



## Just the Facts...

## JP-8 - Medical

<b>GENERAL INFORMATION</b>	<p>JP-8 is an abbreviation for “jet propellant-8”. It is similar to the fuel that replaces, JP-5, but there are some differences. Both of these fuels are colorless liquids made up of over two hundred identifiable hydrocarbons and many other trace substances. The largest constituent by far is de-sulfurized “kerosene”, which makes up more than 98% of the total volume of both JP-5 and JP-8. “Aromatic hydrocarbons” (benzene, toluene, and mixed xylenes) make up a very small fraction of JP-5 and JP-8 fuels. JP-8 contains less benzene than JP-5. Regular automobile gasoline typically contains more benzene than do the kerosene-based jet fuels. JP-8 and commercial jet fuel (jet fuel-A) are chemically identical, but they have different additives.</p> <p>Since the 1990s, the military services and NATO forces have been changing to JP-8 as a single engine basic fuel. This fuel is used to power diesel engines and turbines in land vehicles, aircraft, vessels, and generators, as well as, to burn in tent heaters and field kitchens. Due to the Navy’s shipboard fire safety concerns, carrier-based aircraft have not made the switch from JP-5.</p> <p>For specific uses, such as a fuel for a high performance jet aircraft engine or a fuel for a tent heater, different chemical additives are blended into the basic JP-8 fuel. These additives include stabilizers, corrosion and ice inhibitors, anti-static agents, biocides, and gum and varnish cleaners.</p> <p>JP-8 has performance and health advantages over previously used fuels. It is thicker and less volatile than JP-5, and it contains less benzene--a known cancer-causing chemical. However, it evaporates slowly resulting in prolonged skin contact. Some of the chemical additives give additional toxicity to the basic fuel.</p>
<b>ROUTINE USES IN THE DEPLOYED SETTING</b>	<p>Diesel and turbine powered Army land vehicles, aircraft, water vessels, and auxiliary equipment (large generators) use JP-8 as a fuel. Passenger vehicles, drone aircraft, and some small engine use gasoline. The vehicles, aircraft, and vessels using JP-8 include the Abrams M1A1/M1A2 Main Battle Tanks, Bradley Fighting Vehicles, HumVees, as well as, heavy trucks, helicopters, and most Army “boats”.</p> <p>Exposure to JP-8 can occur during use, fueling, maintenance, and repair operations. During the current deployment, soldiers have used cans with JP-8 to clean gas plugs. This could result in skin exposure when they retrieve the plugs. Additionally, fuel handling and transportation, spill clean-up, and use in stoves, heaters, and generators are other potential sources of JP-8 exposure.</p> <p><i>JP-8 must not be used as an obscurant or for dust/sand suppression. This would result in high exposures to personnel.</i></p>
<b>PERSONAL PROTECTIVE EQUIPMENT (PPE) and COUNTERMEASURES AVAILABLE FOR DEPLOYED PERSONNEL</b>	<p>Eye and skin contact should be avoided through the use of protective eyewear, gloves, and protective outer garments that do not absorb the organic liquid for those with regular and prolonged contact with JP-8. Inhalation exposure can occur from the vapor or aerosol mist during “cold” turbine engine start-up. Nearby personnel should be positioned away from the vapor/aerosol plume. Handling and transfer of fuel should be performed in well-ventilated areas.</p> <p>Aircraft maintenance personnel must wear appropriate respiratory protection and clothing when working with or entering fuel cells.</p> <p>Clothing should be promptly removed if it becomes wet with JP-8. Clothing should be laundered before wearing again.</p>
<b>QUESTIONS TO ASK REGARDING EXPOSURE</b>	<ul style="list-style-type: none"><li>• How did exposure occur and how long did it last? Did it happen on more than one occasion?</li><li>• Was/Were there any acute effect(s) associated with the exposure(s); how long did it/they last?</li><li>• Were any other individuals affected?</li><li>• Was the exposure situation evaluated by the medical department?</li><li>• Determine if JP-8 was used for a non-approved application (obscurant or dust/sand suppression).</li></ul>

<p><b>EXPOSURE LEVELS HISTORICALLY ENCOUNTERED</b></p>	<p>During aircraft fuel cell maintenance, the USAF has found that levels of total JP-8 and benzene (found in JP-8) may exceed the occupational exposure limits recommended by the National Academy of Science. These unique tasks represent the highest exposure levels for military personnel. The exposures occurred during brief 15-minute periods, as well as, whole day exposures. Using appropriate clothing and respiratory protection, these exposures did not result in elevated levels of JP-8 component chemicals in the personnel when medical surveillance was conducted.</p>
<p><b>AVAILABLE EXPOSURE DATA</b></p>	<p>For personnel exposed to concentrations above one-half of the occupational exposure level (time-weighted average (TWA): 350 mg/m<sup>3</sup>; short-term exposure level (STEL) 1,000 mg/m<sup>3</sup>), medical monitoring has been recommended by individuals outside of the DoD, but this has not been established as policy by the armed services. Before entry into a medical surveillance program, exposure levels must be determined and assessed by qualified personnel.</p>
<p><b>COMMON ACUTE AND CHRONIC HEALTH EFFECTS</b></p>	<p>Generally, the acute and chronic effects of JP-8 are similar to those following exposure to hydrocarbons (kerosene) or solvents (PD 680; Stoddard). Much of the information on human health effects is based upon experience and research with kerosene—the major component of jet fuels, and comparison to JP-5. Additionally, the vapor (gaseous) state is often used in studies, and in this form the toxicity varies from that of an aerosol (liquid particulate). The synergistic actions (both additive and subtractive) between the base JP-8 fuel and chemical additives have been studied only to a limited degree. Most information regarding human health effects is restricted to data developed for single agent constituents found in the fuels and additives.</p> <p>JP-8 can irritate the eyes, nose, throat, and lungs. Dizziness, lightheadedness, skin irritation, and an objectionable taste in the mouth and odor on the breath were some of the more commonly reported complaints during an extensive USAF study. This study also found that there were no increases in respiratory illnesses, nor were any long-term health hazards associated with JP-8 exposure.</p> <p>Studies in animals have demonstrated immune suppression with high-level exposures by the dermal and inhalation routes. This was not seen in the USAF study of workers.</p>
<p><b>REVERSIBILITY OF HEALTH EFFECTS</b></p>	<p>The acute effects are reversible when exposure is stopped. High-level exposures causing eye irritation may take several days to resolve. Simple dermatitis may progress if exposure continues and the condition is not adequately treated.</p> <p>Results for a USAF study have not found and long-term health effects from routine JP-8 exposure.</p>
<p><b>TREATMENT REQUIRED/AVAILABLE FOR EXPOSURE</b></p>	<p>The immediate treatment for any hydrocarbon exposure is to stop the exposure (irrigate eyes, rinse skin, move to fresh air) when contact or effects occur. For acute situations, symptomatic treatment is usually the mainstay of medical care. After emergent issues are taken care of, reducing the intensity or eliminating exposure altogether is the appropriate goal of the clinician.</p> <p>Generally, there is no medical treatment required for past routine exposure.</p>
<p><b>LONG TERM MEDICAL SURVEILLANCE REQUIREMENTS OF HEALTH EFFECTS MONITORING</b></p>	<p>Medical surveillance is not required for routine exposure.</p> <p>Following significant acute or chronic exposure, medical evaluation/surveillance can be based upon a known component of the fuel—benzene, toluene, xylenes, naphthalene, or polynuclear aromatic hydrocarbons (PAHs). Benzene, and its metabolites, and 1-hydroxypyrene can be used as biomarkers of fuel exposure, if warranted. These chemicals do not persist in the body. They must be measured in the immediate period following exposure and correlated back to the exposure with serial level, as necessary.</p> <p><i>For personnel exposed to concentrations above one-half of the occupational exposure level, medical surveillance has been recommended. The National Academy of Science has recommended a time-weighted average of 350 mg/m<sup>3</sup>; short-term exposure level (STEL) of 1,000 mg/m<sup>3</sup>.</i></p>
<p><b>SPECIAL RISK COMMUNICATION ISSUES</b></p>	<p>Some individuals working with JP-8 note an objectionable taste in their mouth and odor on their breath after exposure. This is an undesirable condition, but it is temporary and not harmful. It will go away within several hours, but it is a possible indication of excessive exposure. Precautions taken to decrease exposure and contact with JP-8 will likely prevent this from recurring.</p> <p>JP-8 has not been shown to be a carcinogen in humans.</p>