

Sources of Exposure

Toxicokinetics and Normal Human Levels

Biomarkers/Environmental Levels

ToxGuide™

for

JP-5, JP-8, and Jet A Fuels

CAS # 8008-20-6

February 2016

U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
www.atsdr.cdc.gov

Contact Information:
Division of Toxicology and Human Health Sciences
Environmental Toxicology Branch

1600 Clifton Road NE, F-57
Atlanta, GA 30329-4027
1-800-CDC-INFO
1-800-232-4636

General Populations

- Most people would not be exposed to jet fuels JP-5, JP-8, or Jet A unless they work with these products or live very close to where they are used or may have been spilled.
- Exposure to JP-5, JP-8, and Jet A fuels is expected to be low and could occur through atmospheric, soil, or groundwater contamination.

Occupational Populations

- Military or civilian personnel who are employed in jet fuel storage or re-fueling activities will have the greatest exposure via inhalation and dermal routes to these substances.
- Occupational exposure could involve exposure to raw fuel, vapor phase, aerosol phase, a mixture of vapors and aerosols, or fuel combustion exhaust.

Toxicokinetics

- The chemicals in JP-5, JP-8, and Jet A fuels can enter the body through the lungs, digestive tract, or skin.
- The exact amounts that can enter the body are not known, but for some components it can be significant.
- Damage to the skin and longer time of skin contact will increase the amount absorbed through the skin.
- Components of jet fuels distribute widely throughout the body.
- Some components of jet fuels will be metabolized via various metabolic pathways.
- Jet fuel components and metabolites will be eliminated from the body in the urine, feces, or breath.

Normal Human Levels

- No relevant data are available.

Biomarkers

- Many of the individual chemicals found in JP-5, JP-8, and Jet A and their metabolites can be measured in blood and urine. However, these chemicals are not specific to exposure to jet fuels.

Environmental Levels

Air

- No data are available for specific levels of JP-5, JP-8, and Jet A fuels in air.

Sediment and Soil

- No data are available for specific levels of JP-5, JP-8, and Jet A fuels in sediment and soil.

Water

- No data are available for specific levels of JP-5, JP-8, and Jet A fuels in water.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2016. Toxicological Profile for JP-5, JP-8, and Jet A Fuels (Draft for public comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.



Chemical and Physical Information

Routes of Exposure

Relevance to Public Health (Health Effects)

JP-5, JP-8, and Jet A are liquids

- JP-5, JP-8, and Jet A fuels are colorless liquids that are flammable and smell like kerosene.
- JP-5, JP-8, and Jet A are kerosene-based fuels refined by a straight distillation of crude or shale oil. Jet fuels are composed of more than 200 aliphatic and aromatic hydrocarbons (C₆-C₁₇₊). The exact composition is dependent upon the crude oil from which it is refined.
- These fuels contain various performance additives including antioxidants, static inhibitors, corrosion inhibitors, fuel system icing inhibitors, lubrication improvers, biocides, and thermal stability improvers.
- JP-5 and JP-8 are used as military aircraft fuels; they can also be used for fueling land vehicles and as a fuel source for heaters and lights.
- Jet A is the type of fuel used in civilian aircraft; however, the U.S. Air Force has recently started using Jet A (plus certain additives) for flying in the continental United States.

- Inhalation** – Principal route of exposure for workers involved in activities related to aircraft refueling.
- Oral** – Minor route of exposure if drinking well water has been contaminated.
- Dermal** – Minor route of exposure if there is contact with contaminated soil or water. Potentially significant route of exposure for workers not using adequate protective clothing

JP-5, JP-8, and Jet A in the Environment

- The various components of jet fuels will behave differently when they enter the environment.
- Some components will easily evaporate into the air during normal use or when they are spilled onto soils or surface waters.
- Some components will dissolve in water if spilled from underground tanks and may enter groundwater; others will attach to particles in soil or water.
- Some components that evaporate will be broken down by sunlight. Chemicals that dissolve in water may be broken down by microorganism in water or sediment.
- Some chemical components that attach to soil main remain in the environment for more than a decade.

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

Minimal Risk Levels (MRLs)

Inhalation

- No acute-duration inhalation MRLs were derived for JP-5, JP-8, or Jet A.
- An MRL of 2 mg/m³ has been derived for intermediate-duration inhalation exposure (15–364 days) to JP-5 vapor.
- An MRL of 3 mg/m³ has been derived for intermediate–duration inhalation exposure (15–364 days) to JP-8 vapor.
- No intermediate-duration inhalation MRL was derived for Jet A.
- No chronic-duration inhalation MRLs were derived for JP-5, JP-8, or Jet A.

Oral

- An MRL of 3 mg/kg/day has been derived for acute-duration oral exposure (≤14 days) to JP-8.
- An MRL of 0.3 mg/kg/day has been derived for intermediate-duration oral exposure (15–364 days) to JP-8.
- No chronic-duration oral MRL was derived for JP-8.
- No oral MRLs were derived JP-5 or Jet A for any exposure duration.

Health Effects

- Studies of military personnel suggest that exposure to JP-8 can affect the nervous system resulting in changes in reaction time and in other tests of neurological function.
- Studies in laboratory animals have reported a number of targets of toxicity including the lungs (inhalation exposure), liver, skin (dermal exposure), immunological system, and nervous system, and developing.
- The U.S. Department of Health and Human Services and the EPA have not classified JP-5, JP-8, or Jet A fuels as to their carcinogenicity. The International Agency for Research on Cancer has classified JP-5, JP-8, and Jet A as Group 3 carcinogens (not classifiable as to their carcinogenicity to humans).

Children's Health

- No studies examining the health effects of JP-5, JP-8, or Jet A fuels in children were found.
- Children who accidentally ingested kerosene showed lung effects, vomiting, fever, unconsciousness, drowsiness, and irritability. These effects are similar to the effects seen in adults who ingest kerosene
- Studies in laboratory animals have found decreases in pup body weights, alterations in neurodevelopmental tests, and altered immune function.