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Air Toxicological Summary for: Diethylene Glycol Monoethyl Ether (DEGEE)

CAS: 111-90-0

Air Exposure Durations

- Acute_{1hr} = 1 hour
- Acute_{24hr} = 24 hours
- Intermediate = greater than 24 hours to 1 year
- Chronic = greater than 1 year to a lifetime
- Cancer = 0 to 70 years (lifetime)

Acute_{1hr} Non-Cancer Health Based Value (HBV_{Acute1hr}) = Not Derived (insufficient data)

Acute_{24hr} Non-Cancer Health Based Value (HBV_{Acute24hr}) = Not Derived (insufficient data)

Intermediate Non-Cancer Health Based Value (HBV_{inter}) = 20 µg/m³

$$= \frac{\text{POD}_{\text{HEC}} \text{ mg/m}^3}{(\text{UF})}$$

$$= \frac{5.4 \text{ mg/m}^3}{300}$$

$$= 0.018 \text{ mg/m}^3 = 18 \text{ µg/m}^3 \text{ rounds to } 20 \text{ µg/m}^3$$

Reference Concentration: $\text{POD}_{\text{HEC}}/\text{Total UF} = 0.018 \text{ mg/m}^3$ (rodent study)

Source of toxicity value: MDH 2026; aci EPA PPRTV 2009; Hardy et al. 1997

Point of Departure (POD) and Critical Effect: $\text{BMCL}_{10} = 30 \text{ mg/m}^3$; respiratory effects

Human Equivalent Concentration (HEC): $\text{BMCL}_{10\text{HEC}} = 5.4 \text{ mg/m}^3$; $\text{DAF}_{\text{ET}} = 1$

Total uncertainty factor (UF): 300

Uncertainty factor allocation: An uncertainty factor of 10 for intraspecies differences is used to account for sensitive subpopulation among humans.

An uncertainty factor of 3 is applied for animal-to-human extrapolation, as the dosimetric equations were used to account for kinetic differences across species but data for evaluating relative interspecies toxicodynamic differences are insufficient.

An uncertainty factor of 10 is applied for database inadequacies, as data for evaluating developmental/reproductive toxicity and chronic effects is incomplete.

Chronic Non-Cancer Health Based Value (HBV_{chronic}) = 2 µg/m³

$$= \frac{\text{POD}_{\text{HEC}} \text{ mg/m}^3}{(\text{UF})}$$

$$= \frac{5.4 \text{ mg/m}^3}{3000}$$

$$= 0.0018 \text{ mg/m}^3 = 1.8 \text{ µg/m}^3 \text{ rounds to } 2 \text{ µg/m}^3$$

Reference Concentration: $\text{POD}_{\text{HEC}}/\text{Total UF} = 0.0018 \text{ mg/m}^3$ (rodent study)

Source of toxicity value: MDH 2026; aci EPA PPRTV 2009 Hardy et al. 1997

POD and Critical Effect: $\text{BMCL}_{10} = 30 \text{ mg/m}^3$; respiratory effects

Human Equivalent Concentration: $\text{BMCL}_{10\text{HEC}} = 5.4 \text{ mg/m}^3$; $\text{DAF}_{\text{ET}} = 1$

Total uncertainty factor: 3000

Uncertainty factor allocation: An uncertainty factor of 10 is applied for extrapolation to a potentially susceptible human subpopulation, as data for evaluating susceptible human response is insufficient.

An uncertainty factor of 3 is applied for animal-to-human extrapolation, as the dosimetric equations were used to account for kinetic differences across species but data for evaluating relative interspecies toxicodynamic differences are insufficient.

An uncertainty factor of 10 is applied for using data from a short-term study to assess potential effects from chronic exposure.

An uncertainty factor of 10 is applied for database inadequacies, as data for evaluating developmental/reproductive toxicity and chronic effects is incomplete.

Cancer Health Based Value = Not Derived (insufficient data)

Cancer classification: Inadequate information to assess carcinogenic potential; EPA PPRTV 2009

Volatile: Yes – experimental average Henry’s Law = $2.22E^{-8}$ atm-m³/mol; EPA CompTox Dashboard v2.7.0 accessed Feb 2026

Summary of Guidance Value History

MDH had no previously published air guidance values for diethylene glycol monoethyl ether.

Summary of toxicity testing for health effects identified in the Health Standards Statute (144.0751):

Even if testing for a specific health effect was not conducted for this chemical, information about that effect might be available from studies conducted for other purposes. MDH has considered the following information in developing health protective guidance.

	Endocrine	Immunotoxicity	Development	Reproductive	Neurotoxicity	Respiratory
Tested for specific effect?	No	No	Yes	Yes-oral	Yes	Yes
Effects observed?	-- ¹	-- ²	Yes ³	Yes ⁴	Yes ⁵	Yes ⁶

Comments on extent of testing or effects

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³ Developmental toxicity was evaluated in groups of 15 and 21 Sprague-Dawley female rats that were exposed to DEGEE by inhalation at concentrations of 0 or 549 mg/m³ during gestation days 7-15. No maternal toxicity was reported and no statistically significant differences in developmental endpoints were reported. In a subcutaneous maternal DEGEE exposure administered GDs 6-20, no teratogenic potential was reported at the highest of 1000 µL/kg. DEGEE has low toxicity on reproductive performance and development. Evidence of embryo-fetal toxicity was restricted to minor skeletal findings which principally included an increase in the incidence of reduced ossification of cranial bones. These minor skeleton findings were not considered to be indicative of a teratogenic potential but suggested a selective effect on the developing fetuses. In a rat study the dose of 1000 mg/kg bw/d was considered a NOAEL for maternal toxicity. The dose of 300 mg/kg bw/d was considered to be the NOAEL for embryo-fetal toxicity (EC 2006).

⁴ DEGEE has low toxicity on reproductive performance and development. Evidence of embryo-fetal toxicity was restricted to minor skeletal findings which principally included an increase in the incidence of reduced ossification of cranial bones. These minor skeleton findings were not considered to be indicative of a teratogenic potential but suggested a selective effect on the developing fetuses. In a rat study the dose of 1000 mg/kg bw/d was considered a NOAEL for

maternal toxicity. The dose of 300 mg/kg bw/d was considered to be the NOAEL for embryo-fetal toxicity (EC 2006).

- ⁵ Continuous DEGEE inhalation exposure of rats at 0.27 and 4.5 ppm for 4 months followed by a recovery period resulted in changes in blood cell (anaemia) and chemistry profiles as well as CNS effects. In an isolated case report, an alcoholic male (aged 44) drank approximately 300 ml of a liquid containing 47% DEGEE (about 2000 mg/kg). Severe symptoms of central nervous and respiratory injury (dyspnoea), thirst, and acidosis occurred. The urine contained albumin. The subject recovered following symptomatic treatment (EC 2006).
- ⁶ Rats were exposed to 0, 16, 50, and 200 ppm DEGEE (nose-only) for 28 days. There were no signs of systemic intoxication, but there were histopathological changes indicative of mild non-specific irritation in the upper respiratory tract at the mid- and high-exposure levels, 270-1100 mg/m³. The MDH HBVs are based on this respiratory effect, and these values will be protective of the other toxicological effects noted above.

Resources Consulted During Review

1. EPA (PPRTV). 2009. Provisional Peer-Reviewed Toxicity Values for Diethylene Glycol MonoEthyl Ether (DGEE, CASRN 111-90-0). Superfund Health Risk Technical Support Center, National Center for Environmental Assessment, Office of Research and Development. Cincinnati, OH 45268
2. EPA. 2012. Advances in Inhalation Gas Dosimetry for Derivation of a Reference Concentration (RfC) and Use in Risk Assessment (EPA/600/R-12/044) Washington, DC.
3. European Centre for Ecotoxicity and Toxicology of Chemicals (ECETOC). 2005. ECETOC Technical Report No. 95 The Toxicity of Glycol Ethers and its Relevance to Man. ISSN-0773-8072-95 Brussels.
4. European Commission (EC) Scientific Committee on Consumer Products. 2006. Opinion on Diethylene Glycol Monoethyl Ether (DEGEE). SCCP/1044/06.
5. Hardy, C.J., D.W. Coombs, D.J. Lewis et al. 1997. Twenty-eight-day repeated-dose inhalation exposure of rats to diethylene glycol monoethyl ether. *Fund. Appl. Toxicol.* 38(2):143–147.
6. Nelson, B.K., J.V. Setzer, W.S. Brightwell et al. 1984. Comparative inhalation teratogenicity of four glycol ether solvents and an amino derivative in rats. *Environ. Health Perspect.* 47:261– 271.
7. Singh PJ, Penn S, Lee VR. Glycol Ether Toxicology. [Updated 2024 Mar 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK589662/>