

## 8. REGULATIONS, ADVISORIES, AND GUIDELINES

MRLs are substance specific estimates, which are intended to serve as screening levels, are used by ATSDR health assessors and other responders to identify contaminants and potential health effects that may be of concern at hazardous waste sites.

ATSDR has derived an intermediate-duration inhalation MRL of 2 mg/m<sup>3</sup> for JP-5 vapor. The MRL is based on minimal LOAEL of 150 mg/m<sup>3</sup> for liver effects in mice continuously exposed to JP-5 vapor for 90 days (Gaworski et al. 1984). The minimal LOAEL was multiplied by the default human to mouse blood:gas partition coefficient ratio of 1 to calculate the human equivalent concentration (LOAEL<sub>HEC</sub>). The minimal LOAEL<sub>HEC</sub> of 150 mg/m<sup>3</sup> was divided by a total uncertainty factor of 90 (3 for the use of a minimal LOAEL, 3 for extrapolation from animals to humans with dosimetric adjustment, and 10 for human variability).

ATSDR has derived an intermediate-duration inhalation MRL of 3 mg/m<sup>3</sup> for JP-8 vapor. The MRL is based on NOAEL of 500 mg/m<sup>3</sup> and LOAEL of 1,000 mg/m<sup>3</sup> for neurobehavioral effects in rats exposed to JP-8 vapor 6 hours/day, 5 days/week for 90 days (Ritchie et al. 2001). The NOAEL was adjusted for intermittent exposure and multiplied by the default human to mouse blood:gas partition coefficient ratio of 1 to calculate the human equivalent concentration (LOAEL<sub>HEC</sub>). The NOAEL<sub>HEC</sub> of 89 mg/m<sup>3</sup> was divided by a total uncertainty factor of 30 (3 for extrapolation from animals to humans with dosimetric adjustment, and 10 for human variability).

ATSDR has derived an acute-duration oral MRL of 3 mg/kg/day for JP-8. The MRL is based on NOAEL of 250 mg/kg/day and LOAEL of 500 mg/kg/day for immunological effects in mice administered via gavage JP-8 in olive oil for 14 days (Keil et al. 2004). The NOAEL of 250 mg/kg/day was divided by a total uncertainty factor of 100 (10 for extrapolation from animals to humans and 10 for human variability).

ATSDR has derived an intermediate-duration oral MRL of 0.3 mg/kg/day for JP-8. The MRL is based on a LOAEL of 325 mg/kg/day for neurodevelopmental effects in the offspring of rats administered via gavage JP-8 for 90 days prior to cohabitation and during gestation and lactation (Mattie et al. 2001). The LOAEL of 325 mg/kg/day was divided by a total uncertainty factor of 1,000 (10 for the use of a LOAEL, 10 for extrapolation from animals to humans, and 10 for human variability).

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EPA has not derived inhalation reference concentrations (RfCs) or oral reference doses (RfDs) for JP-5, JP-8, or Jet A fuels (IRIS 2015).

The international and national regulations, advisories, and guidelines regarding JP-5, JP-8, and Jet A in air, water, and other media are summarized in Table 8-1.

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**Table 8-1. Regulations and Guidelines Applicable to Jet Fuels**

Agency	Description	Information	Reference
<u>INTERNATIONAL</u>			
Guidelines:			
IARC	Carcinogenicity classification (jet fuel)	Group 3 <sup>a</sup>	IARC 2013
WHO	Air quality guidelines	No data	WHO 2010
	Drinking water quality guidelines	No data	WHO 2011
<u>NATIONAL</u>			
Regulations and Guidelines:			
a. Air			
ACGIH	TLV-TWA <sup>b,c</sup> (kerosene/jet fuels)	200 mg/m <sup>3</sup>	ACGIH 2013
AIHA	ERPGs	No data	AIHA 2013
DOE	PAC-1 <sup>d</sup> (JP-5 and JP-8)	290 mg/m <sup>3</sup>	DOE 2012
	PAC-2 (JP-5 and JP-8)	1,100 mg/m <sup>3</sup>	
	PAC-3 (JP-5 and JP-8)	1,100 mg/m <sup>3</sup>	
EPA	AEGL-1 (JP-5 and JP-8)		EPA 2013c
	10 minutes	290 mg/m <sup>3</sup>	
	30 minutes	290 mg/m <sup>3</sup>	
	60 minutes	290 mg/m <sup>3</sup>	
	4 hours	290 mg/m <sup>3</sup>	
	8 hours	290 mg/m <sup>3</sup>	
	AEGL-2 (JP-5 and JP-8)		
	10 minutes	1,100 mg/m <sup>3</sup>	
	30 minutes	1,100 mg/m <sup>3</sup>	
	60 minutes	1,100 mg/m <sup>3</sup>	
	4 hours	1,100 mg/m <sup>3</sup>	
	8 hours	1,100 mg/m <sup>3</sup>	
	AEGL-3 (JP-5 and JP-8)		
	10 minutes	NR <sup>e</sup>	
30 minutes	NR <sup>e</sup>		
60 minutes	NR <sup>e</sup>		
4 hours	NR <sup>e</sup>		
8 hours	NR <sup>e</sup>		
	Hazardous air pollutant	No data	EPA 2014a
	NAAQS	No data	EPA 2014d
NIOSH	REL (kerosene)	100 mg/m <sup>3</sup>	NIOSH 2014
	IDLH	No data	
OSHA	PEL (8-hour TWA) for general industry	No data	OSHA 2013b 29 CFR 1910.1000, Table Z-1
	Highly hazardous chemicals	No data	

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**Table 8-1. Regulations and Guidelines Applicable to Jet Fuels**

Agency	Description	Information	Reference
<b>NATIONAL</b> (cont.)			
b. Water			
EPA	Designated as hazardous substances in accordance with Section 311(b)(2)(A) of the Clean Water Act	No data	EPA 2013d 40 CFR 116.4
	Drinking water contaminant candidate list	No data	EPA 2009a 74 FR 51850
	Drinking water standards and health advisories	No data	EPA 2012b
	National primary drinking water standards	No data	EPA 2009b
	National recommended water quality criteria	No data	EPA 2014e
	Reportable quantities of hazardous substances designated pursuant to Section 311 of the Clean Water Act	No data	EPA 2013f 40 CFR 117.3
c. Food			
FDA	EAFUS <sup>f</sup>	No data	FDA 2014
d. Other			
ACGIH	Carcinogenicity classification (kerosene/jet fuels)	A3 <sup>g</sup>	ACGIH 2013
EPA	Carcinogenicity classification	No data	IRIS 2015
	RfC	No data	
	RfD	No data	
	Identification and listing of hazardous waste	No data	EPA 2013e 40 CFR 261, Appendix VIII
	Inert pesticide ingredients applied to animals exemptions from the requirement of a tolerance	Yes	EPA 2014b
	Master Testing List	No data	EPA 2014c
	RCRA waste minimization PBT priority chemical list	No data	EPA 1998 63 FR 60332
	Standards for owners and operators of hazardous waste TSD facilities; groundwater monitoring list	No data	EPA 2013g 40 CFR 264, Appendix IX
	Superfund, emergency planning, and community right-to-know		
	Designated CERCLA hazardous substance and reportable quantity	No data	EPA 2013h 40 CFR 302.4
	Superfund, emergency planning, and community right-to-know		
	Effective date of toxic chemical release reporting	No data	EPA 2013j 40 CFR 372.65

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Agency	Description	Information	Reference
<b>NATIONAL</b> ( <i>cont.</i> )			
EPA	Extremely hazardous substances and its threshold planning quantity	No data	EPA 2013i 40 CFR 355, Appendix A
	TSCA chemical lists and reporting periods	No data	EPA 2013a 40 CFR 712.30
	TSCA health and safety data reporting	No data	EPA 2013b 40 CFR 716.120
NTP	Carcinogenicity classification	No data	NTP 2011

<sup>a</sup>Group 3: Not classifiable as to its carcinogenicity to humans.

<sup>b</sup>As total hydrocarbon vapor for kerosene/jet fuels. Application restricted to conditions in which there are negligible aerosol exposures.

<sup>c</sup>Skin designation: refers to the potential significant contribution to the overall exposure by the cutaneous route, including mucous membranes and the eyes, by contact with vapors, liquids, and solids (ACGIH 2013).

<sup>d</sup>PAC-1: mild, transient health effects; PAC-2: irreversible or other serious health effects that could impair the ability to take protective action; PAC-3: life-threatening health effects (DOE 2012).

<sup>e</sup>Not recommended due to insufficient data.

<sup>f</sup>The EAFUS list of substances contains ingredients added directly to food that FDA has either approved as food additives or listed or affirmed as GRAS.

<sup>g</sup>A3: confirmed animal carcinogen with unknown relevance to humans.

ACGIH = American Conference of Governmental Industrial Hygienists; AEGL = acute exposure guideline levels; AIHA = American Industrial Hygiene Association; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; CFR = Code of Federal Regulations; DOE = Department of Energy; EAFUS = Everything Added to Food in the United States; EPA = Environmental Protection Agency; ERPG = emergency response planning guidelines; FDA = Food and Drug Administration; FR = Federal Register; GRAS = generally recognized as safe; IARC = International Agency for Research on Cancer; IDLH = immediately dangerous to life or health; IRIS = Integrated Risk Information System; NAAQS = National Ambient Air Quality Standards; NIOSH = National Institute for Occupational Safety and Health; NR = not recommended; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PAC = protective action criteria; PBT = persistent, bioaccumulative, and toxic; PEL = permissible exposure limit; RCRA = Resource Conservation and Recovery Act; REL = recommended exposure limit; RfC = inhalation reference concentration; RfD = oral reference dose; TLV = threshold limit values; TSCA = Toxic Substances Control Act; TSD = treatment, storage, and disposal; TWA = time-weighted average; USC = United States Code; WHO = World Health Organization