

Sources of Exposure

Toxicokinetics and Normal Human Levels

Biomarkers/Environmental Levels

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. Spills into surface waters where people may swim can also lead to some exposure.

Occupational Populations

- Military or civilian personnel who are employed in jet fuel transport, 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 of individual components of the fuels that can pass into the bloodstream 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.

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). 2017. Toxicological Profile for JP-5, JP-8, and Jet A Fuels. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

ToxGuide™ for JP-5, JP-8, and Jet A Fuels

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U.S. Department of Health and
Human Services
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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 may 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), the immunological and nervous systems, and hearing.
- 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.