FOREWORD INTRODUCTION

1-METHOXYPROPANOL-2OL(PGME)

CAS N°: 107-98-2

SIDS Initial Assessment Report for 11th SIAM

(US, January 23-26, 2001)

Chemical Name: 1-Methoxypropan-2-ol (PGME)

CAS No: 107-98-2

Sponsor Country: U.S.A

National SIDS Contact Point in Sponsor Country:

Oscar Hernandez
Director, Risk Assessment Division
US EPA
Washington, DC 20460
202-260-1835

SIDS INITIAL ASSESSMENT PROFILE

CAS No.	107-98-2
Chemical Name	1-Methoxypropan-2-ol
Structural Formula	$CH_3OCH_2CHOHCH_3$

RECOMMENDATIONS

The chemical is currently of low priority for further work.

SUMMARY CONCLUSIONS OF THE SIAR

Human Health

Propylene Glycol Methyl Ether (PGME) exhibits low acute toxicity by the oral**,** dermal, and inhalation routes. The oral LD 50 ranges from 1,840 mg/kg in rabbits, 4,600 mg/kg in dogs, to >5,000 mg/kg in rats. Dermal LD 50 values were 13-14 gm/kg in rabbits. Inhalation LC 50 values were generally above 6,000 ppm for rats, mice, and guinea pigs. PGME is not a skin sensitizer or skin irritant, and was only slightly irritating to the eye. In repeated dose studies (11 days to six months) NOAELs of 300 ppm and higher have been observed in inhalation studies using rats, mice, rabbits, guinea pigs, and monkeys. Effects observed included sedation, hepatic changes, and decrease in body weight gain. NOAELs (oral) of 459.5 mg/kg and 919 mg/kg were observed in rat studies lasting 13 and 5 weeks, respectively. Observations included central nervous system (CNS) effects, enlarged livers and weight loss. In reproductive toxicity testing, effects observed at 3000 ppm appear to be related to decreased maternal body weights and secondary to general toxicity and nutritional stress. Decreased maternal body weights were also noted at 1000 ppm. The NOAELs observed in the two-generation study were 300 ppm for adults and 1,000 ppm for offspring. Studies in rats, mice, and rabbits showed that PGME was not teratogenic (two inhalation and three gavage studies with teratogenicity NOAELs of 3000 ppm and 800 to 2000 mg/kg, respectively). Commercial PGME is a mixture of two isomers (α and β). The β-isomer is metabolized to 2-methoxyproprionic acid; a known animal teratogen. Although commercially available PGME contains less than 0.5% of the β-isomer, for consistency with the earlier studies, the PGME tested in the animal studies described here was altered to contain approximately 2% of the β-isomer. The weight of the evidence indicates that PGME is not genotoxic. In a 2-year bioassay, there were no statistically significant increases in tumors in rats and mice. In humans, volunteers' eyes were slightly irritated at doses greater than 100 ppm for 1-2 hours; doses of 750 ppm were strongly irritating; and CNS depression was observed at 1,000 ppm. At 300 ppm, mild eye and nasal irritation occurred within 5 minutes and became intolerable after 1 hour. Human exposures to concentrations of PGME greater than 150 ppm are expected to be self-limiting due to irritation effects.

Environment

PGME is not persistent in the environment and is not expected to bioaccumulate in food webs.

The half-life of PGME in air is estimated to be 3.1 hours due to direct reactions with photochemically generated hydroxyl radicals. PGME is readily biodegraded under aerobic conditions. Although environmental monitoring data are not available for PGME, fugacity-based modeling indicates that PGME is likely to partition to water compartments in the environment (surface water, groundwater) with small to negligible amounts remaining in other environmental compartments (air, soil, sediment, and fish). Acute toxicity testing in fish, invertebrates, and algae indicate a very low order of toxicity with effect concentration exceeding 1,000 mg/L. Using an assessment factor of 100 for the fish 96 hour LC 50 of 20,800 mg/L, a PNEC of 208 mg/L was derived.

Exposure

Approximately 100,000 to 500,000 tons of PGME are produced worldwide each year. Within the US, approximately 145 million pounds of PGME were produced in 1999 (Appendix A). According to the Chemical Economics Handbook (SRI International), in the USA, a production volume of 165 million pounds of PGME is estimated for 2000. In 1995, approximately 420 million pounds (190,000 metric tons) were produced worldwide with an estimated annual growth rate of 0.7% - 2.0% according to producer specification. Commercially available PGME contains less than 0.5% of the β-isomer as is required by European Union labeling regulations. PGME is used in the manufacture of propylene glycol methyl ether acetate, as well as in a wide variety of industrial and commercial products, including paints, varnishes, inks, and cleaners. In the US, PGME is used as follows: 34% propylene glycol methyl ether acetate (PMA) production; 30% surface coatings; 23% cleaners; 7% adhesives/electronics; and 6% inks. Exposures to PGME are likely to occur for workers and consumers. Inhalation exposures to relatively high concentrations of PGME are believed to be self-limiting due to the irritant effects of the chemical. Use of protective gloves to minimize absorption is recommended when prolonged dermal exposures to PGME are anticipated.

NATURE OF FURTHER WORK RECOMMENDED

No recommendation.

FULL SIDS SUMMARY

CAS NO: 107-98-2 PGME		SPECIES	PROTOCOL	RESULTS
PHYSICAL-CHEMICAL				
2.1	Melting Point			-95, -97°C
2.2	Boiling Point			120°C (at kPa)
2.3	Density			0.92 g/cm^3
2.4	Vapour Pressure			11.5 hPa at 20°C
2.5	Partition Coefficient (Log K_{ow})			-0.437
2.6 A.	Water Solubility			200 g/l at 20°C
B.	pH			No data
	pKa			No data
2.12	Oxidation: Reduction Potential			No data
ENVIRONMENTAL FATE AND PATHWAY				
3.1.1	Photodegradation		Measured	In air $T_{1/2}$ = 3.1hour (direct)
			Calculated	24.5 hours (indirect)
3.1.2	Stability in Water			Stable under practical use conditions
3.2	Monitoring Data			No data
3.3	Transport and Distribution		Calculated	
			(Fugacity Level 1 type)	In Air 9.41%
				In Water 90.58%
				In Sediment 0.1%
				In Soil 0.01%
				In Biota 0.0%
			(local exposure)	
3.5	Biodegradation			Water: 90%after 29 days
ECOTOXICOLOGY				
4.1	Acute/Prolonged Toxicity to Fish	*Leuciscus idus*	Static	LC_{50} (96 hr) =4600-10000 mg/l
		Pimephales promelas	Static	LC_{50} (96 hr) =20800 mg/l
4.2	Acute Toxicity to Aquatic Invertebrates	*Daphnia magna*	Static	EC_{50} (48 hr) =>500 mg/l,
	Daphnia	*Daphnia magna*		EC_{50} (48 hr) =>23300 mg/l,
4.3	Toxicity to Aquatic Plants e.g. Algae	*Selenastrum capricornum*	Growth	EC_{50} (7 days) = >1000mg/l
				NOEC (7 days) = 1000mg/l
4.5.2	Chronic Toxicity to Aquatic Invertebrates (*Daphnia*)			No data

CAS NO: 107-98-2 PGME		SPECIES	PROTOCOL	RESULTS		
4.6.1	Toxicity to Soil Dwelling Organisms			No data		
4.6.2	Toxicity to Terrestrial Plants			No data		
(4.6.3)	Toxicity to Other Non-Mammalian Terrestrial Species (Including Birds)			No data		
TOXICOLOGY						
5.1.1	Acute Oral Toxicity	Rat	Oral (1 d)	LD_{50} =	6100	mg/Kg
		Rat	Oral (1 d)	LD_{50} =	5710	mg/Kg
		Rat	Oral (1 d)	LD_{50} =	5200	mg/Kg
		Rat	Oral (1 d)	LD_{50} =	>5000	mg/Kg
		Rat	Oral (1 d)	LD_{50} =	5900	mg/Kg
		Mouse	Oral (1 d)	LD_{50} =	10800	mg/Kg
		Rabbit	Oral (1 d)	LD_{50} =	5300	mg/Kg
		Rabbit	Oral (1 d)	LD_{50} =	>1840	mg/Kg
		Dog	Oral (1 d)	LD_{50} =	9000	mg/Kg
		Dog	Oral (1 d)	LD_{50} =	4600-5500	mg/Kg
		Cat	Oral (1 d)	LOEL =	1840	mg/Kg
5.1.2	Acute Inhalation Toxicity	Rat	Inhalation	LC_0 =	>7559	ppm
		Rat	Inhalation	LC_0 =	18200	mg/m^3
		Rat	Inhalation	LC_0 =	36400	mg/m^3
		Rat	Inhalation	LC_0 =	1000	ppm
		Rat	Inhalation	LC_{50} =	54600	mg/m^3
		Rat	Inhalation	LC_{50} =	>6000	mg/m^3
		Rat	Inhalation	LCL_0 =	25500	mg/m^3
		Rat	Inhalation	LC_{50} =	>24000	mg/m^3
		Rat	Inhalation	LC_{50} =	36400	mg/m^3
		Mouse	Inhalation	LC_{50} =	<6038	ppm
		Rabbit`	Inhalation	LCL_0 =	54600	mg/m^3
		Guinea pig	Inhalation	LC_0 =	18750	mg/m^3
		Guinea pig	Inhalation	LC_{50} =	54600	mg/m^3
		Guinea pig	Inhalation	LC_0 =	36400	mg/m^3
5.1.3	Acute Dermal Toxicity	Rabbit	Dermal	LD_{50} =	13000	mg/Kg
		Rabbit	Dermal	LD_{50} =	14100	mg/Kg

CAS NO: 107-98-2 PGME		SPECIES	PROTOCOL	RESULTS		
5.4	Repeated Dose Toxicity	Rat	Inhalation (6 mo)	NOEL =	1500	ppm
		Rat	Inhalation (13 wk)	NOEL =	300	ppm
		Rat	Inhalation (13 wk)	NOEL =	1000	ppm
		Mouse	Inhalation (13 wk)	NOEL =	300	ppm
		Rat	Inhalation (11 d)	NOEL =	1000	ppm
		Rat	Inhalation (2 wk)	NOEL =	5000	ppm
		Mouse	Inhalation (2 wk)	NOEL =	<3000	ppm
		Rat	Oral (13 wk)	NOEL =	<459.5	mg/kg-day
		Rat	Oral (5 wk)	NOEL =	919	mg/kg-day
		Rabbit	Inhalation (6 mo)	NOEL =	>800	ppm
		Rabbit	Inhalation (13 wk)	NOEL =	1000	ppm
		Rabbit	Dermal (90 d)	NOEL =	2	mL/kg
		Rabbit	Dermal (3 wk)	NOEL =	<1000	mg/kg
		Guinea pig	Inhalation (6 mo)	NOEL =	>3000	ppm
		Mouse	Inhalation (11 d)	NOEL =	1000	ppm
		Monkey	Inhalation (6 mo)	NOEL =	800	ppm
		Dog	Oral (14 wk)	NOEL =	<459.5	mg/kg-day
5.5	Genetic Toxicity In Vitro					
A.	Bacterial Test	*S. typhimurium*	w/ & w/o activation	-/-		
	(Gene mutation)	*S. typhimurium*	w/ & w/o activation	-/-		
		S. typhimurium	w/ & w/o activation	-/-		
B.	Non-Bacterial In Vitro Test	Rat hepatocytes	w/o activation	-		
		Chinese hamster lung (V79) cells	w/o activation	-		
			w/o activation	weakly positive		
		Chinese hamster lung (V79) cells	w/o activation	-		
		Chinese hamster ovary cells	w/o activation	-		
			w/o activation	-		
		Chinese hamster lung (V79) cells	w/o activation	+		
		Chinese hamster lung (V79) cells	w/o activation	-		
		Chinese hamster lung (V79) cells				
		Syrian hamster embryo cells				
5.6	Genetic Toxicity In Vivo	Mouse	IP (1 d)	-		

CAS NO: 107-98-2 PGME		SPECIES	PROTOCOL	RESULTS
5.7	Carcinogenicity	Rat	Inhalation (2-years)	NOEL = 300 ppm
		Mouse	Inhalation (2-years)	NOEL = 300 ppm
5.8	Toxicity to Reproduction	Mouse	Oral (2-generation)	NOEL =1% d.w. (~500 mg/kg-day, Repro. Tox. parental) NOEL =1% d.w. (~500 mg/kg-day, Repro. Tox. F1 gen.) NOEL =1% d.w. (~500 mg/kg-day, Repro. Tox. F2 gen.)
		Rat	Inhalation (2-generation)	NOEL =300 ppm. (Repro. Tox. parental) NOEL =1000 ppm (Repro. Tox. F1 gen.) NOEL =1000 ppm (Repro. Tox. F2 gen.)
		Rat	Inhalation (1-generation)	NOEL >600 ppm. (Repro. Tox. parental) NOEL >600 ppm (Repro. Tox. F1 gen.)
5.9	Developmental Toxicity/ Teratogenicity	Rat	Inhalation (21 d)	NOEL = 1500 ppm (General toxicity) NOEL = 3000 ppm (Foetal effects)
		Rabbit	Inhalation (29 d)	NOEL = 1500 ppm (General toxicity) NOEL = 3000 ppm (Foetal data)
		Rat	Oral (21 d)	NOEL = 0.8 mg/kg-day (General toxicity) NOEL = 0.8 mg/kg-day (Foetal data)
		Mouse	Oral (18 d)	NOEL = 2 ml/kg (1,840 mg/kg, General toxicity) NOEL = 2 ml/kg (1,840 mg/kg, Foetal effects)
		Rabbit	Oral (18 d)	NOEL = 1 ml/kg (920 mg/kg, General toxicity) NOEL = 1 ml/kg (920 mg/kg, Foetal data)
5.11	Experience with Human Exposure	Human	Inhalation (1 d)	Odor threshold = 10 ppm LOEL = 100 ppm (irritation) LOEL = 1000 ppm (CNS depression)

SIDS Initial Assessment Report

1.0 IDENTITY

1-Methoxypropan-2-ol (107-98-2), also known as propylene glycol monomethyl ether (PGME), is a liquid that possesses the following physical-chemical properties and characteristics:

Property	Value
Chemical Formula	$CH_3OCH_2CHOCH_3$
Molecular Weight	90.1 g/mol
Purity	>99%
Impurities	Beta-isomer (<0.5%)
Melting Point	-95, -97°C
Boiling Point	120°C
Density	0.92 g/cm^3
Vapor Pressure	11.5 hPa at 20°C
Partition Coefficient (Log K_{ow})	-0.437
Water Solubility	200 g/l at 20°C (miscible)
Odor Threshold	10 ppm
Synonyms	1-methoxy-2-hydroxypropane, 1-methoxy-2-propanol, 1-methoxypropanol-2, 2-methoxy-1-methylethanol, 2-propanol-1-methoxy, propylene glycol monomethyl ether, propylene glycol methyl ether, PM, Arcosolv PM, PM glycol ether, DOWANOL® PM, methoxypropanol, methyl PROXITOL®, PGME, DOWANOL® PM glycol ether, Propasol solvent, Solvent M, Poly-Solv MPM Solvent

2.0 GENERAL INFORMATION ON EXPOSURE

Production Volume

Within the U.S., approximately 145 million pounds of PGME were produced in 1999 (Appendix A). According to the Chemical Economics Handbook (SRI International), in the US a production volume of 165 million pounds of PGME is estimated for 2000. In 1995 approximately 420 million pounds (190 thousand metric tons) of PGME were produced worldwide with an estimated annual growth rate of 0.7%- 2.0%. Commercially available PGME contains less than 0.5% of the β-isomer, as is required by European Union labeling regulations.

Uses and Functions

PGME is used primarily in the chemical, agricultural, automotive, paint, lacquer, and varnish industries. Its predominant use is as a solvent in various manufacturing processes, but it is also used as an intermediate in the production of propylene glycol monomethyl ether acetate. In the U.S., approximately 30%, 23%, 6%, 7%, and 34% of the PGME produced is used for surface coatings, cleaners, inks, adhesives/electronics, and propylene glycol methyl ether acetate (PMA) production, respectively (Appendix A). The current EU classification is R10.

Form of Marketed Product

A survey of approximately 150,000 products in Switzerland revealed 2,334 (1.5%) that contained PGME. The majority of these products may contain 1-10%, however some products contain as much as 10-50% PGME (Appendix A; Dentan *et al.*, 2000). A more detailed list of products and their PGME content from Dentan *et al.* (2000) is provided in the SIDS Dossier for PGME. A survey performed by the INRS between 1993 and 1999 indicates that 1-methoxypropan-2-ol is contained in 316 preparations (0 in perfumes products, 3 in oven cleaners, 9 in surface cleaning products, 2 in detergents, 0 in, phytosanitary products). Data provided by the Fédération des Industries de la Parfumerie (1999) show that 1-methoxypropan-2-ol is used as solvent at a maximum level of 10% and 20% in capillary tinting and nail-varnish remover, respectively.

In the Swedish Products Register (1999)a quanitity of 4224 tons was produced of which 82 out of 894 products were available for consumer uses.

Sources of Release to the Environment

For two manufacturers in Germany, releases of PGME into the atmosphere were estimated to be 1.2 and 3 tons/year during production, processing, and use (BUA, 1997). Additionally, one of the German manufacturers directed 2.1 tons/year to a wastewater treatment plant. For the other manufacturer, 10-16 tons/year were released into the Rhine River during production, processing, and use. Approximately 7-9 tons/year of wastes are disposed of by incineration.

2.1 Environmental Exposure and Fate

The vapor density of PGME is approximately 3-fold greater than air (3.11), with a vapor pressure of 11.5 hPa @ 20º C (Dow Europe SA, 1993) or 0.015 atm. Given its solubility limits and its molecular weight of 90.1 g/mole, a Henry's law constant can be calculated to range from 6.76E-6 to 1.35E-5 atm-m^3/mole. In general, chemicals with a Henry's law constant greater than 1.0E-5 atm-m^3/mole, and a molecular weight less 200 g/mole are considered as volatile chemicals. As such, PGME may be considered volatile, but only marginally so.

A log K_{ow} value of -0.437 was calculated for PGME (Gonsior, 1990). This corresponds to a K_{ow} of 0.37. Octanol/water partitioning coefficient values in this range suggests that PGME would not be expected to move readily from water to soil, sediment, or biota. Similarly, PGME in these media would tend to move to surface water or groundwater if available. K_{OC} for PGME is reported as ranging between 0 and 50 (Gonsior, 1990). This range of soil/sediment partitioning values would indicate that PGME moves quickly and readily through soil to groundwater, with very little sorption to soil expected. A fugacity modeling evaluation (Gonsior, 1990) supports these partitioning predictions. At equilibrium, fugacity modeling predictions indicate that most of the chemical (90.58%) will partition to water, a small amount (9.41%) will remain in air, and negligible amounts (<1%) will partition to sediment, soil, biota, and suspended solids. However, the fugacity modeling does not take into consideration the degradative processes that PGME is subject to in the environment.

Once PGME vapors are exposed to sunlight they tend to degrade fairly quickly as a result of reactions with photochemically generated hydroxyl radicals. The half-life is reported to be 3.1 hours (Dilling *et al.*, 1976). The indirect photochemical hydroxyl radical reaction estimated half-life of 24.5 hours with an estimated rate constant of $1.57x10^{-11}$ cm^3/mol sec (Meylan and Howard 1993, Chemosphere 26:2293-2299) and assuming a hydroxyl radical concentration $0.5x10^6$ OH/cm^3.

PGME molecules in air would tend to adsorb to available rain and fog in the environment (Dilling *et al*., 1976).

The estimated rapid rate of PGME photodegradation and also the estimated partitioning of PGME in the aqueous environment (Gonsior, 1990) are not mutually exclusive results. Although environmental fate modeling has not been performed for this material, its rapid rate of biodegradation would suggest that this material would be present in only exceedingly small levels within the environment and would not constitute a significant hazard.

Several studies have been conducted to assess the biodegradation of PGME in water and treated sewage. Aerobic biodegradation in water was found to be 90% after 29 days (BASF, 1985). The inoculum was industrial and therefore regarded as adapted. Aerobic biodegradation in sewage was measured to be 96% after 28 days (Verschuuren, 1994). Anaerobic biodegradation in sewage was measured to be 38% after 81 days (30 day lag period) (Goodwin, 1998). A MITI-I test showed biodegradation of 88-92 % after 28 days (CITI, 1992). A study of biodegradation in soil was conducted that found half lives for concentrations between 0.2 ppm and 100 ppm in 3 distinct soil types (Londo sandy loam, Tappan sandy loam, and sand) to be between <1 and 56+ days indicating that the half-life is highly dependent upon soil conditions (Gonsior and West, 1995). Half-life was shortened when soil (sand) contained additional microorganism nutrients. Loss of PGME in soil due to biodegradation may be idealized by the study since the chemical is so apt to leach to water, biodegradation in soil may have little opportunity to take place (Gonsior and West, 1995).

2.2 Human Exposure

PGME is used as an intermediate in propylene glycol monomethyl ether acetate production in the chemical industry and as a solvent in the agricultural (pesticides) and paint, lacquer, and varnish industries. It is widely used in industrial, commercial, automotive, and household cleaners. As such, inhalation and dermal exposures occur in worker and consumer populations. In addition, indirect exposures via the environment (*i.e.,* ingestion of surface water) are also possible. Each of these exposure scenarios is discussed below.

Occupational Exposure

The primary occupational exposure to PGME is through inhalation of vapors or via dermal contact. Occupational exposure levels at facilities that produce PGME have been reported to range from 2 mg/m^3 (during disposal) to 51 mg/m^3 (for internal users) (BASF AG, 1979-1994). At a German manufacturing plant for brake cables, concentrations of 11.3 to 82.2 mg/m^3 were detected in workplace air (BUA, 1997). For workplace air concentrations in Norway, levels exceeding 3.7 mg/m^3 were found in 419/687 samples (BUA, 1997). Furthermore, levels exceeding 368 mg/m^3 were found in only a small number of samples (5/687). Concentrations ranging from 20-40 ppm (74-147 mg/m3) were reported for workers cleaning a vat containing PGME (Devanthery *et al.* 2000).

Occupational exposure limits (ELs) for PGME are listed below for several countries.

Exposure Limit (Country)	(mg/m^3)	(ppm)
PEL-TWA (USA)	370	100
TLV-STEL (USA)	553	150
ILV (EU)	370	100
OES (UK)	370	100
MAC (NL)	370	100
MAK (DE)	370	100

An evaluation of a worker's potential daily dermal dose of PGME is presented in Appendix B. Theoretical dermal doses for a worker ranged from 0.48 to 22.7 mg/kg-day. For brief contact with PGME, no precautions other than safety glasses and clean body-covering clothing are necessary. If prolonged or repeated exposures are expected, gloves impervious to PGME should be worn.

Consumer Exposure

Consumer products containing PGME include (Appendix A; Dentan *et al.* 2000):

- floor cleaners, floor polish and related products;
- paints, lacquers, varnishes, and miscellaneous paint-related products;
- nonstructural caulking compounds and sealants;
- synthetic resin and rubber adhesives;
- pesticides;
- automotive cleaners;
- dyes and inks;
- glass window cleaning preparations;
- oven cleaners;
- household hard surface cleaners;
- household rug and upholstery cleaners;
- laundry aids (*e.g.,* ironing aids, dry cleaning spotting preparations); and
- specialty cleaning and sanitation products (*e.g.,* swimming pool cleaners).

The highest exposures to consumers are likely to be associated with the use of paints and varnishes that contain PGME. In Finland, air concentrations ranging from 37 to 232 mg/m^3 were detected during varnishing work (BUA, 1997). Air concentrations of 2 to 26 mg/m^3 were detected in rooms recently painted with water-based paints. Levels of 0.06 mg/m^3 were detected in indoor air arising from building materials (BUA, 1997). An evaluation of a consumer's potential daily dermal dose of PGME is presented in Appendix B. Theoretical dermal doses for a consumer ranged from 0.005 to 0.45 mg/kg-day.

Indirect Exposure via the Environment

Theoretical surface/groundwater concentrations of 0.23-2.3 mg/L were calculated for PGME using fugacity-based fate and transport modeling (see Appendix B). Under the conservative assumption that individuals use untreated river or ground water as their sole source of drinking water, doses of 0.0066-0.066 mg/kg-day were estimated. Because PGME does not bioconcentrate, potential exposure via consumption of fish is anticipated to be negligible.

3.0 HUMAN HEALTH HAZARDS

3.1 Effects on Human Health

Toxicokinetics and Metabolism

Workers exposed to 20-40 ppm PGME for 5 hours had concentrations of 2-8 mg/L PGME appear in their urine, of which 40-60% was in conjugated form (sulfate and glucuronide) (Devanthery *et al.*, 2000). Rats were given a single oral dose of radiolabeled PGME and within 48 hours 50-60% of the label was excreted as CO2 in expired air and 20% was excreted in urine as the glucuronide

conjugate, sulfate conjugate, and propylene glycol (Miller *et al*., 1983). Following 10 six-hour inhalation exposures (3,000 ppm), PGME was completely eliminated in rats 24 hours after the last exposure (Margot and Nolan, 1987). In mice, PGME was readily absorbed and metabolized to propylene glycol following oral gavage with maximum concentrations of PGME and propylene glycol in plasma attained in 20 and 30 minutes following dosing, respectively (Ferrala *et al.*, 1994). In absorption tests with isolated human skin (abdominal epidermis), an absorption rate of 1.17 $mg/cm^2/hr$ was estimated for undiluted PGME (Dugard *et al.* 1984).

Acute Toxicity

Information available suggests that the acute toxicity of PGME is low. The oral LD_{50} value for PGME in experiments in rats ranges from > 5,000 to 6,100 mg/kg (BASF AG, 1964, 1979; Rowe *et al.*, 1954; Smyth *et al.*, 1941, 1962). Oral LD_{50} values from other animal experiments were 10,800 mg/kg for mice (Stenger *et al.*, 1972); 1,840 to 5,300 mg/kg for rabbits (BASF AG, 1985; Stenger *et al.*, 1972), and 4,600 to 9,000 mg/kg for dogs (Shideman and Puscita, 1951; Stenger *et al.*, 1972). Similarly, LC_{50} values were >6,000 to 54,600 mg/m^3 for rats (Gelbke, 1983; Rowe *et al.*, 1954; Smyth *et al.*, 1962); <6,038 to 7,559 ppm for mice (Cieszlak and Crissman, 1991), and 54,600 mg/m^3 for guinea pigs (Rowe *et al.*, 1954). When applied occluded to the skin of rabbits, the LD50 value was found to be in the range of 13-14 g/kg (Rowe et al., 1954; Smyth et al., 1962).

Irritation/Corrosiveness

In animal studies (rabbits), PGME was found to be non-irritating to the skin (BASF AG, 1979; Smyth *et al.*, 1962) and slightly irritating to the eye (BASF AG, 1979; Rowe *et al.*, 1954; Smyth *et al.*, 1962).

Skin Sensitization

PGME was found to be non-sensitizing in guinea pigs (Carreon and Wall, 1984).

Repeated Dose Toxicity

Subchronic animal studies have been conducted for PGME via inhalation, ingestion, and dermal contact, as summarized below:

Inhalation – Laboratory animals exposed to PGME via inhalation have reportedly developed central nervous systems effects (sedation), adaptive hepatic changes, and decreases in body weight gain. NOELs ranged from 300 to 5,000 ppm in experiments in rats lasting 11 days to 6 months (Cieszlak *et al.*, 1996; Goldberg *et al.*, 1964; Landry *et al.*, 1983; Miller *et al.*, 1981; Rowe *et al.*, 1954). For mice, NOELs ranged from 300 ppm to 1,000 ppm in experiments lasting 11 days to 13 weeks (Cieszlak *et al.*, 1996; Miller *et al.*, 1981). In experiments in rabbits lasting 6 months and 13 weeks, NOELs of > 800 ppm and 1,000 ppm were observed, respectively (Landry *et al.*, 1983; Rowe *et al.*, 1954). In 13-week inhalation studies, rats and rabbits exhibited slight transient CNS depression at 3000 ppm but not at 1000 ppm. Rats exhibited minimal changes in liver weights at 3000 ppm in the absence of degenerative changes (Landry et al., 1983). In more recent studies (DOW unpublished, 1996), 3000 ppm of PGME (6 h/d, 13 weeks) produced sedation during the first week of exposure but declined in subsequent weeks. Hepatic mixed function oxidase activity and hepatocellular proliferation were increased at 3000 ppm and, to some extent, at 3000 ppm in these studies. Mild degenerative changes in the livers of rats exposed to 3000 ppm were correlated with the male rat specific alpha-2-micro-globulin deposition. This was accompanied by minimal nephropathy in male rats. Male and female B6C3F1mice displayed a similar hepatic cellular proliferation and hepatic

enzyme induction at 3000 ppm. In other inhalation studies lasting 6 months, NOELs of 800 ppm and > 3,000 ppm were observed for monkeys and guinea pigs, respectively (Rowe *et al.*, 1954).

- *Ingestion* Rats and dogs exposed to PGME by oral gavage administration (13 or 14 weeks in rats or dogs, respectively) displayed mild to severe CNS depression that was dose related. Livers in rats were enlarged at or above 1 mL/kg daily doses (919 mg/kg) and swelling was accompanied by cell necrosis. Mortality in rats was appreciable at a level of 4.0 mL/kg (Stenger et al., 1972). Rats receiving 26 doses of 1.0 mL/kg (NOEL) or less PGME over a 35-day period showed no ill effects (Rowe et al., 1954). In the same study, a dose rate of 3.0 g/kg/day produced only minor liver and kidney effects (LOAEL). However, the renal effects in rats appear to be due to an α2-microglobulin-mediated mechanism of action and therefore, are not relevant to humans.

- *Dermal Contact* – Laboratory animals dermally exposed to PGME have reportedly developed dermal effects (scaling, minimal inflammation, and skin thickening). Large dermal doses can produce narcosis and death. In two subchronic studies in which PGME was dermally applied to rabbits, NOELs of <1,000 mg/kg (3 weeks) and 2 mL/kg (90 days) were observed (Calhoun and Johnson, 1984; Rowe *et al.*, 1954). A NOEL of 1000 mg/kg was reported for systemic effects. Doses of 1 to 5 mL/kg in male rabbits were generally without effect. The LOEL of 4 mL/kg produced slight narcosis.

Reproductive Toxicity

Commercial PGME is a mixture of two isomers (α and β). The β-isomer is metabolized to 2-methoxyproprionic acid, a known animal teratogen. Although commercially available PGME contains less than 0.5% of the β-isomer, for consistency with the earlier studies, the PGME tested in the animal studies described here was altered to contain approximately 2% of the β-isomer. NOELs observed in a two-generation reproductive study on exposure to PGME via inhalation ranged from 300 ppm for adult rats to 1,000 ppm for offspring (Liberacki *et al.*, 1997, Carney *et al* 1999). Sedation and decreased body weight in adults was accompanied by lengthened estrous cycles, decreased fertility, decreased ovary weights and associated ovarian atrophy, reduced pup survival and litter size, slight delays in pubertal indices, and histological changes in the liver and thymus (in offspring) at the highest dose tested (3000 ppm). However, the nature of these effects and the close correlation with decreased maternal body weights suggest that these effects were secondary to general toxicity and/or nutritional stress. For oral exposures, a NOEL of 1% in drinking water in a two-generation reproduction study was reported (Chapin and Sloane, 1997). Reduced pup weights, and in the second generation reduced adult male body weights, and a decrease in epididymal and prostate weights were observed at the highest dose tested (2% in drinking water). In another study (Doe *et al*., 1983), male rats exposed to 200 or 600 ppm PGME via inhalation (6 hours/day for 10 days) showed no effects on the testes.

Developmental Toxicity/Teratogenicity

Studies in laboratory animals indicate that PGME is neither teratogenic nor fetotoxic when administered via inhalation or ingestion.

- *Inhalation* - In a study of rats exposed to PGME via inhalation, NOELs of 1,500 ppm (maternal), 1,500 ppm (teratogenic), and 3,000 ppm (fetotoxic) were observed (Hanley *et al.*, 1984). Effects observed in maternal animals at 3,000 ppm included mild transient central nervous system depression and decreased food consumption and body weight gains. No

teratogenic effects were observed at doses up to 3,000 ppm. PGME was slightly fetotoxic (delayed sternebral ossification) at concentrations of 3,000 ppm.

- *Ingestion* - No maternal toxicity, fetotoxicity, or teratogenicity were observed in rats, mice, and rabbits administered PGME via oral gavage. NOELs of 0.8 mL/kg, 2 mL/kg, and 1 mL/kg were observed for rats, mice, and rabbits, respectively (Stenger *et al.*, 1972). Only the rat fetus showed a developmental effect consisting of delayed ossification of the skull at the highest dose given (0.8 mL/kg). Similarly, these doses did not produce maternal or fetotoxicity in mice when administered by injection. In reproductive toxicity studies conducted by the NTP, Swiss CD-1 mice received PGME in the drinking water at 0.5, 1.0, and 2.0% (estimated intake of 0.95, 1.9 and 3.3 grams/kg/day).

Genetic Toxicity

PGME was not mutagenic in bacteria (*Salmonella typhimurium* TA 1535, TA 1537, TA 1538, TA 98, and TA 100), *in vitro* tests on mammalian cells, or in one *in vivo* test on mice. The weight of evidence would indicate the PGME is not genotoxic. However, PGME did appear to enhance genetic damage induced by methylmethane sulfonate in Chinese hamster lung (V79) cells. Cytotoxic effects are summarized below.

- *In Vitro* - Cytotoxic effects on liver cells of rats (detachment of cells and/or granular appearance) were observed at 0.0316 and 0.1 M (Mandrala, 1983). Effects on lung (V79) cells of Chinese hamsters included cell growth inhibition, slight increase in SCEs, and dose-dependent inhibition on intercellular communication (at non-cytotoxic levels) (Elias *et al.*, 1996). However, SCEs were only noted at very high concentrations, and the resulting dose-response correlation was weak. As such, these data are not convincing of a true genotoxic effect. PGME was not toxic to Chinese hamster ovary (CHO) cells at concentrations up to 5 mg/mL (Dow Europe SA, 1983). However, survival was decreased to 50% at 10 mg/mL.

- *In Vivo* - Concentrations up to 6,000 mg/kg administered to mice did not increase the frequency of micronuclei in polychromatic erythrocytes harvested from bone marrow (Elias *et al.*, 1996).

Carcinogenicity

Studies in laboratory animals indicate that PGME is not carcinogenic. Dose levels of 0, 300, 1000 and 3000 ppm were chosen for 2-yr chronic toxicity and carcinogenicity studies in both rats and mice. In the case of both species, the highest exposure concentration was chosen based on previous subchronic toxicity studies in which sedation, hepatic enzyme induction, and increased hepatic cellular proliferation were shown to occur. In a 2-year bioassay, no statistically significantly increases in tumors in any tissue were observed in male and female rats exposed to PGME via inhalation (Cieszlak *et al.*, 1998a). There were no increases in tumors in any tissue in a 2-year study of male and female mice exposed to PGME via inhalation (Cieszlak *et al.*, 1998b).

The use of NOAEL and LOAEL is not relevant to this section since no significant tumor response was recorded. In the case of non-tumor endpoints, the 300 ppm exposure level was established as an NOEL in rats based on liver effects and on kidney effects in male rats presumed to be due to alpha-2 micro-globulin nephropathy. A NOEL of 1000 ppm was established for mice based on an increased mortality in the high dose (3000 ppm) male group that may have been related to minimal liver toxicity. No histopathological changes of significance were noted in any tissues for mice.

Human Cases

In an inhalation experiment, volunteers' eyes were slightly irritated at doses greater than 100 ppm for 1 - 2 hours; doses of 750 ppm were strongly irritating; and central nervous system depression was observed at 1,000 ppm (Steward *et al.*, 1970). At 300 ppm, mild eye and nasal irritation occurred within 5 minutes and became intolerable after 1 hour. In another inhalation experiment, diethylether was used to minimize responses caused by odor from PGME (Emmen *et al.*, 1997). There were no objective eye irritation effects at doses of 100 and 150 ppm. Subjective effects were reported at 150 ppm. In a dermal experiment, exposure to PGME vapors in human volunteers was found to contribute less than 14% of the total absorbed dose (Jones, 1997). Based on these results, human exposures to concentrations of PGME greater than 150 ppm are expected to be self-limiting.

4.0 HAZARDS TO THE ENVIRONMENT

4.1 Aquatic Effects

In general, information on the aquatic toxicity of PGME is limited to acute studies. The available data for PGME indicate that acute toxicity to aquatic life may occur at concentrations greater than 1,000 mg/L. Results for fish, aquatic invertebrates, plants and algae and bacteria are summarized below.

- *Fish* - Two studies were identified which evaluated the toxicity of PGME to fish. In a study by Bartlett *et al*. (1981), fathead minnows (*Pimephales promelas*) were exposed to PGME in a static system for 96 hours. An EC_{50} (effect concentration for 50% of a test population) of 20,800 mg/L was reported. The effect observed at 20,800 mg/L was not reported. The second study (BASF AG, 1994) reported a no-observed-effect concentration of 4,600 mg/L for mortality effects for *Leuciscus idus* exposed to PGME in a static system for 98 hours. Using an assessment factor of 100 for the fish 96 hour LC 50 of 20,800 mg/L, a PNEC of 208 mg/L was derived.

- *Invertebrates* - Available data for the acute toxicity of PGME in aquatic invertebrates are given in the SIDS summary table. Two studies were identified which evaluated the toxicity of PGME to aquatic invertebrates, a single species (*Daphnia magna*) was evaluated. In a study by Bartlett *et al*. (1981*), Daphnia magna* were exposed to PGME in a static system for 48 hours. An EC_{50} of 23,300 mg/L was reported however; the effect observed was not reported. The second study, BASF AG (1988) reported a 48-hour unbounded no-observed-effect concentration or EC_0 for *Daphnia magna* at 500 mg/L.

- *Plant and Algae* - No data have been reported on the effects of PGME on freshwater or marine vascular plants. A single acute toxicity study for unicellular algae (*Selenastrum capricornutum*) was identified (Dill and Milazzo, 1988). Dill and Milazzo (1988) report an growth rate EC_{50} (effect concentration causing a reduction in growth to 50% of a test population) of greater than 1,000 mg/L for *Selenastrum capricornutum*.

- *Bacteria* - BASF (1983) and Dow Europe SA (1983) reported no-observed-effect concentrations or EC_0s of greater than 5,000 ug/plate agar and 6,250 ug/plate agar for *Salmonella typhimurium* bacteria, respectively. In another study (Klecka *et al*., 1985) a 3-hour IC_{50} (immobilization concentration) of greater than 1,000 mg/L was reported for an unnamed strain of bacteria present in an activated sludge material.

Model output from ECOSAR for PGME is listed below (expressed in mg/L):

Fish 96-hours LC50:	>1000 (Predicted)
Fish (FHM) 96-hours LC50:	20800 (Measured)
Daphnid 48-hour LC50:	>1000 (Predicted)
Daphnid 48-hour LC50:	23300 (Measured)
Green algal 7-day EC50:	>1000 (Measured)
Green algal 96-hour EC50:	>1000 (Predicted)
Aerobic bacteria 3-hour EC50:	>1000 (Measured)
Fish chronic value:	>1000 (Predicted)
Daphnid chronic value:	210 (Predicted)
Algal chronic value:	160 (Predicted)

4.2 Terrestrial Effects

No ecotoxicological data for PGME were identified for terrestrial wildlife (*i.e.*, birds and mammals) or other terrestrial organisms (*i.e.*, plants, invertebrates, bacteria etc.). However, given the low toxicity of PGME in laboratory animals (see Section 3.0), and the low potential for exposure in terrestrial compartments, significant toxicity in terrestrial organisms is unlikely.

4.3 Other Environmental Effects

The bioaccumulation potential of PGME is low. Organic chemicals having log K_{ow} values below 4 are not considered to be bioaccumulative (Connolly and Pederson, 1988; Thomann *et al*., 1992). A log K_{ow} value of -0.437 was calculated for PGME. This range of octanol:water partitioning coefficient values suggests that PGME would not be expected to accumulate in biological tissue or biomagnify in food chains.

5.0 CONCLUSIONS AND RECOMMENDATIONS

PGME is currently of low priority for further work.

This conclusion is supported by the fact that adequate SIDS level physical-chemical and toxicological data are available to characterize PGME. PGME is not persistent in the environment and is not expected to bioaccumulate in food webs. The toxicity of PGME is low for both aquatic and mammalian species. Although environmental monitoring data are not available for PGME, fugacity-based indicates that PGME is likely to partition to water compartments in the environment (surface water, groundwater) with small to negligible amounts remaining in other environmental compartments (air, soil, sediment, and fish). The theoretical concentrations achieved in the environment are generally below levels associated with potential adverse health effects in humans and aquatic species. Since PGME has a fairly short half-life in the environment, these theoretical levels are not expected to persist.

PGME is used in a wide variety of industrial and commercial products, primarily for paints, varnishes, and inks. Although exposures to PGME are likely to occur for workers and consumers, these exposures are predicted to be below levels associated with adverse health effects. Exposures to relatively high concentrations of PGME are believed to be self-limiting due to the irritational effects of the chemical. Use of protective gloves to minimize absorption is recommended when prolonged dermal exposures to PGME are anticipated.

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Appendix A. Production and Use Information for PGME Provided by the American Chemistry Council Propylene Glycol Ethers Panel

	1999 Production Volume	Types of Commercial End Products	Percent Production	Industrial/ Commercial Percentage Use if Known	In Product Types Approx Weight Fraction
Propylene glycol methyl ether	145 million pounds	Surface coatings	30%		2 - 20%
		Cleaners	23%		2 - 50%
107-98-2 (a-isomer)		Inks	6%		2 - 30%
1589-47-5 (ß-isomer <0 5%)		Misc	7%*	100/0	
1320-67-8 (mixture)		PMA Production	34%	100/0	
28677-93-2 (mixture)					

* Miscellaneous includes adhesives and electronics

Appendix B. Evaluation of Potential Exposures to PGME

B.1 Predicted Environmental Concentration (PEC)

Monitoring data for the levels of PGME in the environment are not available. However, the fate and transport of PGME may be estimated based on physio-chemical and environmental parameters that are known (through researched measurements) or estimated (by guidance or professional judgement). The model used in this evaluation is the *Level 1 Model-Version 2.1* developed by the Environmental Modeling Centre at Trent University, Ontario, Canada. The source code for the model is based on the publication *Multimedia Environmental Models: The Fugacity Approach* (Mackay, 1991). For this modeling effort, PGME was assumed to be non-reactive and stable in the environment. The PGME was assumed to migrate, instantaneously, into one or more physical phases of the environment under equilibrium partitioning constraints. These partitioning constraints are influenced and governed by several bulk physical properties, whose measured or approximated values are specific to PGME. The partitioning of PGME is based on calculated values called fugacity capacities, in units of mol/m^3 pascals, that quantifies a chemical specific value, representative of a chemicals tendency to change or migrate between environmental media.

Physical-chemical parameters (and their units) used as input into the Level 1 model are:

- Molecular Mass: 90.1 g/mol
- Data Temperature: 20 C
- Log K_{ow}: -0.44 (unitless)
- Water solubility: 200,000 g/m^3
- Vapor Pressure: 1.15 Pa
- Melting Point: -97 C

Environmental compartments used in the modeling include air, water, soils, sediments, suspended aquatic matter, aquatic biota and aerosol (Mackay, 1991). The generic environmental area of effect is assumed to be 100,000 Km^2 (Mackay and Paterson, 1991). The following parameters are default values suggested by the modeling guidance (Mackay, 1991, Mackay and Paterson, 1991).

- Atmospheric height is assumed to be 1000 m (*i.e.* the affected troposphere.)
- Water surface area is assumed to be 10% of the total area (10,000 km^2). The water depth is assumed to be 20 m.
- Partitioning into the soil is assumed to be homogeneous to a depth of 10 cm. Soil is assumed to be 2% organic carbon.
- Sediment is assumed to be 1 cm deep and equivalent in top surface area to water. Sediment is assumed to be 4% organic carbon.
- Suspended aquatic matter is assumed to be 20% organic carbon with a volume fraction of 5 $mg_{(suspended\ matter)}/L_{(water)}$.
- Aquatic biota, which are generally expressed as fish, are included at an arbitrary volume fraction of 10^{-6}. Fish are assumed to contain 5% lipid where lipid is considered a property similar to organic carbon in other media, with regard to solvent properties.
- Aerosol particles are assumed to occupy a total volume of 2000 m^3, an air volume fraction of 30 $ug_{(aerosol\ particles)}/m^3{}_{(air)}$.

Estimates of the annual quantity of PGME produced worldwide ranges from 100,000 to 500,000 tons (9.07E+07 to 4.54E+08 kg). The modeling predictions in this evaluation were based on 2 initial source concentrations.

- A worst case exposure scenario was based on a 500,000-ton source concentration (*i.e.,* assuming that all of the PGME produced per year is released within a single geographical area).
- A more reasonable, yet still conservative, case was based on a 50,000-ton source concentration (assuming 10% of the PGME produced per year is released within a single geographical area).

For both modeling runs, greater than 99.9% of the PGME released to the environment distributed to the water compartment. For this reason, exposure to PGME in other environmental compartments (soil, air, aerosols, sediment, suspended sediment, and fish) is considered to be negligible. For exposures to surface water, PECs of 0.23 mg/L and 2.3 mg/L were calculated for the conservative, most-likely case and worst-case modeling evaluations, respectively.

B.2 Assessment of Human Exposures

Assessment of Occupational Exposures

Exposure to PGME in the occupational setting can occur through inhalation or dermal exposure.

- *Inhalation Exposure* - Estimated human exposures (EHE) ranging 51 mg/m^3 to 368 mg/m^3 are considered to conservatively representative of potential occupational exposures.

- *Dermal Exposure* - EHEs ranging from 0.48 mg/kg-d to 22.7 mg/kg-d were calculated using the following equation based on U.S. Environmental Protection Agency (USEPA) guidance (1989):

$$Dermal\ Dose = \frac{\%PGME * ET * EF * ED * SA * AR}{AT * BW}$$

Where,

Dermal Dose	=	average daily dermal dose (mg/kg-day);
%PGME	=	percent PGME in product contacted by worker (10% and 50% assumed);
ET	=	exposure time (1 and 2 hours/day assumed);
EF	=	exposure frequency (125 and 250 days/year assumed);
ED	=	exposure duration (25 years as an upperbound for occupational tenure (EFH, 1996));
SA	=	surface area of exposed skin (840 cm2 for hands only; 1980 cm2 for hands and forearms (EFH, 1996));
AR	=	absorption rate (1.17 mg/cm2/hr for pure chemical (Dugard *et al.* 1984));
AT	=	averaging time (9125 days based on ED assumption); and
BW	=	body weight (70 kg (USEPA, 1989).

Assessment of Consumer Exposures

Consumers may be exposed to PGME through inhalation and dermal contact.

- *Inhalation Exposure* – EHEs ranging from 26 mg/m^3 to 232 mg/m^3 are considered to be conservatively representative of potential consumer exposures.

- *Dermal Exposure* - EHEs ranging from 0.005 mg/kg-d to 0.45 mg/kg-d were calculated using the following equation based on USEPA (1989) guidance:

$$Dermal\ Dose = \frac{\%PGME * ET * EF * ED * SA * AR}{AT * BW}$$

Where,

Dermal Dose	=	average daily dermal dose (mg/kg-day);
%PGME	=	percent PGME in product contacted by consumer (1 and 10% assumed);
ET	=	exposure time (0.5 and 1 hours/day assumed);
EF	=	exposure frequency (25 and 50 days/years assumed);
ED	=	exposure duration (30 years);
SA	=	surface area of exposed skin (840 cm2 for hands only (EFH, 1996); 1980 cm2 for hands and forearms (EFH, 1996));
AR	=	absorption rate (1.17 mg/cm2/hr for pure chemical (Dugard *et al.* 1984));
AT	=	averaging time (10,950 days based on ED assumed); and
BW	=	body weight (70 kg).

Assessment of Indirect Exposures via the Environment

Although monitoring data are not available, concentrations of PGME in water have been estimated using fugacity-based modeling. Theoretical oral doses were calculated using the equation given below:

$$Oral\ Dose = \frac{C * IR * EF * ED}{AT * BW}$$

Where,

C	=	concentration of PGME in water (0.23 – 2.3 mg/L);
IR	=	intake rate for water (2 L/day);
EF	=	exposure frequency (350 days/year);
ED	=	exposure duration (30 years);
AT	=	averaging time (10950 days); and
BW	=	body weight (70 kg).

For the ingestion of PGME-containing water (as a source of drinking water), oral doses of 0.0063-0.063 mg/kg-d represent a range of potential EHE values.

SIDS DOSSIER

1-METHOXYPROPAN-2-OL

.....

CAS No. 107-98-2

Sponsor Country: U.S.A.

DATE: October 12, 2000

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4.6.1 TOXICITY TO SOIL DWELLING ORGANISMS
4.6.2 TOXICITY TO TERRESTRIAL PLANTS
4.6.3 TOXICITY TO OTHER NON-MAMMALIAN TERRESTRIAL SPECIES (INCLUDING BIRDS)
4.7 BIOLOGICAL EFFECTS MONITORING (INCLUDING BIOMAGNIFICATION)
4.8 BIOTRANSFORMATION AND KINETICS
4.9 ADDITIONAL REMARKS

5. TOXICITY

5.1 * ACUTE TOXICITY
5.1.1 ACUTE ORAL TOXICITY
5.1.2 ACUTE INHALATION TOXICITY
5.1.3 ACUTE DERMAL TOXICITY
5.1.4 ACUTE TOXICITY BY OTHER ROUTES OF ADMINISTRATION
5.2 CORROSIVENESS/IRRITATION
5.2.1 SKIN IRRITATION/CORROSION
5.2.2 EYE IRRITATION/CORROSION
5.3 SKIN SENSITISATION

5.4 * REPEATED DOSE TOXICITY
5.5 * GENETIC TOXICITY IN VITRO
A. BACTERIAL TEST
B. NON-BACTERIAL IN VITRO TEST
5.6 * GENETIC TOXICITY IN VIVO
5.7 CARCINOGENICITY
5.8 * TOXICITY TO REPRODUCTION
5.9 * DEVELOPMENTAL TOXICITY / TERATOGENICITY
5.10 OTHER RELEVANT INFORMATION
A. SPECIFIC TOXICITIES (NEUROTOXICITY, IMMUNOTOXICITY etc.)
B. TOXICODYNAMICS, TOXICOKINETICS
5.11 * EXPERIENCE WITH HUMAN EXPOSURE

6. REFERENCES

Note: *; Data elements in the SIDS
†; Data elements specially required for inorganic chemicals

S I D S P R O F I L E

DATE: October 12, 2000

1.01 A.	**CAS No.**	107-98-2
1.01 C.	**CHEMICAL NAME (OECD Name)**	1-methoxypropan-2-ol
1.01 D.	**CAS DESCRIPTOR**	
1.01 G.	**STRUCTURAL FORMULA**	CH_3-O-CH_2-CH(CH_3)-OH
	OTHER CHEMICAL IDENTITY INFORMATION	
1.5	**QUANTITY**	100,000 - 500,000 tonnes
1.7	**USE PATTERN**	Dispersive and Non-dispersive A solvent for cellulose, acrylics, paints, varnishes, inks, leather/textile aids, sealing of cellophane foils, and as an antifreeze. An additive in cleaners, stains, dyes, polishes.
1.9	**SOURCES AND LEVELS OF EXPOSURE**	Internal users: 51 mg/m^3 Storage/fillling at production facility: 20 mg/m^3 Mini plant: 13 mg/m^3 Laboratory: 13 mg/m^3 Production facility: 12 mg/m^3 Maintenance: 4 mg/m^3 Disposal: 2 mg/m^3
ISSUES FOR DISCUSSION (IDENTIFY, IF ANY)	SIDS testing required:	

SIDS SUMMARY

DATE: October 12, 2000

CAS No: 107-98-2 Study		Info Available Y/N	OECD Study Y/N	GLP Y/N	Other Study Y/N	Estimation Method Y/N	Acceptable Y/N	Testing Required Y/N
PHYSICAL CHEMICAL DATA								
2.1	Melting Point	Y	N	N	Y	N	Y	N
2.2	Boiling Point	Y	N	N	Y	N	Y	N
2.3	Density	Y	N	N	Y	N	Y	N
2.4	Vapour Pressure	Y	N	N	Y	N	Y	N
2.5	Partition Coefficient	Y	N	N	Y	Y	Y	N
2.6.	Water Solubility	Y	N	N	Y	Y	Y	N
	pH and PkA values	N						
2.12	Oxidation Reduction Potential	N						
OTHER P/C STUDIES RECEIVED		N						
ENVIRONMENTAL FATE and PATHWAYS								
3.1.1	Photodegradation	Y	N	N	Y	Y	Y	N
3.1.2	Solubility in water	N						
3.2	Monitoring data	N						
3.3	Transport and Distribution	N						
3.5	Biodegradation	Y	Y	N	N	N	Y	N
OTHER ENVIR FATE STUDIES RECEIVED		N						
ECOTOXICITY								
4.1	Acute Toxicity to Fish	Y	N	Y	N	N	Y	N
4.2	Acute Toxicity to Daphnia	Y	Y	N	N	N	Y	N
4.3	Toxicity to Algae	Y	N	Y	N	N	Y	N
4.5.2	Chronic Toxicity to Daphnia	N				Y		
4.6.1	Toxicity to Soil Dwelling Organisms	N				Y		
4.6.2	Toxicity to Terrestrial Plants	N				Y		
4.6.3	Toxicity to Birds	N				Y		
OTHER ECOTOXICITY STUDIES RECEIVED		N						

SIDS SUMMARY (Continued)

CAS No: 107-98-2 Study		Info Available Y/N	OECD Study Y/N	GLP Y/N	Other Study Y/N	Estimation Method Y/N	Acceptable Y/N	Testing Required Y/N
TOXICITY								
5.1.1	Acute Oral	Y	N	N	Y	N	Y	N
5.1.2	Acute Inhalation	Y	N	Y	Y	N	Y	N
5.1.3	Acute Dermal	Y	N	N	Y	N	Y	N
5.4	Repeated Dose	Y	N	Y	Y	N	Y	N
5.5	Genetic Toxicity *in vitro*	Y						N
	-Gene Mutation	Y	Y	Y	N	N	Y	N
	-Chromosome Aberration	Y	Y	Y	N	N	Y	N
5.6	Genetic Toxicity *in vivo*	Y						
5.8	Reproduction Toxicity	Y	Y	Y	Y	N	Y	N
5.9	Development/Teratogenicity	Y	N	Y	Y	N	Y	N
5.11	Human Experience	Y	N	N	Y	N	Y	N
OTHER TOXICITY STUDIES RECEIVED		Y						

1. GENERAL INFORMATION

1.01 SUBSTANCE INFORMATION

***A. CAS-Number**

107-98-2

B. Name *(IUPAC name)*

1-Methoxypropan-2-ol

***C. Name** *(OECD name)*

1-Methoxypropan-2-ol

†D. CAS Descriptor

Not applicable in this case

E. EINECS-Number 203-539-1

F. Molecular Formula C4 H10 O2

***G. Structural Formula** CH3-O-CH2-CH(CH3)-OH

H. Substance Group

I. Substance Remark

J. Molecular Weight 90.1

1.02 OECD INFORMATION

A. Sponsor Country: U.S.A.

B. Lead Organisation:

Name of Lead Organisation: American Chemistry Council Propylene Glycol Ethers Panel
Contact person: Susan A. Lewis. Ph.D.
Address: American Chemistry Council
1300 Wilson Blvd.
Arlington, VA 22209
U.S.A.
Tel: 703-741-5635
Fax: 703-741-6091

1.1 GENERAL SUBSTANCE INFORMATION

A. Type of Substance element [ ]; inorganic [ ]; natural substance [ ]; organic [X]; organometalic [ ]; petroleum product [ ]

B. Physical State *(at 20°C and 1.013 hPa)*
gaseous [ ]; liquid [X]; solid [ ]

C. **Purity** *(indicate the percentage by weight/weight)*
>99%

1.2 **SYNONYMS**
1-Methoxy-2-hydroxypropane
1-Methoxy-2-propanol
1-Methoxypropanol-2
2-Methoxy-1-methylethanol
2-Propanol, 1-methoxy
2-propanol-1-methoxy
Propylene glycol monomethyl ether
Propylene glycol methyl ether
PM
Arcosolv PM
PM glycol ether
DOWANOL® PM
Methoxy propanol
Methoxypropanol
Methyl PROXITOL
PGME
Dowanol® PM Glycol Ether
Propasol® Solvent
Solvent M
Poly-Solv® MPM Solvent

1.3 **IMPURITIES**
β-isomer (<0.5%)
$CH_3C(OCH_3)CH_2OH$

1.4 **ADDITIVES**

***1.5** **QUANTITY**
100,000 - 500,000 tonnes
Remarks:
Reference:

1.6 **LABELLING AND CLASSIFICATION**

Labelling

Type:	Directive 67/548//EEC	
Specific limits:	no	
Symbols:		
Nota:		
R-phrases:	(10)	Flammable
S-phrases:	(2)	Keep out of reach of children
Text of S-phrases:		
Remarks:		

Classification

Type:	Directive 67/548/EEC	
Category of danger:		
R-phrases:	(10)	Flammable
Remarks:		

***1.7** **USE PATTERN**

A. **General**

Type of Use:	Category: Non dispersive
Industrial	Chemical industry: intermediate (PGMEA production) Chemical Industry: used in closed system

Type of Use:	Category: Wide dispersive
Industrial	Paint, lacquer, varnish industry Solvent
Agricultural	Inert
Other	Cleaning/washing/sanitary agents Inks Surface coatings Leather/textile

Remarks: PGME is cited as used in 220 cleaners. PGME is a component in motor vehicle cleaners, industrial cleaners, degreasers, floor cleaners, general all-purpose cleaners, window and glass cleaners, commercial disinfectants, sanitary and swimming pool cleaners, graffiti removers, tank cleaners for the food industry and textile detergents.

Reference: BUA Report 173. Wissenschaftliche Verlagsgesellschaft 1997.

General

Type of Use:	Category: Non dispersive
Industrial	Solvent for cellulose, acryl, paints, varnishes.
Other	leather/textile sealing of cellophane foils, antifreeze

Reference: Browning, 1965; Hawley, 1981.

B. Uses in Consumer Products

Remarks: Number of PGME-Containing Products out of 150,000 Products Surveyed

	PGME Content				
PGME-Containing Products	**1%**	**1-10%**	**10-30%**	**30-50%**	**50%**
Fungicides	0	3	2	0	2
Insecticides	0	1	2	0	6
Herbicides	0	4	0	0	0
For wood protection	6	12	2	0	3
Disinfectants	0	2	1	0	0
Inks/Varnishes/paints	141	667	237	62	66
For metals	1	10	5	0	1
For waterproofing	0	3	0	0	0
Glue/mastic	14	71	26	21	3
Solvents/diluents	8	130	86	45	29
Stain removers	0	7	4	1	0
For cleaning	19	171	37	11	8
Detergents/soaps	0	5	5	0	1
For shoes/leather	1	4	3	1	0
Photography	1	7	2	2	4
Auxiliary materials	11	45	40	14	12
Various	0	2	1	0	1
Hydraulic brake fluid	3	4	0	0	0

For galvano tech.	3	2	0	0	1
Hardeners	4	24	41	11	9
For floorings	7	4	3	0	1
For furniture	1	3	1	0	1
For cars	12	32	17	5	1
For rust prevention	2	11	2	0	0
Paints for ceramics	1	3	1	0	0
Perfumes	2	4	2	1	0
For surface treatments	4	17	6	2	3
Total	241	1248	526	167	152

Reference: Dentan et al. (2000)

	Function	Amount present	Physical state
Remarks:	Surface coatings	2-20%	liquid
	Cleaners	2-50%	liquid
	Inks	2-30%	liquid

Reference: Chemical Manufacturers Association

1.8 OCCUPATIONAL EXPOSURE LIMIT VALUE

Exposure limit value

Type: PEL (USA), TWA (USA)
Value: 100 PPM (approx 370 mg/m3)

Type: MAC (NL), OEL (UK)
Value: 360 mg/m3

Type: MAK (DE)
Value: 375 mg/m3

Short term exposure limit value

Value: 533 PPM (approx 540 mg/mg3)
Length of exposure period: 15 minutes
Frequency: no more than 4 times per day
Remarks: at least 60 minutes between STEL exposures
Reference: ACGIH, Threshold Limit Value 1997

*1.9 SOURCES OF EXPOSURE

(a)
Media of release: Vapor
Source: Internal users: 51 mg/m^3
Storage/fillling at production facility: 20 mg/m^3
Mini plant: 13 mg/m^3
Laboratory: 13 mg/m^3
Production facility: 12 mg/m^3
Maintenance: 4 mg/m^3
Disposal: 2 mg/m^3
Remarks:
Reference: BASF AG, 1979-1994;

(b)
Media of release: Vapor

Source: Ink vat cleaners: 20-40 ppm
Remarks: PGME identified in workers' urine following exposure. Concentration was correlated with external exposure.
Reference: Devanthery et al. (2000)

1.10 ADDITIONAL REMARKS

A. Options for disposal

Remarks:
Reference:

B. Other remarks

2. PHYSICAL-CHEMICAL DATA

***2.1 MELTING POINT**

(a) **Preferred result**
Value: = - 97 °C
Decomposition: Yes [ ] No [X] Ambiguous [ ]
Sublimation: Yes [ ] No [X] Ambiguous [ ]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks: See also: Ullmann's Encyclopaedia of Industrial Chemistry. Gerhartz et al. (eds), 5th edition, VCH Verlagsgescellschaft, Weinheim (Germany), Vol.A3, p.24, 1985.
Reference: Safety Data Sheet, Dow Europe S.A., October 1993.

(b)
Value: = -95 °C
Decomposition: Yes [ ] No [X] Ambiguous [ ]
Sublimation: Yes [ ] No [X] Ambiguous [ ]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks: None
Reference: BASF AG (1994) Sicherheitsdatenblatt Solvenon PM, 28.02.1994.

***2.2 BOILING POINT**

Value: = 120°C
Pressure: 1013 hPa
Decomposition: Yes [ ] No [X] Ambiguous [ ]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p.2866.
Reference: Safety Data Sheet, Dow Europe S.A., October 1993.

†2.3 DENSITY

(a) **Preferred result**
Type: Bulk density [ ]; Density [X]; Relative Density [ ]
Value: 0.917 g/cm3

Temperature: 25 °C
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Remarks: Oscillating density meter according to DIN 51757
Reference:

(b)
Type: Bulk density [ ]; Density [X]; Relative Density []
Value: 0.92 g/cm3
Temperature: 20 °C
Method:
GLP: Yes [ ] No [ ] ? [X]
Remarks: Specific gravity was measured in relation to water (water=1).
Reference: Safety Data Sheet, Dow Europe S.A., October 1993.

(c)
Type: Bulk density [ ]; Density [X]; Relative Density [ ]
Value: 0.92 g/cm3
Temperature: 20 °C
Method: other
GLP: Yes [ ] No [ ] ? [X]
Remarks:
Reference: BASF AG (1994) Sicherheitsdatenblatt Solvenon PM, 28.02.1994.

(d)
Type: Bulk density [ ]; Density []; Relative Density [X]
Value: 3.11
Temperature:
Method: other
GLP: Yes [ ] No [ ] ? [X]
Remarks: Vapour density was measured in relation to air (air=1).
Reference: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p.2866.

*2.4 VAPOUR PRESSURE

(a) **Preferred result**
Value: = 11.8 hPa
Temperature: 20 °C
Method: calculated [ ]; measured [X] Year: 1993
GLP: Yes [ ] No [ ] ? [X]
Remarks:
Reference: Safety Data Sheet, Dow Europe S.A., October 1993.

(b)
Value: = 11.7 hPa
Temperature: 25 °C
Method: calculated [X]; measured [ ] Year: 1994
GLP: Yes [ ] No [ ] ? [X]
Remarks: 11.8 mm Hg @ 25 °C = 11.7 hPa
Reference: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID,p.2866.

(c)
Value: = 13.3 hPa
Temperature: 20 °C

Method: calculated [ ]; measured [ ]; not specified [X]
GLP: Yes [ ] No [ ] ? [X]
Remarks:
Reference: BASF AG (1994) Sicherheitsdatenblatt Solvenon PM, 28.02.1994.

***2.5 PARTITION COEFFICIENT $log_{10}P_{ow}$**

Log Pow: = -0.437
Temperature: °C
Method: calculated [X]; measured [ ]
GLP: Yes [ ] No [ ] ? [X]
Remarks: Kow=0.37 and log Kow= -0.437 were estimated from Pomona Med Chem structural fragment method (unitless).
Reference: Gonsior SJ (1990) "Environmental assessment for glycol ethers", unpublished report of Dow Chemical Company.

***2.6 WATER SOLUBILITY**

A. Solubility

(a)
Value: 100 vol%
Temperature: 20°C
Description: Miscible[X]; Of very high solubility [ ];
Of high solubility [ ]; Soluble [ ]; Slightly soluble [ ];
Of low solubility [ ]; Of very low solubility [ ]; Not soluble [ ]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks:
Reference: Safety Data Sheet, Dow Europe S.A., October 1993.

(b)
Value: 200 g/l
Temperature: 20 °C
Description: Miscible[X]; Of very high solubility [ ];
Of high solubility [ ]; Soluble [ ]; Slightly soluble [ ];
Of low solubility [ ]; Of very low solubility [ ]; Not soluble [ ]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks: pH = 4 - 7
Reference: BASF AG (1994) Sicherheitsdatenblatt Solvenon PM. 28.02.1994.

2.7 FLASH POINT *(liquids)*

(a) **Preferred result**
Value: 31 °C
Type of test: Closed cup [X]; Open cup [ ]; Other [ ]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks: Seta Flash is a closed cup method. The equipment and method is covered by ASTM D 3828-87.
Reference: Safety Data Sheet, Dow Europe S.A., October 1993.

(b)
Value: 32 °C

Type of test: Closed cup [ ]; Open cup [ ]; Other [X]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks: DIN 51 755
Reference: BASF AG (1994) Sicherheitsdatenblatt Solvenon PM, 28.02.1994.

(c)
Value: 38 °C
Type of test: Closed cup [ ]; Open cup [X]; Other [ ]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks: Test was run under DIN 58758.
Reference: Ullmann's Encyclopaedia of Industrial Chemicals (1985) 5th edition, Vol A3.

2.8 AUTO FLAMMABILITY *(solid/gases)*

(a) **Preferred result**
Value: 287 °C
Pressure: 1013 hPa
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks: According to DIN 51794 and ASTM D286-587
Reference: Safety Data Sheet, Dow Europe S.A., October 1993.

(b)
Value: 270 °C
Pressure: 1013 hPa
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks: According to DIN 51794
Reference: BASF AG (1994) Sicherheitsdatenblatt Solvenon PM, 28.02.1994.

2.9 FLAMMABILITY

Results: Extremely flammable [ ]; Extremely flammable - liquefied gas [ ]; Highly Flammable [ ]; Flammable [ ]; Non flammable [ ]; Spontaneously flammable in air [ ]; Contact with water liberates highly flammable gases [ ]; Other [X]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks: Lower and upper flammability limits (% vol/vol) at 150 °C in air are 1.48 and 13.74, respectively.
Reference: Safety Data Sheet, Dow Europe S.A., October 1993.

2.10 EXPLOSIVE PROPERTIES

Results: Explosive under influence of a flame[ ];
More sensitive to friction than m-dinitrobenzene [ ];
More sensitive to shock than m-dinitrobenzene [ ]; Not explosive [X];
Other [ ]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Remarks: Upper and lower explosive limits in air: 1.7-11.5 vol %.
Reference: BASF AG (1994) Sicherheitsdatenblatt Solvenon PM, 28.02.1994.

2.11 OXIDIZING PROPERTIES

Results:	Maximum burning rate equal or higher than reference mixture [ ]; Vigorous reaction in preliminary test [ ]; No oxidizing properties [X]; Other [ ]
Method:	Other
GLP:	Yes [ ] No [ ] ? [X]
Remarks:	Avoid contact with oxidizing materials.
Reference:	Safety Data Sheet, Dow Europe S.A., October 1993. BASF AG (1994) Sicherheitsdatenblatt Solvenon PM, 28.02.1994.

2.12 ADDITIONAL REMARKS

Remarks:	No additional remarks

2.13 ADDITIONAL DATA

A. Partition co-efficient between soil/sediment and water (Kd)

Value:	
Method:	
GLP:	
Remarks:	No studies located
Reference:	

B. Other data

Results:	No studies located
Remarks:	
Reference:	

3. ENVIRONMENTAL FATE AND PATHWAYS

3.1 STABILITY

*3.1.1 PHOTODEGRADATION

(a)	
Type:	Air [X]; Water [ ]; Soil [ ]; Other [ ]
Light source:	Sun light [ ]; Xenon lamp [ ]; Other [X]
Light spectrum:	< 290 nm
Relative intensity:	ca 2.6 based on intensity of sunlight
Concentration of Substance:	0.0367 mg/l
Temperature:	27 °C
Direct photolysis:	
Half life:	3.1 hour
Degradation:	50 % (weight/weight) after 3.1 hour
Quantum yield:	
Method:	calculated [ ]; measured [X] Other
GLP:	Yes [ ] No [ ] ? [X]
Test substance:	No data
Remarks:	Tests were run under simulated atmospheric conditions with NO. Light source consisted of 2 General Electric 275-W reflector sunlamps and

	ultraviolet light. Disappearance rate of organic compounds in the reactor determined by flame ionisation.
Result:	In combination with trichloroethylene PM degraded 32% within 6.7 hours. Calculated half-life was 10.5 hours at an initial concentration of 10 ppm (=36.8 mg PGME/m^3).
Reference:	Dilling et al.. (1976) Env Sci Res. 10, 351-356.

3.1.2 STABILITY IN WATER

Type:	
Half life:	
Degradation:	
GLP:	
Test substance:	as prescribed by 1.1 - 1.4
Remarks:	Stable under practical use conditions
Reference:	

3.1.3 STABILITY IN SOIL

(a)

Type:	Field trial [ ]; Laboratory [X]; Other [ ]
Radiolabel:	Yes [X] No [ ] ? [ ]
Concentration:	0.2 ppm, 9.9 ppm, 100 ppm
Soil temperature:	25°C
Soil humidity:	100 g water/100 g soil dry weight
Soil classification:	DIN19863 [ ]; NF X31-107 [ ]; USDA [X]; Other [ ] Year: 1979
Content of clay etc.:	Clay 12%, Silt 16%, Sand 72%
Organic Carbon:	2.5 %
Soil pH:	7.5
Cation exchange capacity:	9.5 meq/100 g soil dry weight
Microbial biomass:	9.9 x10^6 bacteria/gram soil.
Dissipation time:	DT 50: <1 day DT 90:
Method:	Other
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	as prescribed by 1.1 - 1.4
Remarks:	Test was done under aerobic condition with 9.9 x10^6 bacteria/gram soil. Dissipation time (DT50) in Londo sandy loam for 0.2, 10, and 100 ppm was < 1 day, < 2days, and < 5 days, respectively. Potential for mobility in soil is very high (Koc between 0 and 50).
Reference:	Gonsior SJ and West RJ (1995) Environ Toxicol Chem 14:1273-1279.

(b)

Type:	Field trial [ ]; Laboratory [X]; Other [ ]
Radiolabel:	Yes [X] No [ ] ? [ ]
Concentration:	0.4 ppm, 100 ppm
Soil temperature:	25°C
Soil humidity:	100 g water/100 g soil dry weight
Soil classification:	DIN19863 [ ]; NF X31-107 [ ]; USDA [X]; Other [ ] Year: 1979
Content of clay etc.:	Clay 14%, Silt 12%, Sand 74%
Organic Carbon:	2 %
Soil pH:	6.7

Cation exchange capacity:	7.3 meq/100 g soil dry weight
Microbial biomass:	$5.1x10^6$ bacteria/gram soil
Dissipation time:	DT 50: < 7 day DT 90:
Method:	Other
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	as prescribed by 1.1 - 1.4
Remarks:	Test was done under aerobic condition with $5.1x10^6$ bacteria/gram soil. Dissipation time (DT50) in Tappan sandy loam for 0.4 ppm and 100 ppm PM was < 1 day and < 7 days, respectively. Potential for mobility in soil is very high (Koc between 0 and 50).
Reference:	Gonsior SJ and West RJ (1995) Environ Toxicol Chem 14:1273-1279.

(c)

Type:	Field trial [ ]; Laboratory [X]; Other [ ]
Radiolabel:	Yes [X] No [ ] ? [ ]
Concentration:	0.4 ppm, 100 ppm
Soil temperature:	25°C
Soil humidity:	100 g water/100 g soil dry weight
Soil classification:	DIN19863 [ ]; NF X31-107 [ ]; USDA [X]; Other [ ] Year: 1979
Content of clay etc.:	Clay 2%, Silt 4%, Sand 94%
Organic Carbon:	0.4 %
Soil pH:	5.7
Cation exchange capacity:	0.9 meq/100 g soil dry weight
Microbial biomass:	9.3×10^5 bacteria/gram soil
Dissipation time:	DT 50: > 56 day DT 90:
Method:	Other
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	as prescribed by 1.1 - 1.4
Remarks:	Test was conducted under aerobic condition with 9.3×10^5 bacteria/gram soil. Dissipation time (DT50) in sand for 0.4 ppm PM was < 4 days. At 100 ppm, DT was >56 days, however, with additional nutrients the DT50 for 100 ppm PM increased to < 23 days. Potential for mobility in soil is very high (Koc between 0 and 50).
Reference:	Gonsior SJ and West RJ (1995) Environ Toxicol Chem 14:1273-1279.

3.2 MONITORING DATA (ENVIRONMENT)

Type of Measurement:	
Media:	
Results:	
Remarks:	No data available

3.3 TRANSPORT AND DISTRIBUTION BETWEEN ENVIRONMENTAL COMPARTMENTS INCLUDING ESTIMATED ENVIRONMENTAL CONCENTRATIONS AND DISTRIBUTION PATHWAYS

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

Type:	Adsorption [ ]: Desorption [ ]; Volatility [X]: Other [ ]
Media:	Water-Air
Method:	Other

Remarks: Air/water partition (Kaw) is estimated to be 1.21 x 10^{-4} (log Kaw=-3.92). Based on the high water solubility values and low estimated Koc (= 0.23; log Koc = -0.64) values the compound would not be expected to adsorb significantly to soil.
Reference: Gonsior SJ (1990) "Environmental assessment for glycol ethers", unpublished report of the Dow Chemical Company.

***3.3.2 THEORETICAL DISTRIBUTION (FUGACITY CALCULATION)**

Media: Air-biota [ ]; Air-biota-sediment-soil-water [X]; Soil-biota [ ]; Water-air [ ]; Water-biota [ ]; Water-soil [ ]; Other [ ]
Method: Fugacity level I [ ]; Fugacity level II [ ]; Fugacity level III [ ]; Fugacity level IV [ ]; Other (calculation) [X]; Other (measurement)[ ]
Results: Predicted distribution of PM is:
9.41 % to Air
90.58 % to Water
0.1 % to Sediment
0.01 % to Soil
0.0 % to Biota (Fish)
0.0 % to Suspended Solid in Water
Remarks:
Reference: Gonsior SJ (1990) "Environmental assessment for glycol ethers", unpublished report of the Dow Chemical Company.

3.4 IDENTIFICATION OF MAIN MODE OF DEGRADABILITY IN ACTUAL USE

Results:
Remarks: PM is miscible with water. No appreciable reduction was detected after 24-hour aeration. Log air/water partition (log Kaw) is estimated to be -3.92.
Reference: Alexander HC and Batchelder TL (1975) "The pollutional evaluation of compounds", unpublished report of the Dow Chemical Company.

***3.5 BIODEGRADATION**

(a)
Type: aerobic [X]; anaerobic [ ]
Inoculum: adapted [ ]; non-adapted [ ]; ? [ ]; industrial sewage [X]
Concentration: 20 mg/l related to COD [ ]; DOC [X]; Test substance [ ];
Medium: water [X]; water-sediment [ ]; soil [ ]; sewage treatment [ ]
Degradation: 90 % after 29 days
Results: Readily biodeg. [X]; Inherently biodeg. [ ]; under test condition no biodegradation observed [ ], Other [ ]
Method: OECD Guideline 301 E
GLP: Yes [ ] No [ ] ? [X]
Test substance: PM concentration 37.8 mg/l 20 mg/l DOC)
Remarks: Biodegradation started after a lag-period of ca 17 days.
Reference: BASF (1985) "Pruefung der biologischen Abbaubarkeit von 1-Methoxypropanol 2 im modifizieten OECD-Screening Test", unpublished report of BASF Germany, Ludwigshafen.

(b)
Type: aerobic [X]; anaerobic [ ]
Inoculum: adapted [ ]; non-adapted [X]; ? [ ]; industrial sewage [ ]
Concentration: 40 mg/l related to COD [ ]; DOC [X]; Test substance [ ];
Medium: water [ ]; water-sediment [ ]; soil [ ]; sewage treatment [ ]

Degradation: 96 % after 28 days
Results: Readily biodeg. [X]; Inherently biodeg. [ ]; under test condition no biodegradation observed [ ], Other [ ]
Method: OECD Guideline 301 E
GLP: Yes [ ] No [ ] ? [X]
Test substance:
Remarks: Secondary effluent from sewage treatment plant used as inoculum
Reference: Verschuuren, H.G. (1994) Unpublished report of Dow Europe.

(c)
Type: aerobic [ ]; anaerobic [X]
Inoculum: adapted [ ]; non-adapted [X]; ? [ ]; industrial sewage [ ]
Concentration: 50 mg/l related to COD [ ]; DOC [X]; Test substance [ ];
Medium: water [ ]; water-sediment [ ]; soil [ ]; sewage treatment [X]
Degradation: 38 % after 81 days (30 day lag period)
Results: Readily biodeg. [X]; Inherently biodeg. [ ]; under test condition no biodegradation observed [ ], Other [ ]
Method: ASTM E 1196-92
GLP: Yes [ ] No [ ] ? [X]
Test substance:
Remarks: Anaerobic digester sludge from a municipal sewage treatment plant used as inoculum.
Reference: Goodwin, P.A. (1998) Unpublished report of Dow USA.

3.6 BOD_5,COD OR RATIO BOD_5/COD

BOD_5
Method: Other
Concentration:
Value:
GLP: Yes [ ] No [ ] ? [X]

COD
Method: Other
Value:
GLP: Yes [ ] No [ ] ? [X]

Ratio BOD_5/COD: = 0

Remarks: BOD5 is below detection limits. Degradation is expected in the atmospheric environment within minutes to hours. The BOD/THOD (%) ratio for PM is 0%. 21%, and 58% after 5, 10, and 20 days, respectively.
Result: PM will biodegrade in the environment
Reference: Gonsior SJ (1990) “Environmental assessment for glycol ethers”, unpublished report of the Dow Chemical Company

3.7 BIOACCUMULATION

Species:
Exposure period:
Temperature:
Concentration:
BCF: < 2
Elimination:
Method:

Type of test:	
GLP:	Yes [ ] No [ ] ? [X]
Test substance:	as prescribed by 1.1 - 1.4
Remarks:	No accumulation is to be expected.
Reference:	Alexander HC and Batchelder TL (1975) "The pollutional evaluation of compounds", unpublished report of the Dow Chemical Company.

3.8 ADDITIONAL REMARKS

A. Sewage Treatment

Remarks: No additional remarks

B. Other

Remarks: No additional remarks

4. ECOTOXICOLOGICAL DATA

4.1 ACUTE/PROLONGED TOXICITY TO FISH

(a)

Type of test:	static [X]; semi-static [ ]; flow-through [ ]; other [ ]; open-system [ ]; closed-system [ ]
Species:	*Leuciscus idus*
Exposure period:	96 hr
Results:	$LC_{0\ (96h)}$ = 4600 mg/l $LC_{50\ (96h)}$ = 4600 - 10,000 mg/l NOEC = 4600 mg/l
Analytical monitoring:	Yes [X] No [ ] ? [ ]
Method:	Other; according to guideline DIN 38412
GLP:	Yes [ ] No [X] ? [ ]
Test substance:	As prescribed by 1.1 - 1.4
Remarks:	
Reference:	BASF AG (1994) ABT Toxikologie, unpublished report of BASF AG, (88/290), 25.01.1989.

(b)

Type of test:	static [X]; semi-static [ ]; flow-through [ ]; other [ ] open-system [ ]; closed-system [ ]
Species:	*Pimephhales promelas*
Exposure period:	96 hr
Results:	$LC_{50\ (96h)}$ = 20.8 g/l
Analytical monitoring:	Yes [ ] No [ ] ? [X]
Method:	Other
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	As prescribed by 1.1 - 1.4
Remarks:	Material is practically non-toxic to fish on an acute basis (LC50 > 100 mg/l).
Reference:	Bartlett et al. (1981) "Evaluation of the toxicity of DOWANOL* PM to representative aquatic organisms", unpublished report of the Dow Chemical Company.

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

A. Daphnia

(a)

Type of test:	static [X]; semi-static [ ]; flow-through [ ]; other [ ]; open-system [ ]; closed-system [ ]
Species:	*Daphnia magna*
Exposure period:	48-hr
Results:	$EC_{0\ (48h)}$ = 500 mg/l
Analytical monitoring:	Yes [ ] No [ ] ? [X]
Method:	Directive 84/449/EEC, C.2
GLP:	Yes [ ] No [ ] ? [X]
Test substance:	No data
Remarks:	The 3-, 6-, and 24-hour EC_0 was 500 mg/l; no additional information is provided.
Reference:	BASF AG (1988) unpublished investigation 0082/88 of BASF AG.

(b)

Type of test:	static [X]; semi-static [ ]; flow-through [ ]; other [ ]; open-system [ ]; closed-system [ ]
Species:	*Daphnia magna*
Exposure period:	48-hr
Results:	$EC_{50\ (48h)}$ = 23300 mg/l
Analytical monitoring:	Yes [ ] No [ ] ? [X]
Method:	Other
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	As prescribed by 1.1 - 1.4
Remarks:	The material is practically non-toxic to aquatic invertebrates on a static acute basis.
Reference:	Bartlett et al. (1981) "Evaluation of the toxicity of DOWANOL® PM to representative aquatic organisms", unpublished report of the Dow Chemical Company.

***4.3 TOXICITY TO AQUATIC PLANTS e.g. Algae**

Species:	*Selenastrum capricornutum* Printz
End-point:	Biomass [ ]; Growth rate [X]; Other [ ]
Exposure period:	7 days
Results:	EC50 >1000 mg/l
Analytical monitoring:	Yes [ ] No [ ] ? [X]
Method:	Other:
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	As prescribed by 1.1 - 1.4, purity
Remarks:	PM was tested at concentrations of 63, 125, 250, 500 and 1000 mg/l. Growth endpoints were cells/ml and total cell volume/ml.
Reference:	Dill DC and Milazzo DP (1988) "DOWANOL PM glycol ether: Evaluation of the toxicity to the green alga, Selenestrum capricornutum printz", unpublished report of the Dow Chemical Company.

4.4 TOXICITY TO BACTERIA

(a)

Type:	Aquatic [ ]; Field [ ]; Soil [ ]; Other [X]
Species:	*Salmonella typhimurium*
Exposure Period:	48 hour
Results:	EC_0 >5000
Analytical monitoring:	Yes [ ] No [ ] ? [X]
Method:	Other

GLP:	Yes [ ] No [ ] ? [X]
Test substance:	No data
Remarks:	Within the dose range no bacteriotoxic effects were seen.
Test Condition:	PM was dissolved in DMSO.
Reference:	BASF (1983). Loesungsmittel PM: Ames test, with cover sheet dated 061289, BASF Corp. EPA/OTS; DOC#86-8900007694, OTS 0521200.

(b)

Type:	Aquatic [ ]; Field [ ]; Soil [ ]; Other [X]
Species:	*Salmonella typhimurium*
Exposure Period:	72 hour
Results:	$EC_0 > 6250$
Analytical monitoring:	Yes [ ] No [ ] ? [X]
Method:	Other
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	as prescribed by 1.1-1.4
Remarks:	No bacterial toxicity was observed in the dose range.
Test Condition:	Doses were given in ug/plate agar.
Reference:	Dow Europe SA (1983) "Bacterial mutagenicity test on DOWANOL PM", unpublished report

(c)

Type:	Aquatic [ ]; Field [ ]; Soil [ ]; Other [X]
Species:	Activated sludge
Exposure Period:	3 hour
Results:	IC50 > 1,000 mg/l
Analytical monitoring:	Yes [ ] No [ ] ? [X]
Method:	OECD Activated Sludge Respiration Inhibition Test
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	No data
Remarks:	No inhibition observed within dose range tested
Test Condition:	Stock solutions of PM in water were added directly to activated sludge
Reference:	Klecka, GM, Landim, LP and Bodner, KM. (1985) Chemosphere 14: 1239-1251.

4.5 CHRONIC TOXICITY TO AQUATIC ORGANISMS

4.5.1. CHRONIC TOXICITY TO FISH

Type of test:	
Species:	
Results:	
Remarks:	No data available

4.5.2. CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

Type of test:	
Species:	
Results:	
Remarks:	No data available

4.6 TOXICITY TO TERRESTRIAL ORGANISMS

4.6.1 TOXICITY TO SOIL DWELLING ORGANISMS

Type of test:
Species:
Results:
Remarks: No data available

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

Type of test:
Species:
Results:
Remarks: No data available

4.6.3 TOXICITY TO OTHER NON MAMMALIAN TERRESTRIAL SPECIES (INCLUDING AVIAN)

Species:
End-point:
Results:
Remarks: No data available

4.7 BIOLOGICAL EFFECTS MONITORING (INCLUDING BIOMAGNIFICATION)

Results
Remarks: No data available

4.8 BIOTRANSFORMATION AND KINETICS

Type:
Results:
Remarks: No data available

4.9 ADDITIONAL REMARKS

Results:
Remarks: No additional remarks

5. TOXICITY

5.1 ACUTE TOXICITY

5.1.1 ACUTE ORAL TOXICITY

(a) **Preferred result**
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rat/
Value: = 6100 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: 170 rats (male/female), 9 dose levels
Reference: Rowe, VK et al.. (1954) Arch Ind Hyg Occup Med 9, 509-525.

(b)
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rat/

Value: 5710 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: 2-Methoxy-1-propanol (beta isomer)
Remarks: Contrary to the Beta isomer of PM , the LD50 of the Alpha Isomer is 7510 mg/kg. See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Smyth HF et al.. (1941) J Ind Hyg Toxicol, 23, 259ff.

(c)
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rat/
Value: 5200 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Smyth HF et al. (1962) Amer Ind Hyg Assoc J, 23, 95-107.

(d)
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rat/
Value: > 5000 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Reference: BASF AG (1979) Abt Toxikologie, unpublished report 78/186, 19.07.1979

(e)
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rat/
Value: ca 5900 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks:
Reference: BASF AG (1964) Abt Toxikologie, unpublished report (XIV/25), 29.09.1964.

(f)
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Mouse/
Value: 10800 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

(g)
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rabbit/
Value: 5300 mg/kg
Method: Other

GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574

(h)
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [ ]; LDL_0 [ ]; Other [X]
Species/strain: Rabbit/
Value:
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: A single dose of 2 ml/kg (1840 mg/kg) was not lethal to any of four rabbits.
Reference: BASF AG (1965) Abt Toxikologie, unpublished report XV/225-XIV/257, 31.12.1965.

(i)
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Dog
Value: 9000 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Shideman FE and Puscita L (1951) J Pharmacol Exp Therap, 102, 79-87.

(j)
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Dog
Value: 4600 - 5500 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

(k)
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [ ]; LDL_0 [ ]; Other [X]
Species/strain: Cat
Value:
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: Only one cat was investigated. A single dose of 2 ml/kg (1840 mg/kg) was not lethal but led to some behaviour changes for 2 days.
Reference: BASF AG (1965) Abt Toxikologie, unpublished report of BASF AG (XV/225-XIV/257), 31.12.1965

5.1.2 ACUTE INHALATION TOXICITY

a) **Preferred Result**
Type: LC_0 [X]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]

Species/strain: Rat/Fischer 344
Exposure time: 6 hours
Value: >7559 ppm
Method: Other
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: Animals were observed for two weeks after exposure. All rats survived exposure to 6038 or 7559 ppm; animals were laterally recumbent and generally unresponsive during exposure, but appeared normal by day two - three. Mean body weight for both sexes was decreased approximately 10% from pre-exposure levels, but exceeded pre-exposure levels within a week.
Reference: Cieszlak, FS and Crissman, JW (1991). Dowanol* PM glycol ether: An acute vapor inhalation study in Fischer 344 rats. Unpublished report of The Dow Chemical Company.

(b)
Type: LC_0 [X]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
Species/strain: Rat/
Exposure time: various
Value: see remarks
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: Acute inhalation studies conducted on rats indicated that rats survived single 7-hour exposures to 5,000 ppm. At 10,000 ppm, the time to reach an LC50 value was 5 to 6 hours, while at 15,000 ppm, the time to reach an LC50 was 4 hours. Deaths resulting from single exposures appeared to be due to central nervous system depression.
Reference: Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.

(c)
Type: LC_0 [X]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
Species/strain: Rat/
Exposure time: 6 hour
Value: 36.4 mg/l
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Smyth et al. (1962) Amer Ind Hyg Assoc J, 23, 95-107.

(d)
Type: LC_0 [X]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
Species/strain: Rat/
Exposure time: 4 hour
Value: 1000 ppm
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Reference: Smyth HF et al. (1962) Amer Ind Hyg Assoc J, 23, 95-107.

(e)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [X]; LCL_0 [ ]; Other [ ]
Species/strain: Rat/

Exposure time: 4 hours
Value: > 6 mg/l
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: No data
Remarks: See also: "Gesundheitsschaedliche Arbeitsstoffe: Toxikologisch-arbeitsmedizinische Begruendung von MAK-Werten (Maximale Arbeitsplatz-Konzentrationen" D. Henschler (ed), VCH Verlagsgesellschaft, Weinheim (Germany), 1984.
Reference: Gelbke, HP (1983) Personal communication on basis of studies by BASF AG, Ludwigshafen, 1978-1983.

(f)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [X]; LCL_0 [ ]; Other [ ]
Species/strain: Rat/
Exposure time: 1 hour
Value: > 24 mg/l
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: No data
Remarks: Exposed to 25.5, 36.4 and 54.6 mg/l. 340 rats (15 groups of 10-40 males and females) were exposed for 1-8 h.
Reference: Gelbke, HP (1983): Personal communication on base of studies by BASF AG, Ludwigshafen, 1978-1983.

(g)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [X]; LCL_0 [ ]; Other [ ]
Species/strain: Mouse/B6C3F1
Exposure time: 6 hours
Value: <6038 ppm (females)
Between 6038 - 7559 ppm (males)
Method: Other
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: Animals were observed for two weeks after exposure. All mice were laterally recumbent during exposure to 6038 ppm, with 4/5 female mice dead or moribund on day 2. Male mice and surviving female mice appeared normal on day 2. Male body weights were decreased 17% following exposure but recovered quickly. Only male mice were exposed to 7559 ppm; mice were laterally recumbent, motionless and unresponsive to noise for much of the exposure and upon removal from the chamber. By day 3, only 2/5 mice had survived. Survivors appeared normal but body weights decreased 12% from pre-exposure levels; body weights recovered within a week.
Reference: Cieszlak, FS and Crissman, JW (1991). Dowanol* PM glycol ether: An acute vapor inhalation study in B6C3F1 mice. Unpublished report of The Dow Chemical Company.

(h)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [X]; Other [ ]
Species/strain: Rabbit/
Exposure time: 7 hour
Value: 54.6 mg/l
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4

Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.

(i)
Type: LC_0 [X]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
Species/strain: Guinea pig/
Exposure time: Various
Value: see Remarks
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 -1.4
Remarks: Acute inhalation studies conducted on guinea pigs indicated that guinea pigs survived single 7-houe exposures to 18.75 mg/l. At 54.6 mg/l the time to reach an LC50 was 10 hours.
Reference: Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.

(j)
Type: LC_0 [X]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
Species/strain: Guinea pig/
Exposure time: 7 hour
Value: 36.4 mg/l
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: LC_0 for 6 hour exposure = 54.6 mg/l.
See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.

5.1.3 ACUTE DERMAL TOXICITY

(a) **Preferred Result**
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rabbit/
Value: ca 13000 mg/kg b.w.
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: Six doses from 5000 to 14000 mg/kg were applied for 24 h under occlusive dressing. Depression, incomplete anaesthesia, and slight skin irritation at application site were observed.
Reference: Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.

(b)
Type: LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rabbit/
Value: 14100 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks:
Reference: Smyth HF et al. (1962) Amer Ind Hyg Assoc J, 23, 95-107.

5.1.4 ACUTE TOXICITY, OTHER ROUTES OF ADMINISTRATION

(a)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rat/
Route of Administration: i.m. [ ]; i.p. [ ]; i.v. [X]; infusion [ ]; s.c. [ ]; other [ ]
Exposure time: N.A.
Value: 3900 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: 8 day observation period. Dyspnea, somnolence, ataxia, prostration, sleep, and muscle spasms were reported.
See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

(b)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Mouse/
Route of Administration: i.m. [ ]; i.p. [ ]; i.v. [X]; infusion [ ]; s.c. [ ]; other [ ]
Exposure time: N.A.
Value: 4900 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

(c)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rabbit/
Route of Administration: i.m. [ ]; i.p. [ ]; i.v. [X]; infusion [ ]; s.c. [ ]; other [ ]
Exposure time: N.A.
Value: 1100 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

(d)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Dog
Route of Administration: i.m. [ ]; i.p. [ ]; i.v. [X]; infusion [ ]; s.c. [ ]; other [ ]
Exposure time: N.A.
Value: 1800 - 2300 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]

Test substance: No data
Remarks: After iv injection, dogs experienced pain at the injection site, shallow breathing, decreased blood pressure, cardiac arrhythmia, and convulsions.
See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

(e)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rat/
Route of Administration: i.m. [ ]; i.p. [X]; i.v. [ ]; infusion [ ]; s.c. [ ]; other [ ]
Exposure time: N.A.
Value: 3900 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

(f)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Mouse/
Route of Administration: i.m. [ ]; i.p. [X]; i.v. [ ]; infusion [ ]; s.c. [ ]; other [ ]
Exposure time: N.A.
Value: > 2000 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks:
Reference: BASF AG (1979) Abt Toxikologie, unpublished report 78/186, 19.07.1979.

(g)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Mouse/
Route of Administration: i.m. [ ]; i.p. [X]; i.v. [ ]; infusion [ ]; s.c. [ ]; other [ ]
Exposure time: N.A.
Value: ca. 5900 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks:
Reference: BASF AG (1964) Abt Toxikologie, unpublished report XIV/257, 29.09.1964.

(h)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rat/
Route of Administration: i.m. [ ]; i.p. [ ]; i.v. [ ]; infusion [ ]; s.c. [X]; other [ ]
Exposure time: N.A.
Value: 7200 mg/kg
Method: Other

GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

(i)
Type: LC_0 [ ]; LC_{100} [ ]; LC_{50} [ ]; LCL_0 [ ]; Other [ ]
LD_0 [ ]; LD_{100} [ ]; LD_{50} [X]; LDL_0 [ ]; Other [ ]
Species/strain: Rabbit/
Route of Administration: i.m. [ ]; i.p. [ ]; i.v. [ ]; infusion [ ]; s.c. [X]; other [ ]
Exposure time: N.A.
Value: 4600 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

5.2 CORROSIVENESS/IRRITATION

5.2.1 SKIN IRRITATION/CORROSION

(a) **Preferred Result**
Species/strain: Rabbit/
Results: Highly corrosive [ ]; Corrosive [ ]; Highly irritating [ ]; Irritating [ ]; Moderate irritating [ ]; Slightly irritating [X]; Not irritating [ ]
Classification: Highly corrosive (causes severe burns) [ ]; Corrosive (caused burns) [ ]; Irritating [ ]; Not irritating [X]
Method: Draize Test
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remarks: Undiluted PM (0.01 ml) was applied to the uncovered belly for 24 h.No appreciable irritation to the skin (primary skin irritation grade 2 = least visible capillary injection). Failed to cause more than a very mild irritation, and that after constant contact for several weeks.
Reference: Smyth HF et al. (1962) Amer Ind Hyg Assoc J. 23, 95-107.

(b)
Species/strain: Rabbit/
Results: Highly corrosive [ ]; Corrosive [ ]; Highly irritating [ ]; Irritating [ ]; Moderate irritating [ ]; Slightly irritating [X]; Not irritating [ ]
Classification: Highly corrosive (causes severe burns) [ ]; Corrosive (caused burns) [ ]; Irritating [ ]; Not irritating [X]
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: Test method according to U.S. Federal Register, 38, No. 187, 27.09.1973.
Reference: BASF AG (1979) Abt. Toxikologie, unpublished report of 78/186, 19.07.1979.

5.2.2 EYE IRRITATION/CORROSION

(a)

Species/strain:	Rabbit/
Results:	Highly corrosive [ ]; Corrosive [ ]; Highly irritating [ ]; Irritating [ ]; Moderate irritating [ ]; Slightly irritating [X]; Not irritating [ ]
Classification:	Irritating [ ]; Not irritating [X]; Risk of serious damage to eyes [ ]
Method:	Other
GLP:	Yes [ ] No [X] ? [ ]
Test substance:	As prescribed by 1.1 - 1.4
Remarks:	One drop of undiluted PM was applied to the eyes of rabbits on each of 5 consecutive days.
Reference:	Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.

(b)

Species/strain:	Rabbit/
Results:	Highly corrosive [ ]; Corrosive [ ]; Highly irritating [ ]; Irritating [ ]; Moderate irritating [ ]; Slightly irritating [X]; Not irritating [ ]
Classification:	Irritating [ ]; Not irritating [X]; Risk of serious damage to eyes [ ]
Method:	Other
GLP:	Yes [ ] No [X] ? [ ]
Test substance:	No data
Remarks:	Irritation potential of 0.5 ml undiluted PM is low; reported rating of 3 on a scale of 10.
Reference:	Smyth HF et al. (1962) Amer Indus Hyg Assoc J, 23, 95-107.

(c)

Species/strain:	Rabbit/
Results:	Highly corrosive [ ]; Corrosive [ ]; Highly irritating [ ]; Irritating [ ]; Moderate irritating [ ]; Slightly irritating [X]; Not irritating [ ]
Classification:	Irritating [ ]; Not irritating [X]; Risk of serious damage to eyes [ ];
Method:	Other
GLP:	Yes [ ] No [X] ? [ ]
Test substance:	As prescribed by 1.1 - 1.4
Reference:	BASF AG (1979) Abt. Toxikologie, unpublished report 78/186, 19.07.1979.

5.3 SKIN SENSITISATION

Type:	Other
Species/strain:	Guinea pig/
Results:	Sensitizing [ ]; Not sensitizing [X]; ambiguous [ ]
Classification:	Sensitizing [ ]; Not sensitizing [ ]
Method:	Other
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	As prescribed by 1.1 - 1.4
Remarks:	Test type was a modified Maguire test; see Maguire HC (1973) J Cosmetic Chem, 24, 1973.
Reference:	Carreon RE and Wall JM (1984) “Propylene glycol monomethyl ether: skin sensitization potential in the guinea pig”, unpublished report of the Dow Chemical Company.

***5.4 REPEATED DOSE TOXICITY**

(a)
Species/strain: Rat/
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 6 months
Frequency of treatment: 7 h exposures daily, 5 days/week
Post exposure observation period: no data
Dose: up to a supersaturated atmosphere
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [X]; Concurrent vehicle [ ]; Historical [ ]
NOEL: > 1500 ppm
LOEL:
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 -1.4
Remark: Method similar to OECD guideline 408/409.
See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.

(b)
Species/strain: Rat/Fischer 344
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 13 weeks
Frequency of treatment: 6 h exposures daily, 5 days/week
Post exposure observation period: no data
Dose: 0, 300, 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL: 300 ppm - females
LOEL: 3000 ppm - females
300 ppm - males
Results: Exposure to 3000 ppm produced sedation in male and female rats during first week of exposure that was ameliorated by increased hepatic mixed function oxidase activity and hepatocellular proliferation which is a normal physiologic adaptation to increased metabolic demand. No sedation or adaptive hepatic effects were observed at 300 ppm. A male rat specific alpha 2μ-globulin nephropathy was observed at 3000 ppm and to a slight extent at 300 ppm.
Method: Other
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 -1.4
Reference: Cieszlak FS et al. (1996) Propylene glycol monomethyl ether: A 13-week vapor inhalation study to evaluate hepatic and renal cellular proliferation, P450 enzyme induction and protein droplet nephropathy in Fischer 344 rats. Unpublished report of The Dow Chemical Company.

(c)
Species/strain: Rat/Fischer 344
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 13 weeks
Frequency of treatment: 6 h exposures daily, 5 days/week
Post exposure observation period: no data

Dose:	300, 1000, 3000 ppm
Control group:	Yes [X]; No [ ]; No data [ ]; Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL:	1000 ppm
LOEL:	3000 ppm
Results:	No treatment related effects were found in animals exposed to 300 or 1000 ppm. At 3000 ppm clinical observations indicated a transientcentral nervous system depression, relative liver weight increased slightly concomitant with nondegenerative (adaptive) histological effects. Body weight gain was slightly decreased in females.
Method:	OECD 413
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	As prescribed by 1.1 -1.4
Remark:	See also: Patty's Industrial Hygiene and Toxicology (1994), p. 2865-2872.
Reference:	Landry TD et al. (1983) Fund Appl Toxicol, 3, 627-630.

(d)

Species/strain:	Mouse/B6C3F1
Sex:	Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration:	inhalation
Exposure period:	13 weeks
Frequency of treatment:	6 h exposures daily, 5 days/week
Post exposure observation period:	no data
Dose:	0, 300, 1000, 3000 ppm (subchronic group) 0, 300, 3000 ppm (subchronic group evaluated for enzyme induction and cellular proliferation)
Control group:	Yes [X]; No [ ]; No data [ ]; Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL:	300 ppm
NOAEL	1000 ppm
LOEL:	3000 ppm
Results:	Exposure to 3000 ppm produced sedation in male and female mice during the first three days of exposure. An accelerated atrophy of the X-zone of the adrenal gland of female mice was observed at 3000 ppm and to a very slight degree at 1000 ppm. A slight numerical increase in renal and hepatic cellular proliferation, significantly increased hepatic enzyme induction was observed at 3000 ppm in both sexes; increased liver weight (females only) was also observed at 3000 ppm. No effects were observed at 300 ppm.
Method:	Other
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	As prescribed by 1.1 -1.4
Remark:	Atrophy of the X-zone of the adrenal gland was described as an age-related event in mice and was considered to be a non-specific, non-adverse effect.
Reference:	Cieszlak FS et al. (1996) Propylene glycol monomethyl ether: A 13-week vapor inhalation study to evaluate hepatic and renal cellular proliferation, P450 enzyme induction in B6C3F1 mice. Unpublished report of The Dow Chemical Company.

(e)

Species/strain:	Rat/Fischer 344
Sex:	Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration:	inhalation

Exposure period: 2 weeks (9 exposures in 11 days)
Frequency of treatment: 6 h exposures daily, 5 days/week during week 1, 4 days during week 2
Post exposure observation period: none
Dose: 0, 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL: -
LOEL: -
Results: Exposure to 3000 ppm produced sedation in male and female rats during the first week of exposure. Resolution of sedation correlated with increases in relative liver weights. Increases in the rate of hepatocellular proliferation (mitotic response) was observed after the first week in male rats. No histopathologic changes were noted in the livers of exposed rats. Relative kidney weights of both sexes were slightly, but statistically increased, following two weeks of exposure. Kidney weight changes in males was accompanied by the deposition of alpha 2μ-globulin characteristic of malerat specific "protein droplet nephropathy".
Method: Other
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 -1.4
Remark: Induction of mixed function oxidase activity in both sexes suggested an increased ability of exposed rats to metabolize inhaled PGME.
Reference: Stott, WT et al. (1992). The evaluation of hepatic cellular proliferation and P450 induction in B6C3F1 mice and Fischer 344 rats exposed to Propylene glycol monomethyl ether. Unpublished report of The Dow Chemical Company.

(f)
Species/strain: Rat/Fischer 344
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 11 days (9 exposures)
Frequency of treatment: 6 h/day
Post exposure observation period: 6 weeks (half of control and 3000 ppm animals)
Dose: 300, 1000, 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL: 1000 ppm
LOEL: 3000 ppm
Results: No deaths occurred during PM exposure. Rats in the 3000 ppm groups appeared to be anaesthetised or sedated during exposure. There were no gross pathologic observations or histopathologic changes in the liver or kidneys in all groups. All affected parameters (liver weights, platelet counts, urinalyses) recovered to normal levels after 6 weeks.
Method: Other
GLP: Yes [X] No [ ] ? [ ]
Test substance: as prescribed by 1.1 -1.4
Reference: Miller RR et al. (1981) Toxicol Appl Pharmacol, 61, 368-377.

(g)
Species/strain: Rat/Wistar
Sex: Female [ ]; Male [X]; Male/Female [ ]; No data [ ]
Route of Administration: inhalation
Exposure period: 10 days
Frequency of treatment: 6 h/day

Post exposure observation period: no data
Dose: 200 and 600 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL: -
LOEL: -
Results: PM had no effect on the testes.
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: No data
Remark: Rat strain used was Alderley Park strain, Wistar-derived. It should be noted that this particular study was designed to assess testicular pathology and hematology.
See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Doe JE et al. (1983) Toxicol Appl Pharmacol, 69, 43-47.

(h)
Species/strain: Rat/
Sex: Female [ ]; Male [ ]; Male/Female [ ]; No data [X]
Route of Administration: inhalation
Exposure period: 2 weeks
Frequency of treatment: 5 h/day, 5 days/week
Post exposure observation period: no data
Dose: 2500, 5000, 10,000 ppm
Control group: Yes [ ]; No [ ]; No data [X];
Concurrent no treatment [ ]; Concurrent vehicle [ ]; Historical [ ]
NOEL: 5000 ppm
LOEL: 10,000 ppm
Results: Animals in the 5000 and 10,000 ppm group displayed a transient non-specific depression of behaviour for the first several exposures, followed by rapid development of tolerance. Decreased growth rate was seen at 10,000 ppm.
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: No data
Remark: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Goldberg ME et al. (1964) Amer Ind Hyg Assoc J, 25, 369.

(i)
Species/strain: Mouse/B6C3F1
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 2 weeks (9 exposures in 11 days)
Frequency of treatment: 6 h exposures daily, 5 days/week during week 1, 4 days during week 2
Post exposure observation period: none
Dose: 0, 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL: -
Results: Exposure to 3000 ppm produced sedation in male and female mice during the first week of exposure. Resolution of sedation correlated with increases in relative liver weights. Increases in the rate of hepatocellular proliferation (mitotic response) was observed after the first week in both

sexes, and after the second week of exposures in females. No histopathologic changes were noted in the livers of exposed mice

Method: Other
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 -1.4
Remark: Induction of mixed function oxidase activity suggested an increased ability of exposed mice to metabolize inhaled PGME.
Reference: Stott, WT et al. (1992). The evaluation of hepatic cellular proliferation and P450 induction in B6C3F1 mice and Fischer 344 rats exposed to Propylene glycol monomethyl ether. Unpublished report of The Dow Chemical Company.

(j)
Species/strain: Rat/CFE
Sex: Female [ ]; Male [ ]; Male/Female [ ]; No data [X]
Route of Administration: oral feed
Exposure period: 13 weeks
Frequency of treatment: 5 days per week
Post exposure observation period: no data
Dose: 459.5, 919, 1836, 3672 mg/kg (0.5, 1.0, 2.0, 3.0 ml/kg/day)
Control group: Yes [ ]; No [ ]; No data [X];
Concurrent no treatment [ ]; Concurrent vehicle [ ]; Historical [ ]
NOEL: < 459.5 mg/kg bw
LOEL: 459.5 mg/kg bw
Results: Mild to severe central nervous system depression was observed. This caused a growth depression due to reduced feed intake. Livers were enlarged, especially at doses >919 mg/kg. Cell necrosis was observed, mainly in the peripheral portions of the lobules. There was minor kidney injury at higher doses.
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: No data
Remark: Method similar to OECD guideline 408. See also: Patty's Industrial Hygiene and Toxicology (1994), 4th edition, Vol IID, p. 2865-2872.
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

(k)
Species/strain: Rat/
Sex: Female [ ]; Male [ ]; Male/Female [ ]; No data [X]
Route of Administration: oral gavage
Exposure period: 35 days
Frequency of treatment: daily, 5 doses/week
Post exposure observation period: no data
Dose: 91.9, 275.7, 919, 2757 mg/kg
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL: 919 mg/kg bw
LOEL: 2757 mg/kg bw
Results: No mortalities were found. At 2757 mg/kg, some animals initially lost body weight, but they recovered quickly. The final body weight was not significantly different from that of controls. 2757 mg/kg produced only minor effects on liver and kidney.
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 -1.4

Remark: Method similar to OECD guideline 407
See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.

(l)
Species/strain: Rabbit/
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 3-6 months
Frequency of treatment: 7 h exposures daily, 5 days/week
Post exposure observation period: no data
Dose: 800, 1500, 3000, 6000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [X]; Concurrent vehicle [ ]; Historical [ ]
NOEL: 800 ppm
LOEL:
Results: Toxicological effects from repeated vapour exposures were Slightly increased liver weights in females and slight histological changes of liver and lungs at 1500 and 3000 ppm. There were no observable treatment-related effects with repeated exposure to 800 ppm.
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 -1.4
Remark: Method similar to OECD guideline 408/409.
See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.

(m)
Species/strain: Rabbit/New Zealand White
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 13 weeks
Frequency of treatment: 6 h exposures daily, 5 days/week
Post exposure observation period: no data
Dose: 300, 1000, 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL: 1000 ppm
LOEL: 3000 ppm
Results: No treatment related effects were found in animals exposed to 300 or 1000 ppm. At 3000 ppm clinical observations indicated a transient central nervous depression and serum alkaline phosphatase was increased.
Method: OECD 413
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 -1.4
Remark: See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Landry TD et al. (1983) Fund Appl Toxicol, 3, 627-630.

(n)
Species/strain: Rabbit/
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]

Route of Administration: oral
Exposure period: up to 14 doses
Frequency of treatment: once daily, 5 days/week
Post exposure observation period: no
Dose: 1840 mg/kg (2 ml/kg)
Control group: Yes [ ]; No [ ]; No data [X];
Concurrent no treatment [ ]; Concurrent vehicle [ ]; Historical [ ]
NOEL: -
LOEL: -
Results: PM had no effect on the testes.
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: As prescribed by 1.1 - 1.4
Remark: Only three animals were used for this study. One animal died after 9 applications. The treatment led to a slight decrease of erythrocytes and lymphocytes.
Reference: BASF AG (1965) Abt. Toxikologie, unpublished report XV/225-XIV/257, 31.12.1965.

(o)
Species/strain: Rabbit/
Sex: Female [ ]; Male [X]; Male/Female [ ]; No data [ ]
Route of Administration: dermal
Exposure period: 90 days
Frequency of treatment: 5 days/week
Post exposure observation period: no data
Dose: 1 to 10 ml/kg
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [ ]; Historical [ ]
NOEL: 2 ml/kg bw
LOEL: 4 ml/g bw
Results: Slight narcosis at 3676 mg/kg (4 ml/kg) was observed.
Method: Other (Method similar to OECD guideline 410)
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 -1.4
Remark: Larger doses (7 to 10 ml/kg) produced narcosis which generally led to the death of the animal (8/9 deaths at 7 ml/kg, 11/11 deaths at 10 ml/kg). Repeated applications in doses of 1 to 5 ml/kg were generally without effect. Histologic examination of tissues of surviving animals were within normal limits.
Reference: Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.
See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol. IID, p. 2865-2872.

(p)
Species/strain: Rabbit/New Zealand White
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: dermal
Exposure period: 21 days (15 applications)
Frequency of treatment: 1 application/day
Post exposure observation period: no data
Dose: 1000 mg/kg
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [ ]; Historical [ ]
NOEL: < 1000 mg/kg bw

LOEL:
Results: Rabbits receiving 1000 mg/kg PM showed no signs of systemic effects in various parameters including hemotolgic analysis and histopathology. The only treatment related effect was slight scaling and minimal inflammation with a protective thickening response of the skin.
Method: Other
GLP: Yes [X] No [ ] ? [ ]
Test substance: as prescribed by 1.1 - 1.4
Reference: Calhoun LL and Johnson KA (1984) "Propylene glycol monomethyl ether (PGME): 21-day dermal study in New Zealand white rabbit", unpublished report of the Dow Chemical Company.

(q)
Species/strain: Guinea pig/
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 6 months
Frequency of treatment: 7 h exposures daily, 5 days/week
Post exposure observation period: no data
Dose: 1500 ppm, 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [X]; Concurrent vehicle [ ]; Historical [ ]
NOEL: > 3000 ppm
LOEL:
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 -1.4
Remark: Method similar to OECD guideline 408/409.
See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference: Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.

(r)
Species/strain: Mouse/B6C3F1
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 11 days (9 exposures)
Frequency of treatment: 6 h/day
Post exposure observation period: 6 weeks (half of control and 3000 ppm animals)
Dose: 300, 1000, 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL: 1000 ppm
LOEL: 3000 ppm
Results: No deaths occurred during PM exposure. Mice in the 3000 ppm groups appeared to be anaesthetised or sedated during exposure. There were no gross pathologic observations or histopathologic changes in the liver or kidneys in all groups. All affected parameters (relative liver weight of female mice at 3000 ppm) recovered to normal levels after 6 weeks.
Method: Other
GLP: Yes [X] No [ ] ? [ ]
Test substance: as prescribed by 1.1 -1.4
Remark:
Reference: Miller RR et al. (1981) Toxicol Appl Pharmacol, 61, 368-377.

(s)

Species/strain:	Monkey/
Sex:	Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration:	inhalation
Exposure period:	6 months
Frequency of treatment:	7 h exposures daily, 5 days/week
Post exposure observation period:	no data
Dose:	800 ppm, 1500 ppm, 3000 ppm
Control group:	Yes [X]; No [ ]; No data [ ]; Concurrent no treatment [X]; Concurrent vehicle [ ]; Historical [ ]
NOEL:	800 ppm
LOEL:	1500 ppm
Method:	Other
GLP:	Yes [ ] No [X] ? [ ]
Test substance:	As prescribed by 1.1 - 1.4
Remark:	Method similar to OECD guideline 408/409. See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference:	Rowe VK et al. (1954) Arch Ind Hyg Occup Med, 9, 509-525.

(t)

Species/strain:	Dog
Sex:	Female [ ]; Male [X]; Male/Female [ ]; No data [ ]
Route of Administration:	oral feed
Exposure period:	14 weeks
Frequency of treatment:	5 days per week
Post exposure observation period:	no data
Dose:	459.5, 919, 1836, 3672 mg/kg (0.5, 1.0, 2.0, 3.0 ml/kg/day)
Control group:	Yes [ ]; No [ ]; No data [X]; Concurrent no treatment [ ]; Concurrent vehicle [ ]; Historical [ ]
NOEL:	< 459.5 mg/kg bw
LOEL:	459.5 mg/kg bw
Results:	Mild to severe central nervous system depression in a dose-related manner was observed. Male dogs developed numerous spermiphages in the epididymis. There were minor kidney changes at higher doses.
Method:	Other
GLP:	Yes [ ] No [ ] ? [X]
Test substance:	No data
Remark:	Method similar to OECD guideline 409 See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p. 2865-2872.
Reference:	Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

5.5 GENETIC TOXICITY IN VITRO

A. BACTERIAL IN VITRO TEST

(a)

Type:	Ames test
System of testing:	*Salmonella typhimurium*, strains TA 1535, TA 1537, TA 1538, TA 98, TA 100
Concentration:	Incubated with 2, 10, 50, 250, 1250, 6250 ug/plate
Metabolic activation:	With [ ]; Without [ ]; With and Without [X]; No data [ ]
Results:	
Cytotoxicity conc:	not stated

Precipitation conc: not stated
Genotoxic effects: negative + ? --
With metabolic activation: [ ] [ ] [X]
Without metabolic activation: [ ] [ ] [X]
Method: OECD 471
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks:
Reference: Dow Europe SA (1983) "Bacterial mutagenicity tests on Dowanol PM", unpublished report.

(b)
Type: Ames test
System of testing: *Salmonella typhimurium*, strains TA 1535, TA 1537, TA 1538, TA 98, TA 100
Concentration: Incubated with 20, 100, 500, 2500, 5000 ug/plate
Metabolic activation: With [ ]; Without [ ]; With and Without [X]; No data [ ]
Results:
Cytotoxicity conc: not toxic at doses tested
Precipitation conc: not stated
Genotoxic effects: negative + ? --
With metabolic activation: [ ] [ ] [X]
Without metabolic activation: [ ] [ ] [X]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: No data
Remarks: Within the dose range tested, no bacteriotoxic effects were observed.
Reference: BASF (1983) "Bericht ueber die Pruefung von Loesungsmittel PM im AMES Test (Standard plate test mit Salmonella typhimurium)",unpublished report.

(c)
Type: Ames test
System of testing: *Salmonella typhimurium*, strains TA 1535, TA 1537, TA 1538, TA 98, TA 100
Concentration: Incubated with 20 - 5000 ug/plate
Metabolic activation: With [ ]; Without [ ]; With and Without [X]; No data [ ]
Results:
Cytotoxicity conc: not stated
Precipitation conc: not stated
Genotoxic effects: negative + ? --
With metabolic activation: [ ] [ ] [X]
Without metabolic activation: [ ] [ ] [X]
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: Method according to Ames et al. (1975) Mut Res, 31, 347-364.
Reference: BASF AG (1983) Abt. Toxikologie, unpublished report 82/322, 20.06.1983.

B. NON-BACTERIAL IN VITRO TEST

(a)
Type: Unscheduled DNA Synthesis
System of testing: Rat hepatocytes
Concentration: Incubated with 0.1; 0.0316; 0.01; 0.00316; 0.001; 0.000316;

0.0001; 0.0000316 M
Metabolic activation: With [ ]; Without [ ]; With and Without [ ]; No data [ ]
Hepatocytes are metabolically competent
Results:
Cytotoxicity conc: 0.0316 and 0.1 M
Precipitation conc: not stated
Genotoxic effects: negative + ? --
Without metabolic activation: [ ] [ ] [X]
Method: OECD 482
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: PM was toxic to hepatocyte cultures at 0.0316 and 0.1 M as indicated by detachment of cells and/or a granular appearance.
Reference: Mendrala AL (1983) "Evaluation of DOWANOL* PM in the rat hepatocyte unscheduled DNA synthesis assay" unpublished report of the Dow Chemical Company.

(b)
Type: Gene Mutation Assay
System of testing: Chinese hamster lung (V79) cells
Concentration: 14-55 mM
Metabolic activation: With [ ]; Without [X]; With and Without [ ]; No data [ ]
Results:
Cytotoxicity conc:
Precipitation conc: not stated
Genotoxic effects: negative + ? --
With metabolic activation: [ ] [ ] [ ]
Without metabolic activation: [ ] [ ] [X]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: 98.1% purity, 1.2% β-isomer
Remarks: Cell growth inhibition rather than an acute cytotoxicity was observed. There was no increase in 6-TG^r mutant recovery in cells treated with PGME.
Reference: Elias, Z et al. (1996) Occupational Hygiene 2: 187-212.

(c)
Type: Sister Chromatid Exchange (SCE) Assay
System of testing: Chinese hamster lung (V79) cells
Concentration: >10 - 100 mM
Metabolic activation: With [ ]; Without [X]; With and Without [ ]; No data [ ]
Results:
Cytotoxicity conc: not stated
Precipitation conc: not stated
Genotoxic effects: negative + ? --
With metabolic activation: [ ] [ ] [ ]
Without metabolic activation: [ ] [X] [ ]
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: 98.1% purity, 1.2% β-isomer
Remarks: A small but statistically significant increase in SCEs over control levels was observed. This result, however, was observed only at very high concentrations and the dose-response correlation was weak.
Reference: Elias, Z et al. (1996) Occupational Hygiene 2: 187-212

(d)

Type:	Cytogenetic Assay
System of testing:	Metaphase analysis of Chinese hamster ovary (CHO) cells
Concentration:	Incubated with 1.25, 2.5, 5.0, 10.0 mg/ml
Metabolic activation:	With [ ]; Without [ ]; With and Without [X]; No data [ ]
Results:	
Cytotoxicity conc:	10 mg/ml
Precipitation conc:	not stated
Genotoxic effects:	negative + ? -
	With metabolic activation: [ ] [ ] [X]
	Without metabolic activation: [ ] [ ] [X]
Method:	OECD 473
GLP:	Yes [X] No [ ] ? [ ]
Test substance:	As prescribed by 1.1 - 1.4
Remarks:	PM was not toxic to CHO cells up to 5 mg/ml; survival was reduced to ca. 50% at 10 mg/ml.
Reference:	Dow Europe SA (1983) "Metaphase analysis of Chinese hamster ovary (CHO) cells treated with DOWANOL* PM", unpublished report.

(e)

Type:	Chromosomal Aberration Assay
System of testing:	Chinese hamster lung (V79) cells
Concentration:	>10 - >100 mM
Metabolic activation:	With [ ]; Without [X]; With and Without [ ]; No data [ ]
Results:	
Cytotoxicity conc:	not stated
Precipitation conc:	not stated
Genotoxic effects:	negative + ? -
	With metabolic activation: [ ] [ ] [ ]
	Without metabolic activation: [ ] [ ] [X]
Method:	Other
GLP:	Yes [ ] No [ ] ? [X]
Test substance:	98.1% purity, 1.2% β-isomer
Remarks:	There was no increase in the incidence in chromosomal aberrations in cells treated with PGME. Although not clastrogenic, PGME did appear to enhance genetic damage induced by MMS (methylmethanesulfonate); potentiation was dose-dependent at concentrations up to 200 mM PGME.
Reference:	Elias, Z et al. (1996) Occupational Hygiene 2: 187-212.

(f)

Type:	Micronucleus Assay
System of testing:	Chinese hamster lung (V79) cells
Concentration:	not stated
Metabolic activation:	With [ ]; Without [X]; With and Without [ ]; No data [ ]
Results:	
Cytotoxicity conc:	not stated
Precipitation conc:	not stated
Genotoxic effects:	negative + ? -
	With metabolic activation: [ ] [ ] [ ]
	Without metabolic activation: [ ] [ ] [X]
Method:	Other
GLP:	Yes [ ] No [ ] ? [X]
Test substance:	98.1% purity, 1.2% β-isomer
Remarks:	PGME did not induce an increase in the frequency of micronuclei at non-cytotoxic concentrations.

Reference: Elias, Z et al. (1996) Occupational Hygiene 2: 187-212.

(g)
Type: Inhibition of Metabolic Cooperation Assay
System of testing: Chinese hamster lung (V79) cells
Concentration: 14-55 mM
Metabolic activation: With [ ]; Without [X]; With and Without [ ]; No data [ ]
Results:
Cytotoxicity conc: not stated
Precipitation conc: not stated
Genotoxic effects: negative

	+	?	-
With metabolic activation:	[ ]	[ ]	[ ]
Without metabolic activation:	[X]	[ ]	[ ]

Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: 98.1% purity, 1.2% β-isomer
Remarks: PGME induced a dose-dependent inhibitory effect on intercellular communication at non-cytotoxic concentrations. This is an assay for promotion, not genotoxicity.
Reference: Elias, Z et al. (1996) Occupational Hygiene 2: 187-212.

(h)
Type: Cellular Transformation Assay
System of testing: Syrian hamster embryo (SHE) cells
Concentration: not stated
Metabolic activation: With [ ]; Without [X]; With and Without [ ]; No data [ ]
Results:
Cytotoxicity conc: not stated
Precipitation conc: not stated
Genotoxic effects: negative

	+	?	-
With metabolic activation:	[ ]	[ ]	[ ]
Without metabolic activation:	[ ]	[ ]	[X]

Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: 98.1% purity, 1.2% β-isomer
Remarks: PGME did not induce morphological transformation of SHE cells.
Reference: Elias, Z et al. (1996) Occupational Hygiene 2: 187-212.

5.6 GENETIC TOXICITY IN VIVO

Type: Micronucleus Assay
Species: Mouse
Strain: CD-1 mice
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Concentration: 2500, 4000, 5000, 6000 mg/kg
Route of Administration: Intraperitoneal injection
Frequency of treatment: One-time injection
Sampling frequency: 24, 48, 72 hr after treatment
Results: Negative
Toxic concentration: 6000 mg/kg (3/8 mortality at 48 hr)
Remarks: There was no increase in the frequency of micronuclei in polychromatic erythrocytes harvested from bone marrow of mice treated with PGME.
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: 98.1% purity, 1.2% β-isomer

Reference: Elias, Z et al. (1996) Occupational Hygiene 2: 187-212.

5.7 CARCINOGENICITY

(a)
Species/strain: Rat/Fischer 344
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 2 years
Frequency of treatment: 6 hr/day, 5 days/week
Postexposure observation period: none
Doses: 0, 300, 1000, 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL: 300 ppm
LOEL: 1000 ppm
Results: PGME-induced sedation at 3000 ppm resolved in all animals during the second week of exposure in conjunction with the appearance of adaptive changes in the liver (MFO induction and hepatocellular proliferation-from previous work). MFO activities (PROD) subsequently dropped to near-control values by week 52, coinciding with a return of sedation at 3000 ppm PGME. In male rats, the loss of metabolic adaptation was followed by a dose-related increase in eosinophilic foci of altered hepatocytes after two years of exposure to 1000 or 3000 ppm PGME. Kidney toxicity was observed in male rats only, which was confirmed immunohistochemically as an alpha 2μ-globin nephropathy. No statistically-identified increases in tumors were observed in any tissue, however, a numerical increase in kidney tumors (3/50) were observed in male rats from the intermediate exposure level with 1/50 observed at 3000 ppm PGME.
Remarks: The lack of statistical significance or a dose-response relationship in renal tumors, in conjunction with the induction of the male rat-specific alpha 2μ-globulin nephropathy, render these minimal renal observations irrelevant for human risk assessment purposes.
Method: OECD 453
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Reference: Cieszlak, FS et al. (1998) Propylene glycol monomethyl ether: A 2-year vapor inhalation chronic toxicity/oncogenicity study and evaluation of hepatic and renal cellular proliferation, P450 enzyme induction and protein droplet nephropathy in Fischer 344 rats. Unpublished report (in preparation) of The Dow Chemical Company (sponsored by the Chemical Manufacturers Association P-Series Glycol Ethers Panel, Arlington, VA.

(b)
Species/strain: Mouse/B6C3F1
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 2 years
Frequency of treatment: 6 hr/day, 5 days/week
Postexposure observation period: none
Doses: 0, 300, 1000, 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL: 300 ppm
LOEL: 1000 ppm

Results: A transient sedation of mice inhaling 3000 ppm PGME during the first week of exposures was observed; however, this resolved during the second week concomitant with adaptive changes in the livers of these animals (previous study results). Mice exposed to 3000 ppm had increased mortality (males), decreased in-life body weights and body weight gains relative to controls, over much of the exposure period, as well as minimal increases in absolute and relative liver weightsand hepatic MFO activity. No treatment-related histopatholgical changesaccompanied these liver effects, nor were histopathological changes observed in any other tissues. These data, along with the occurrence of chronic, albeit small increases in hepatocellular proliferation in mice inhaling 3000 ppm suggested minimal regenerative response in the liver, likely related to shorted life spanmetabolically stressed hepatocytes. Decreases in body weights were also observed, although less frequently, in both sexes exposed to 1000 ppm. No treatment-related increases in tumors were observed in any tissue of male or female mice.
Method: OECD 453
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Reference: Cieszlak, FS et al. (1998) Propylene glycol monomethyl ether: A 2-year vapor inhalation chronic toxicity/oncogenicity study and evaluation of hepatic cellular proliferation and P450 enzyme induction in B6C3F1 mice. Unpublished report (inpreparation) of The Dow Chemical Company (sponsored by the Chemical Manufacturers Association P-Series Glycol Ethers Panel, Arlington, VA.)

*5.8 TOXICITY TO REPRODUCTION

(a)
Type: Fertility [ ]; One generation study [ ]; Two generation study [X]; Other [ ]
Species/strain: Mouse/CD-1
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: drinking water
Exposure period:
Frequency of treatment: daily
Postexposure observation period:
Premating exposure period: male: 7 days , female: 7 days
Duration of the test:
Doses: 0, 0.5, 1.0, 2.0% in drinking water
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL Parental: = 1%
NOEL F1 Offspring: = 1%
NOEL F2 Offspring: = 1%
Results: The referenced study is an abstract. There were no changes in body weight or food consumption in any of the first generation exposure groups except for a 4% reduction in pup weight at the highest dose tested. In the second generation exposure groups, reductions in male and female body weight were noted (14% reduction during nursing; 8% reduction in body weight in males during and after mating, and epididymus and prostate weights were 9 and 8% below controls in males, respectively). There was no evidence of reproductive toxicity; mating and fertility indices, and the number and viability of F1 and F2 offspring were not affected. Among F1 offspring, mean pup weight was decreased in the 2% group. F2 offspring from the 2% group displayed reduced pup weight at birth, which continued postnatally during nursing. At sacrifice, female body weights in the 2% group were

lower than controls; absolute testis, and relative epididymis and prostate weights were also reduced. F1 female body-weight-adjusted liver weights were increased.

Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: As prescribed by 1.1 - 1.4
Reference: Chapin RE and Sloane RA (1997) Environ Health Perspect , 105 (Suppl 1), 233-234.

(b)
Type: Fertility [ ]; One generation study [ ]; Two generation study [X]; Other [ ]
Species/strain: Rat/Sprague-Dawley
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration: inhalation
Exposure period: 6 hours/day
Frequency of treatment: 5 days/week prior to mating and 7 days/week during mating, gestation and lactation
Postexposure observation period: NA
Premating exposure period: male: NA, female:NA
Doses: 0, 300, 1000 and 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ]; Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL Parental: 300 ppm
NOEL F1 Offspring: 1000 ppm
NOEL F2 Offspring: 1000 ppm
Results: At 3000 ppm, toxicity in the P1 and P2 adults was marked, as evidenced by sedation during and after exposure for several weeks, and mean body weights which were as much as 21% lower than controls. This marked parental toxicity was accompanied by lengthened estrous cycles, decreased fertility, decreased ovary weights, reduced pup survival and litter size, slight delays in puberty onset, and histologic changes in the liver and thymus of the F1 and F2 offspring. At 3000 ppm, there was an increase in histologic ovarian atrophy in P1 and P2 females, and at 1000 ppm, there was a decrease in pre-mating body weight in the P1 and P2 females. No treatment-related differences in sperm counts or motility were observed among the P1 or P2 males.
Method: OECD 416
GLP: Yes [X] No [ ] ? [ ]
Test substance: No data
Remarks: The nature of the reproductive/neonatal effects and their close individual correlation with decreased paternal body weights suggest that these effects were secondary to general toxicity and/or nutritional stress. No such effects were observed at 1000 ppm, a concentration which caused less marked, but significant body weights effects without sedation.
Reference: Liberacki AB et al. (1997) Propylene glycol monomethyl ether: Two-generation inhalation reproduction study in Sprague-Dawley rats. Carney E.W. et al (1999)

(c)
Type: Fertility [ ]; One generation study [ ]; Two generation study [ ]; Other [X]
Species/strain: Rat/Wistar
Sex: Female [X]; Male [ ]; Male/Female [ ]; No data [ ]
Route of Administration: inhalation

Exposure period: day 6 - 17 gestation
Frequency of treatment: 6 hours/day
Postexposure observation period: NA
Premating exposure period: male: NA, female:NA
Doses: 200, 600 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL Parental: > 600 ppm/day
NOEL F1 Offspring: > 600 ppm/day
NOEL F2 Offspring: NA
Results: PM had no effect on maternal animals or on their litters.
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: No data
Remarks: Rat strain used was Alderley Park strain, Wistar-derived.
Reference: Doe JE et al. (1983) Toxicol Appl Pharmacol, 69, 43-47.

*5.9 DEVELOPMENTAL TOXICITY/TERATOGENICITY

(a)
Species/strain: Rat/Fischer 344
Sex: Female [X]; Male [ ]; Male/Female [ ]; No data [ ]
Route of Administration: inhalation
Duration of the test: 21 days
Exposure period: days 6-15 of gestation
Frequency of treatment: 6 hours/day.
Doses: 500, 1500, 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL Maternal Toxicity: 1500 ppm/day
NOEL Fetotoxicity: 1500 ppm/day
NOEL Teratogenicity 3000 ppm/day
Results: Maternal general tox: mild transient CNS depression, decreased food consumption and body weight gain were observed in maternal animals at 3000 ppm.
Pregnancy/litter data: slight fetotoxicity (delayed sternebral ossification) was observed in rats exposed to 3000 ppm.
Fetal data: PM was not teratogenic in rats at exposures up to 3000 ppm.
Method: Other
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks: Method similar to OECD 414
Reference: Hanley TR et al. (1984) Fund Appl Toxicol, 4, 784-794.

(b)
Species/strain: Rabbit/New Zealand White
Sex: Female [X]; Male [ ]; Male/Female [ ]; No data [ ]
Route of Administration: inhalation
Duration of the test: 29 days
Exposure period: days 6-18 of gestation
Frequency of treatment: 6 hours/day.
Doses: 500, 1500, 3000 ppm
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL Maternal Toxicity: 1500 ppm/day

NOEL Fetotoxicity: 3000 ppm/day
Results: Maternal general tox: mild transient CNS depression, decreased food consumption were observed in maternal animals at 3000 ppm.
Fetal data: PM was not teratogenic in rabbits at exposures up to 3000 ppm.
Method: Other
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4
Remarks:
Reference: Hanley TR et al. (1984) Fund Appl Toxicol, 4, 784-794.

(c)
Species/strain: Rat/
Sex: Female [X]; Male [ ]; Male/Female [ ]; No data [ ]
Route of Administration: gavage
Duration of the test:
Exposure period: days 1-21 of gestation
Frequency of treatment: once per day
Doses: 0.05, 0.1, 0.2, 0.4, 0.8 ml/kg
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL Maternal Toxicity: 0.8 ml/kg
NOEL Teratogenicity: 0.8 ml/kg
Results: Maternal general toxicity:
Pregnancy/litter data: there were no effects on the number of pups born.
Fetal data: a delayed ossification of the skull was observed in one pup from the 0.8 mg/kg group. Delayed ossification also found when PM injected s.c.
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: No data
Remarks: Rat strain: CFE from Carworth
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

(d)
Species/strain: Mouse/
Sex: Female [X]; Male [ ]; Male/Female [ ]; No data [ ]
Route of Administration: gavage
Duration of the test:
Exposure period: days 1-18 of gestation
Frequency of treatment: once per day
Doses: 0.5, 1, 2 ml/kg
Control group: Yes [X]; No [ ]; No data [ ];
Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOEL Maternal Toxicity: 2 ml/kg
NOEL Fetotoxicity: 2 ml/kg
Results: Maternal general tox: none at doses tested.
Pregnancy/litter data:
Fetal data: there was no evidence of fetotoxicity or teratogenicity at the doses tested. No maternal or fetotoxicity were observed when subcutaneous injections of PM were administered at the same doses.
Method: Other
GLP: Yes [ ] No [ ] ? [X]
Test substance: No data
Remarks: Mouse strain: CFLP from Carworth
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

(e)
Species/strain: Rabbit/
Sex: Female [X]; Male [ ]; Male/Female [ ]; No data [ ]
Route of Administration: gavage
Duration of the test:
Exposure period: days 1-18 of gestation
Frequency of treatment: once per day
Doses: 0.25, 0.5, 1 ml/kg
Control group: Yes [ ]; No [ ]; No data [X];
Concurrent no treatment [ ]; Concurrent vehicle [ ]; Historical [ ]
NOEL Maternal Toxicity: 1 ml/kg
NOEL Teratogenicity: 1 ml/kg
Results: Maternal general tox: none at doses tested.
Fetal data: there was no evidence of fetotoxicity or teratogenicity at the doses tested. No maternal or fetotoxicity were observed when subcutaneous injections of PM were administered at the same doses.
Method: Other Year: 1972
GLP: Yes [ ] No [ ] ? [X]
Test substance: No data
Remarks: Rabbit strain: Gelbsilber
Reference: Stenger, EG et al., (1972) Arzneim. Forsch., 22, 569-574.

5.10 OTHER RELEVANT INFORMATION

A. Specific toxicities

Type:
Results: No studies located
Remarks:
Reference:

B. Toxicodynamics, toxicokinetics

Type: Metabolism
Results:
Remarks: 48 hours after oral dosing F-344 rats with 8.7 mmol/kg of [14C] PM, 50-60% is excreted as CO2 and about 20% in urine. The highest level of radioactivity was found in the liver when compared to blood levels. In the urine, PM, propylene glycol (1,2-propanediol), and sulfate and glucuronide conjugates were identified.
References: Miller RR et al. (1983) Toxicol Appl Pharmacol, 67, 229-237.

(b)
Type: Toxicokinetics
Results:
Remarks: Rats inhaled PM at 300, 1500 and 3000 ppm. Blood levels of PM failed to plateau during a single 6-hour exposure, indicating an absoption through respiration. The clearance of PM following a single exposure (nose only or whole body) is described as a pseudo-zero order process. Following 10 6-hour exposures, PM at 3000 ppm was completely eliminated 24 hours after the last exposure. Repeated exposure to 3000 ppm increased liver weight and mixed function oxidase activity. This enyzmatic induction may account for the rapid development of tolerance to repeated inhalation exposures to high concentrations of PGME.
References: Margott DA and Nolan RJ (1987) Toxicol Appl Pharmacol, 89, 19-28.

(c)
Type: Toxicokinetics
Results:
Remarks: A method utilizing capillary GC and FID was developed for the detection of PM and its metabolites in rat and mouse plasma. Oral absorption and metabolism of PM was studied in mice. PM was readily absorbed and metabolised to propylene glycol following oral gavage. The maximum concentration of PM and PG in plasma were attained at 20 and 30 minutes following dosing, respectively.
References: Ferrala NF et al. (1994) J Chromatogr B Biomed Appl, 660, 291-296.

* 5.11 EXPERIENCE WITH HUMAN EXPOSURE

(a)
Results:
Remarks: Male human subjects were exposed to increasing concentrations of PGME from 50 to 1000 ppm (2050) in one case). Duration of exposure was up to 7 h at concentrations up to 250 ppm and up to 2 h at concentrations up to 2050 ppm. The substance become noticeable at 10 ppm. Above 100 ppm, the odor was transiently objectionable; eyes were slightly irritated after 1-2 h exposure. At 3000 ppm, there was mild eye and nasal irritation within 5 minutes which became intolerable after 1 h. 750 ppm was scored as very strongly irritating. At 1000 ppm, indications of CNS depression were recognized. Breath analysis data demonstrated that PM was rapidly excreted via the lungs. The human volunteers all experienced rapid development of odor tolerance. Hence, unless prompt action is taken when objectionable odor is experienced, it cannot be relied upon to prevent exposures that may be hazardous. However, because the odor is readily detected and is objectionable, PM vapours are considered to have adequate warning properties, if needed. Neurologic, clinical, chemical and general medical studies did not show any significant abnormalities.
Reference: Steward RD et al. (1970) Arch Env Hlth, 20, 218-224.
See also: Patty's Industrial Hygiene and Toxicology (1994) 4th edition, Vol IID, p.2865-2872.

(b)
Type: Eye irritation in human volunteers
Exposure levels: 0, 100, and 150 ppm
Results: Minimal subjective eye effects were noted at 150 ppm only; there was no impact on objective measures of eye irritation at either exposure level. The NOAEL for eye irritation due to PGME vapor is at least 150 ppm.
Remarks: Testing was conducted on 12 healthy male volunteers using a repeated measures design. Each subject was exposed for 2.5 hours to each of three exposure conditions which were spaced 7 days apart. During all exposure sessions, 20 ppm diethylether was used as a masking agent to minimize any responses caused by PGME odor. Exposure to the test substance and the effect measurements were conducted in a double-blind fashion. Measurement of pre- and post-exposure eye redness, corneal thickness, tear film break-up time, conjuctival epithelial damage, blinking frequency, and subjective ratings were used to evaluate the possible irritating effects of PGME.
Reference: Emmen, HH et al. (1997). Human volunteer study with propylene glycol monomethyl ether: Potential eye irritation during vapour exposure. Unpublished report from TNO Nutrition and Food Research Laboratory, Sponsored by the Oxygenated Solvents Producers Association.

(c)
Results:
Remarks: Dermal absorption of PGME in the vapor phase was investigated in male and female human volunteers. Each study involved two exposures: in one a mask was worn which provided fresh air to exclude the inhalation route and leave only the dermal route available for absorption. In the other exposure volunteers were exposed by inhalation as well as dermal absorption. Volunteers were exposed for 4 hours and wore shorts and tee shirts during exposure. Blood, urine, and breath samples were taken before and after exposure. Blood level measurements indicated that the mean dermal absorption contribution was 6.3% (range 2.0-10.3%). The estimated mean dermal absorption based on breath sample analysis was 5.6% (range 0.7-14.2%). Elimination half-life in the total absorption (dermal and inhalation) average 1.5 hours; by contrast, the mean apparent half-life for the dermal study was 2.7 hours. Urinary half life for the dermal-only study was nearly twice that for total exposure. It is possible that in the case of dermal absorption, absorption is delayed but there may be a reservoir effect giving an apparent delay in elimination.
Reference: Jones, K. (1997). Dermal Absorption of Vapours I-Final Report. Unpublished report of Health & Safety Laboratory, Sheffield, UK.

(d)
Results:
Remarks Isolated human skin (abdominal epidermis) was set up in glass diffusion cells and PGME absorption was measured for 8 hours. An absorption rate of 1.17 $mg/cm^2/hr$ was estimated for undiluted PGME.
Reference Dugard, P.H., Walher, M., Mawdsley, S.J., Scott, R.C. 1984. Absorption of some glycol ethers through human skin *in vitro*. Env. Health Perspect. 57: 193-197.

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