air within a few days or weeks by reacting with chemicals in air or by sunlight.

How Might I Be Exposed to PAHs?

- Breathing air containing PAH compounds in the workplace or downwind of facilities burning organic materials.
- Breathing air containing PAH compounds from cigarette smoke, wood smoke, vehicle exhaust, asphalt roads, or agricultural burn smoke.
- Coming in contact with air, water, or soil near hazardous waste sites.
- Eating grilled or charred meats, contaminated cereals, flour, bread, vegetables, fruits, meats, and processed or pickled foods.
- Drinking contaminated water or cow's milk.
- Infant ingestion of mothers contaminated breast milk.

How Can PAHs Affect My Health?

Mice fed high levels of one PAH (benzo(a)pyrene) during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people. Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure but these effects have not been seen in people.

How Likely are PAHs to Cause Cancer?

The EPA classifies several PAHs as probable human carcinogens, based on sufficient evidence of carcinogenicity in animals. The Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens. Some people who have breathed or touched mixtures of PAHs for long periods of time have developed cancer. Some PAHs have been shown to cause lung cancer in laboratory animals when they were breathed in from air containing them.

Is There a Medical Test to Determine Whether I've Been Exposed to PAHs?

Yes. There are special tests that can detect PAHs, but they cannot tell whether any health effects will occur or determine the extent or source of your exposure. PAHs or their metabolites can be measured in urine, body tissues, or blood after exposure to PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

For more information, contact **Navy and Marine Corps Public Health Center**

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For ToxFAQs™, visit <http://www.atsdr.cdc.gov/toxfaqs/index.asp>

References:

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Electric Power Research Institute (EPRI). 2008. Examination of the Sources of Polycyclic Aromatic Hydrocarbon (PAH) in Urban Background Soil. Interim Report, December 2008. EPRI, Palo Alto, CA: 2008. 1015558.