International Civil Aviation Organization

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WORKING PAPER

DANGEROUS GOODS PANEL (DGP)
MEETING OF THE WORKING GROUP OF THE WHOLE

Memphis, 30 April to 4 May 2007

Agenda Item 3: Development of recommendations for amendments to the *Supplement to the Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2009/2010 Edition

IDENTIFICATION OF TOXIC BY INHALATION LIQUIDS IN THE SUPPLEMENT

(Presented by R. Richard)

SUMMARY

This paper invites the DGP-WG to consider amending the Supplement to identify liquids which pose an inhalation hazard.

Action by the DGP-WG is in paragraph 2.

1. INTRODUCTION

1.1 At its previous Working Group of the Whole meeting, the Panel considered a proposal to identify materials in the Supplement which are toxic by inhalation. There was general support for the proposal, however it was agreed that a revised proposal should be submitted on the basis of comments received.

1.2 This proposal contains a revised listing of toxic by inhalation liquids with supporting data (see appendix). Gases are no longer proposed to be identified in the supplement as their classification within Division 2.3 readily identifies the inhalation hazard. In the appendix, the "RTECS" column provides the identification number corresponding to the substance's listing within the Registry of the Toxic Effects of Chemical Substances. In addition, the substance's lethal concentration (LC_{50}) and saturated vapour concentration (SVC) are shown. The "Notes" column provides information for materials classified on the basis of human experience or by analogy to like substances. All materials are known to pose a severe inhalation risk and are currently forbidden from transport on both passenger and cargo aircraft in Table 3-1.

2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to identify Toxic by Inhalation Substances in the Supplement by assigning a Special Provision to the applicable entries as follows:

2XX	This substance is toxic by inhalation.

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APPENDIX

LIST OF TOXIC BY INHALATION LIQUIDS

UN#	Name	Class	PG	SR	RTECS	LC50 (ppm)	SVC (ppm)	Notes
1541	Acetone cyanohydrin, stabilized	6.1			OD9275	--	13200	Decomposes to acetone and highly toxic hydrogen cyanide at room temperatures.
1092	Acrolein, stabilized	6.1		3	AS1050	25	289000	
1098	Allyl alcohol	6.1		3	BA5075	253	26000	
1722	Allyl chloroformate	6.1		3, 8	LQ5775	61	20400	
2334	Allylamine	6.1		3	BA5425	590	261000	
1560	Arsenic trichloride	6.1			CG1750	--	11500	Capable of forming highly toxic arsine gas. Explosion hazard in dust form when exposed to flame.
2692	Boron tribromide	8			ED7400	--	73700	Decomposes to highly toxic hydrogen bromide at high temperatures. Fire and explosion may result in contact with water, steam, or alcohol.
1745	Bromine pentafluoride	5.1		6.1, 8	EF9350	--	453000	Decomposition produces highly toxic hydrogen fluoride and hydrogen bromide. Contact with combustibles produces fire or explosion. Contact with water produces explosion.
1746	Bromine trifluoride	5.1		6.1, 8	EF9360	50	9200	
1569	Bromoacetone	6.1		3	UC0525	--	11900	Decomposition produces highly toxic hydrogen bromide.
2743	n-Butyl chloroformate	6.1		3, 8	LQ5890	--	9870	As with all chloroformates, decomposition produces toxic gases.
2485	n-Butyl isocyanate	6.1		3	NQ8250	105	13900	
2484	tert-Butyl isocyanate	6.1		3	NQ8300	22	19700	
1695	Chloroacetone, stabilized	6.1		3, 8	UC0700	262	41900	
2668	Chloroacetonitrile	6.1	II	3	AL8225	--	13200	Decomposes to produce toxic and flammable vapors including hydrogen cyanide. Reacts with strong oxidants, reducing agents, acids, bases, steam, producing highly toxic and flammable fumes.
1752	Chloroacetyl chloride	6.1		8	AO6475	660	24600	

UN#	Name	Class	PG	SR	RTECS	LC50 (ppm)	SVC (ppm)	Notes
2232	2-Chloroethanal	6.1			AB2450	160	24300	
1580	Chloropicrin	6.1			PB6300	--	26100	Decomposes to form toxic gases including oxides of nitrogen, chlorine and carbon monoxide. Extremely noxious with an odor threshold of only 1.1 ppm.
1754	Chlorosulphonic acid (with or without sulphur trioxide)	8			FX5730	16	1320	
1143	Crotonaldehyde, stabilized	6.1		3	GP9499	93	42100	
2488	Cyclohexyl isocyanate	6.1		3	NQ8650	15	2170	
2521	Diketene, stabilized	6.1		3	RQ8225	551	10500	
1595	Dimethyl sulphate	6.1		8	WS8225	17	1000	
2382	Dimethylhydrazine, symmetrical	6.1		3	MV2625	680	92000	
1163	Dimethylhydrazine, unsymmetrical	6.1		3, 8	MV2450	504	206000	
1182	Ethyl chloroformate	6.1		3, 8	LQ6125	145	55300	
2826	Ethyl chlorothioformate	8		3	LQ6950	138	10900	
1892	Ethyldichloroarsine	6.1			CH3500	36	2800	
1135	Ethylene chlorohydrin	6.1		3	KK0875	74	6450	
1605	Ethylene dibromide	6.1			KH9275	650	11300	
1185	Ethyleneimine, stabilized	6.1		3	KX5075	76	217000	
2646	Hexachlorocyclopentadiene	6.1			GY1225	3	100	
3294	Hydrogen cyanide, solution in alcohol with not more than 45% hydrogen cyanide	6.1		3	--			Concentrations of HCN solution up to 45% HCN may give off toxic HCN vapors.
1051	Hydrogen cyanide, stabilized containing less than 3% water	6.1		3	MW6825	40	842000	
1052	Hydrogen fluoride, anhydrous	8		6.1	MW7875	1300	1020000	
1994	Iron pentacarbonyl	6.1		3	NO4900	6	30300	
2407	Isopropyl chloroformate	6.1		3, 8	LQ6475	299	36800	
2483	Isopropyl isocyanate	3		6.1	NQ9230			
3079	Methacrylonitrile, stabilized	3		6.1	UD1400	656	84200	
3246	Methanesulphonyl chloride	6.1		8	--			Decomposition products include highly toxic chlorine gas.
2605	Methoxymethyl isocyanate	3		6.1	NQ9240	--	--	Decomposition products include toxic gases such as hydrogen cyanide, oxides of nitrogen and carbon monoxide. Classified by analogy to methyl isocyanate. Odorless at concentrations in air far above safe levels.

UN#	Name	Class	PG	SR	RTECS	LC50 (ppm)	SVC (ppm)	Notes
1647	Methyl bromide and ethylene dibromide mixture, liquid	6.1			PA5300	--	--	Methyl bromide is a Division 2.3 gas and ethlene dibromide is a toxic by inhalation liquid with an LC_{50} of 650 and an SVC of 11300. Mixtures of any ratio will be toxic by inhalation.
1238	Methyl chloroformate	6.1		3, 8	FG3675	88	135000	
1239	Methyl chloromethyl ether	6.1		3	KN6650	160	210000	
3023	2-Methyl-2-heptanethiol	6.1		3	MJ1500	102	5000	
2644	Methyl iodide	6.1			PA9450	448	414000	
2480	Methyl isocyanate	6.1		3	NQ9450	22	458000	
2477	Methyl isothiocyanate	6.1		3	PA9625	635	27400	
2606	Methyl orthosilicate	6.1		3	VV9800	200	13300	
1251	Methyl vinyl ketone, stabilized	6.1		3, 8	EM9800	5	93400	
1244	Methylhydrazine	6.1		3, 8	MV5600	68	50300	
1259	Nickel carbonyl	6.1		3	QR6300	18	422000	
2032	Nitric acid, red fuming	8		5.1, 6.1	QU5900	134	55300	
1380	Pentaborane	4.2		6.1	RY8925	12	225000	
1670	Perchloromethyl mercaptan	6.1			PB0370	--	32900	Classification based on analogy with hydrogen sulfide and on human experience. Considered approximately 20 times more toxic than hydrogen sulfide. Exposure causes lacrimation, eye inflammation; nose, throat irritation; cough; dyspnea; deep breath pain, coarse rales; vomiting; pallor; tachycardia; acidosis; anuria.
2487	Phenyl isocyanate	6.1		3	DA3675	16	2470	
2337	Phenyl mercaptan	6.1		3	DC0525	66	1450	
1672	Phenylcarbylamine chloride	6.1			NJ6700	--	--	Classification is based on human experience. Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Decomposes to produce corrosive and toxic gases.
1810	Phosphorus oxychloride	8			TH4897	96	35500	
2740	n-Propyl chloroformate	6.1		3, 8	LQ6830	319	25500	
2482	n-Propyl isocyanate	6.1		3	NR0190	44	69700	
1809	Phosphorus trichloride	6.1		8	TH3675	208	125000	
1829	Sulphur trioxide, stabilized	8			WT4830	347	98700	

UN#	Name	Class	PG	SR	RTECS	LC50 (ppm)	SVC (ppm)	Notes
1834	Sulphuryl chloride	8			WT4870	131	142000	
1510	Tetranitromethane	5.1		6.1	PB4025	36	11000	
2474	Thiophosgene	6.1			XN2450	--	150000	Classification is based on human experience. May be fatal if inhaled, swallowed or absorbed through the skin. Causes burns. Severe skin, eye and respiratory irritant. Also reacts violently with water to produce toxic fumes.
1838	Titanium tetrachloride	8			XR1925	119	12800	
2442	Trichloroacetyl chloride	8			A07140	128	22700	
2438	Trimethylacetyl chloride	6.1		3, 8	AO7200	507	35500	

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