EERC
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018
(701) 777-5000

EERC MSDS No.: 07-002
MSDS Creation: 07/16/07
Updated:
Technical Contact: Ted R. Aulich
Prepared by: hmv

Material Safety Data Sheet

Fossil Fuel-Based Fischer-Tropsch Turbine Fuel

THIS PRODUCT IS NOT FOR SALE AND MAY NOT BE TRANSFERRED TO A THIRD PARTY WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE EERC

Section 1 – Chemical Product and Company Identification

MSDS Name: Aviation Turbine Fuel
Catalog Number/Lab Reference Number: Aulich, Wocken – July 2007
Research Sample No.: RaG--070717
Synonyms: JP-8, jet fuel
Organization Identification:
Energy & Environmental Research Center
University of North Dakota
23 North 2nd Street, Stop 9018
Grand Forks, ND 58202-9018

For Additional Information, Call: Ted R. Aulich, (701) 777-2982
After Hours, Please Call: 24-hour desk, (701) 777-2591

Section 2 – Hazards Identification

NFPA 704: National Fire Protection

Health: 0 **Fire:** 2 **Reactivity:** 0
0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard

HMIS CLASSIFICATION: Hazardous Material Identification System

Health (blue): 1* **Fire (red):** 2 **Reactivity (yellow):** 0
*CHRONIC
EMERGENCY OVERVIEW
Appearance/Odor: Colorless/Mild

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WARNING

Potential Health Effects: Aspiration hazard if swallowed. Can enter lungs and cause damage. Use ventilation adequate to keep exposure below recommended limits, if any. Avoid breathing vapor or mist. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Wash thoroughly after handling.

Likely Routes of Exposure:

Eye: Contact may cause mild eye irritation including stinging, watering, and redness.

Skin: Mild to moderate skin irritant. Contact may cause redness, itching, burning, and skin damage. Prolonged or repeated contact may cause drying and cracking of the skin, dermatitis (inflammation), burns, and severe skin damage. No harmful effects from skin absorption have been reported.

Ingestion: No harmful effected reported from ingestion. ASPIRATION HAZARD – This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.

Inhalation: Expected to have a low degree of toxicity by inhalation.

Medical Conditions Aggravated by Exposure: Conditions aggravated by exposure may include skin disorders, respiratory (asthma-like) disorders.

Target Organs: Inadequate data available for this material.

Potential Environmental Effects: Toxic to aquatic organisms.

Section 3 – Composition, Information on Ingredients

Component	CAS #	% by Wt.	% by Vol.
Kerosene C9–16	8008-20-6	97–100	97–100
Naphthalene	91-20-3	0–3	0–3

Section 4 – First Aid Measures

Eye Contact: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops, seek medical attention.

Inhalation: If respiratory symptoms or other symptoms of exposure develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion: Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious

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and vomiting, place on the left side with the head down. If possible, do no leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.
Note to Physicians: Federal regulations (29 CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.

Section 5 – Fire Fighting Measures

Suitable Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protected exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced firefighters.
Unsuitable Extinguishing Media: Water fog or water spray are of value for cooling, but may not achieve extinguishment.
Products of Combustion: The use of hydrocarbon fuels in an area without adequate ventilation may result in hazardous levels of combustion products (e.g., oxides of carbon, sulfur and nitrogen, and other hydrocarbons) and/or dangerously low oxygen levels.
Protection of Firefighters: Hazardous combustion products; Use of SCBA in enclosed or confined spaces, or as otherwise needed.

Section 6 – Accidental Release Measures

Personal Precautions: Combustible material.
Methods for Containment: Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof electrical equipment is recommended. Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk.
Methods for Cleanup: Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8). Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors (see Section 5). Spilled material may be absorbed into an appropriate absorbent material.
Other Information: Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is make into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

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Section 7 – Handling and Storage

Handling: Open container slowly to relieve any pressure. Bond all equipment when transferring from one vessel to another. Can accumulate static charge by blow or agitation. Can be ignited by static discharge. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-407 for specific bonding requirements for aircraft fueling.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR1910-146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames. Use good personal hygiene practices.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental operations.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and fire codes.

Section 8 – Exposure Controls / Personal Protection

Engineering Controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional engineering controls may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).
Eye/Face Controls: Approved eye protection to safeguard against potential eye contact, irritation or injury is recommended. Depending on conditions of use, a face shield may be necessary.
Skin Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation, absorption, and skin damage (see glove manufacturer literature for information on permeability). Depending on conditions of use, apron and/or arm

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covers may be necessary. The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation, absorption, and skin damage. Examples of approved materials are nitrile, or Viton® (see glove manufacturer literature for information on permeability). Depending on conditions of use, apron and/or arm covers may be necessary.
Respiratory Protection: A NIOSH-certified air purifying respirator with an organic vapor cartridge may be used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited. Use a NIOSH approved self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode if there is potential for an uncontrolled release, exposure levels are not known or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29CFR1910.134 ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

If benzene values equal or exceed applicable exposure limits the use of respiratory protection should comply with the requirements in OSHA 29CFR1910.1028-Benzene.

Exposure Guidelines:

Chemical Name	ACGIH	NIOSH	OSHA
Kerosene	200 mg/m^3 TWA-SKIN (as total hydrocarbon vapor)	100 mg/m^3 TWA	250 ppm IDLH
Naphthalene	10 ppm TWA 52 mg/m^3 TWA 15 ppm STEL 79 mg/m^3 STEL	10 ppm TWA 50 mg/m^3 TWA 15 ppm STEL 75 mg/m^3 STEL	10 ppm TWA 50 mg/m^3 TWA

NE = Not established.

Section 9 – Physical and Chemical Properties

Appearance: Liquid
Color: Colorless
Odor: Mild kerosene odor
Odor Threshold: No data
Physical State: Liquid
pH: Not applicable
Freezing Point: –47°C
Boiling Point: 280°–572°F (140°–300°C)
Flash Point: 115°F/121°C
Evaporation Rate: >1 (nBuAc = 1)
Flammability (solid, gas): Liquid, gas

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Upper Flammability: 5.0
Lower Flammability: 0.7
Vapor Pressure: <1 mm Hg
Vapor Density: >1 (air = 1)
Specific Gravity: 0.80 @ 60°F (15.6°C)
Solubility (water): Negligible
Partition Coefficient (n-octanol/water): Not tested
Autoignition: Not tested
Percent Volatile, wt%: 100% @ 545°F (285°C)
Volatile Organic Compound (VOC) content, wt%: Not tested

Section 10 – Stability and Reactivity

Stability: Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure. Combustible liquid and vapor. Vapor can cause flash fire.
Conditions to Avoid: Avoid all possible sources of ignition (see Sections 5 and 7).
Incompatible Materials: Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc.
Hazardous Decomposition Products: The use of hydrocarbon fuels in an area without adequate ventilation may result in hazardous levels of combustion products (e.g., oxides of carbon, sulfur and nitrogen, and other hydrocarbons) and/or dangerously low oxygen levels.
Possibility of Hazardous Reactions: Flammable liquid and vapor. Vapor can cause flash fire.

Section 11 – Toxicological Information

ACUTE EFFECTS

Kerosene
Oral LD_{50}: >5 g/kg (rat), = 28 ml/kg (rabbit), = 20 ml/kg (guinea pig)
Dermal LD_{50}: >2,000 mg/kg (rabbit)
Inhalation: mildly irritating to nose and throat
Eye Irritation: mildly irritating (rabbits)
Skin irritation: mildly irritating (rabbits)
Sensitization: mildly irritating (rabbits)

Naphthalene
Oral LD_{50}: 490 mg/kg; 2.6 g/kg (rat)
Dermal LD_{50}: >2.5 g/kg (rat)
Inhalation: mildly irritating to nose and throat
Eye Irritation: mildly irritating (rabbits)

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Skin irritation: mildly irritating (rabbits)
Sensitization: mildly irritating (rabbits)

CHRONIC EFFECTS
Carcinogenicity: Cancer mortality and morbidity were followed in a cohort of 2182 men exposed to jet fuel in the Swedish Armed Forces. No increase in the frequency of total neoplasms or cancers at specific site was seen, even when the duration of employment, latency, occupation, or type of exposure were considered. IARC has concluded that there is inadequate evidence for the carcinogenicity of jet fuel in both animals and humans.
Mutagenicity: No information available.
Reproductive Effects: No information available.
Developmental Effects: No information available.

Section 12 – Ecological Information

Ecotoxicity: Reported LC50/EC50 values for water-soluble fractions of kerosenes and jet fuels are usually in the range of 10 to 100 mg/liter. Adverse effects on the gills, pseudobranch, kidney, and nasal mucosa have been reported in fish involved in spills of jet fuel. Juvenile clams may be particularly sensitive to marine sediments contaminated as a result of spilled jet fuel. Direct toxicity and fouling of sea birds from jet fuel can occur if birds dive through floating layers of spilled fuel.
Persistence/Degradability: When kerosenes and jet fuels escape into the environment due to leaks or spills, most of their constituent hydrocarbons will evaporate and be photodegraded by reaction with hydroxyl radicals in the atmosphere. The half-lives in air for many of the individual hydrocarbons is less than one days. Less volatile hydrocarbons can persist in the aqueous environment for longer periods. They remain floating on the surface of the water; those that reach soil or sediment biodegrade relatively slowly. Soil contaminated with jet fuel can develop adapted microbial species able to use the fuel as a carbon source; soil aeration and nutrient supplementation can enhance this biodegradation.
Bioaccumulation/Accumulation: Phytotoxic effects of jet fuel have been reported following exposure of plants to sprays or vapors. Lack of seed germination and inhibition of seedling growth may also occur. There is evidence for moderate bioaccumulation of the water-soluble hydrocarbons present in jet fuels.
Mobility in Environment: Since paraffinic hydrocarbons have low solubility in water and exhibit moderate to rapid rates of biodegradation, they are not expected to persist or accumulate in the environment. Mobility in aquatic and terrestrial environments is estimated to be low due to the low water solubility and high vapor pressure. If spilled, the more volatile components will evaporate rapidly.

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It is estimated, based on testing of other materials, that the water-accommodated fraction (WAF) would cause moderate toxicity in fish (96 hg LC 50 about 8 mg/L), aquatic invertebrates (48 hr EC 50 about 32 mg/L in Daphnia), and algae (96 hr EC 50 about 10 mg/L).

Section 13 – Disposal Considerations

Disposal: Container contents should not be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state, and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

Resource Conservation and Recovery Act (RCRA) Hazard Class: This material, if discarded as produced, is not a RCRA "listed" hazardous waste. However, it should be fully characterized for ignitability (D001) and benzene (D018) prior to disposal (40CFR261). Use which results in chemical or physical change or contamination may subject it to regulation as a hazardous waste. Along with properly characterizing all waste materials, consult state and local regulations regarding the proper disposal of this material.

Section 14 – Transportation Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	Fuel, aviation, turbine engine (Jet-A), JP-8				
Hazard Class	3				
UN No.	UN1863				
Packing Group	III				

Proper Shipping Description:
DOT shipping label: FLAMMABLE LIQUID
May be reclassified for transportation as a COMBUSTIBLE LIQUID under conditions of DOT 49 CFR 173.120 (b) (2)

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Section 15 – Regulatory Information

OSHA
TSCA (Toxic Substances Control Act): All components are listed on the TSCA inventory.
CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act): This material contains the following chemicals subject to the reporting requirements of SARA 302 and 40 CRF 372: None.
SARA Title III (Superfund Amendments and Reauthorization Act):
SARA 302: TPQ: RQ:
SARA 311/312 Hazard Categories:
Acute Health: Yes
Chronic Health: Yes
Fire Hazard: Yes
Pressure Hazard: No
Reactive Hazard: No
SARA 313 Reportable Ingredients: This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:
Naphthalene 91-20-3 0–3%

INTERNATIONAL REGULATIONS:

Section 16 – Additional Information

The information provided above is believed to be accurate and represents the best information currently available to us. However, we make no warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall the EERC or its employees be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages resulting from the use of this sample.