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C.W.M. Bodar

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Contact:
Dr. C.W.M. Bodar
Expertise Centre for Substances
charles.bodar@rivm.nl

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Rapport in het kort

Environmental risk limits for 2-(2-methoxyethoxy)ethanol (DEGME)

Dit rapport geeft milieurisicogrenzen voor 2-(2-methoxyethoxy)ethanol (DEGME) in (grond)water en bodem. Milieurisicogrenzen zijn de technisch-wetenschappelijke advieswaarden voor de uiteindelijke milieukwaliteitsnormen in Nederland. De milieurisicogrenzen voor DEGME zijn gebaseerd op de uitkomsten van de EU risicobeoordeling voor DEGME (Bestaande Stoffen Verordening 793/93). De afleiding van de milieurisicogrenzen sluit tevens aan bij de richtlijnen uit de Kaderrichtlijn Water.

Contents

Summary

Environmental risk limits (ERLs) are derived using ecotoxicological, physico-chemical, and human toxicological data. They represent environmental concentrations of a substance offering different levels of protection to man and ecosystems. It should be noted that the ERLs are scientifically derived values. They serve as advisory values for the Dutch Steering Committee for Substances, which is appointed to set the Environmental Quality Standards (EQSs) from these ERLs. ERLs should thus be considered as preliminary values that do not have any official status.

This report contains ERLs for 2-(2-methoxyethoxy)ethanol (DEGME) in water, groundwater and soil. The following ERLs are derived: negligible concentration (NC), maximum permissible concentration (MPC), maximum acceptable concentration for ecosystems (MAC_{eco}), and serious risk concentration for ecosystems (SRC_{eco}). The risk limits were solely based on data presented in the Risk Assessment Reports (RAR) for this compound, created under the European Existing Substances Regulation (793/93/EEC). No risk limits were derived for the sediment compartment, because of the relatively low sediment-water partition coefficient. For DEGME, also no risk limits for the air compartment were derived (not relevant).

For the derivation of the MPC and MAC_{eco} for water, the methodology used is in accordance with the Water Framework Directive. This methodology is based on the Technical Guidance Document on risk assessment for new and existing substances and biocides (European Commission (Joint Research Centre), 2003). For the NC and the SRC_{eco} and for the ERLs for the soil and atmospheric compartment, the guidance developed for the project 'International and National Environmental Quality Standards for Substances in the Netherlands' was used (Van Vlaardingen and Verbruggen, 2007). An overview of the derived environmental risk limits is given in Table 1.

Table 1. Derived MPC, NC, MAC_{eco}, and SRC_{eco} values for DEGME.

ERL	**unit**	**value**			
		MPC	NC	MAC_{eco}	SRC_{eco}
$MPC_{eco, water}$	*$mg.l^{-1}$*	*12*			
$MPC_{dw, water}$	*$mg.l^{-1}$*	*7*			
$MPC_{sp, water}$	*$mg.l^{-1}$*	*n.d.*			
$MPC_{hh\ food, water}$	*$mg.l^{-1}$*	*87*			
water [a]	$mg.l^{-1}$	12	0.12	120	370
drinking water [a]	$mg.l^{-1}$	7			
marine, eco	$mg.l^{-1}$	1.2		12 [b]	
sediment		n.d.			
soil [c]	$mg.kg_{dw}^{-1}$	0.3	0.003		152
groundwater	$mg.l^{-1}$	7	0.07		

n.d. = not determined

[a] the $MPC_{dw, water}$ is always noted as a separate value from the other MPC_{water} values ($MPC_{eco, water}$., $MPC_{sp, water}$ or $MPC_{hh, food, water}$). From these other MPC's$_{water}$ (thus excluding the $MPC_{dw, water}$) the lowest one is taken forward as the 'overall' MPC_{water}. Subsequently, the NC_{water} is always based on this overall MPC_{water} value (1/100[th]). This irrespective if this value is lower than the $MPC_{dw, water}$ or not.

[b] provisional value

[c] expressed on Dutch standard soil

1 Introduction

1.1 Project framework

In this report environmental risk limits (ERLs) for surface water (freshwater and marine), groundwater and soil are derived for 2-(2-methoxyethoxy)ethanol (DEGME). The following ERLs are considered:

- negligible concentration (NC) – concentration at which effects to ecosystems are expected to be negligible and functional properties of ecosystems must be safeguarded fully. It defines a safety margin which should exclude combination toxicity. The NC is derived by dividing the MPC (see next bullet) by a factor of 100.
- maximum permissible concentration (MPC) – concentration in an environmental compartment at which:
  1 no effect to be rated as negative is to be expected for ecosystems;
  2a no effect to be rated as negative is to be expected for humans (for non-carcinogenic substances);
  2b for humans no more than a probability of 10^{-6} over the whole life (one additional cancer incident in 10^{6} persons taking up the substance concerned for 70 years) can be calculated (for carcinogenic substances) (Lepper, 2005).
- maximum acceptable concentration (MAC_{eco}) – concentration protecting aquatic ecosystems for effects due to short-term exposure or concentration peaks.
- serious risk concentration (SRC_{eco}) – concentration at which serious negative effects in an ecosystem may occur.

It should be noted that ERLs are scientifically (based on (eco)toxicological, fate and physico-chemical data) derived values. They serve as advisory values for the Dutch Steering Committee for Substances, which is appointed to set the Environmental Quality Standards (EQSs) from these ERLs. ERLs should thus be considered as preliminary values that do not have any official status.

2 Methods

2.1 Data collection

The final Risk Assessment Report (RAR) of DEGME produced in the framework of Existing Substances Regulation (793/93/EEC) was used as only source of physico-chemical and (eco)toxicity data (European Commission, 2000). Information given in the RARs is checked thoroughly by European Union member states (Technical Committee) and afterwards approved by the Scientific Commission on Health and Environmental Risk (SCHER). Therefore, no additional evaluation of data is performed for the ERL derivation. Only valid data combined in an aggregated data table are presented in the current report. Occasionally, key studies are discussed when relevant for the derivation of a certain ERL.

In the aggregated data table only one effect value per species is presented. When for a species several effect data are available, the geometric mean of multiple values for the same endpoint is calculated where possible. Subsequently, when several endpoints are available for one species, the lowest of these endpoints (per species) is reported in the aggregated data table.

2.2 Methodology for derivation of environmental risk limits

The methodology for data selection and ERL derivation is described in Van Vlaardingen and Verbruggen (2007) which is in accordance with Lepper (2005). For the derivation of ERLs for air, no guidance is available. However, as much as possible the basic principles underpinning the ERL derivation for the other compartments are followed for the atmospheric ERL derivation (if relevant for a chemical).

3 Derivation of environmental risk limits for 2-(2-methoxyethoxy)ethanol

3.1 Substance identification, physico-chemical properties, fate and human toxicology

3.1.1 Identity

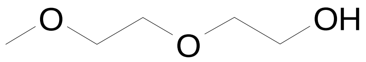

Figure 1. Structural formula of DEGME.

Table 2. Identification of DEGME.

Parameter	Name or number
Chemical name	2-(2-methoxyethoxy)ethanol
Common/trivial/other name	DEGME
	diethylene glycol methyl ether
	diglycol monomethyl ether
	3,6-Dioxa-1-heptanol
	Dowanol DM
	ethanol, 2,2'oxybis-, monomethyl ether
	ethanol, 2-(2-methoxyethoxy)- (6CI, 8CI, 9CI)
	Emkanol MDG
	ethylene diglycol monomethyl ether
	1-hydroxy-3,6-dioxaheptan
	beta-Methoxy-beta'-hydroxydiethyl ether
	methoxydiglycol
	methyl carbitol
	methyldiethoxol
	methyldiglykol
	methyl diglycol ether
	methyl dioxitol
	Poly-Solv DM
CAS number	111-77-3
EC number	203-906-6
Molecular formula:	$C_5 H_{12} O_3$

3.1.2 Physico-chemical properties

Table 3. Physico-chemical properties of DEGME.

Parameter	Unit	Value	Remark
Molecular weight	[$g.mol^{-1}$]	120.2	
Water solubility	[$g.l^{-1}$]	miscible	
log K_{OW}	[-]	- 0.682	
K_{OC}	[l/kg]	0.35	Value from RAR based on default QSAR TGD 1996/EUSES 1.0. Slightly higher K_{oc} value would be estimated when using TGD 2003/EUSES 2.0.
Vapour pressure	[hPa]	<0.3 0.24	at 20ºC at 25ºC
Melting point	[°C]	-65	
Boiling point	[°C]	190-196	
Henry's law constant	[$Pa.m^3.mol^{-1}$]	$2.9x10^{-3}$	at 20ºC

3.1.3 Behaviour in the environment

Table 4. Selected environmental properties of DEGME.

Parameter	Unit	Value	Remark
hydrolysis half-life	DT_{50} [d]	-	Experimental data were not reported. However, DEGME is not expected to hydrolyse based on the absence of hydrolysable groups (RAR information).
photolysis half-life	DT_{50} [h]	-	RAR*: "Since DEGME does not adsorb ultraviolet radiation within the solar spectrum, direct photolysis in the atmosphere is not expected to occur"*. A half life of 16 hours is estimated for photo-oxidation (reaction with OH radicals). No specific data on photolysis in water.
degradability	readily biodegradable, but failing 10-day window		

The RAR gives some general considerations on the environmental distribution of DEGME: "*It is concluded that DEGME seems to be readily degradable. However, as not all biodegradation pass levels are reached within the 10/14d time windows, DEGME is considered as ready biodegradable, but failing the 10 days window in the risk assessment process. The Henry's Law constant of 2.9 * 10^{-3} $Pa.m^3$/mol 20^0C indicates that volatilization of DEGME from surface waters is not expected to be an important fate* *process. The estimated K_{oc} of 0.353 l/kg indicates that DEGME will be highly mobile in soil. Owing to the complete miscibility of DEGME in water, physical removal may occur from air by precipitation and dissolution in clouds. However, its short atmospheric residence time (reaction with OH-radicals) suggests that wet deposition is of limited importance".*

3.1.4 Bioaccumulation and biomagnification

Table 5. Overview of bioaccumulation data for DEGME.

Parameter	Unit	Value	Remark
BCF (fish)	[$l.kg^{-1}$]	1.4	Calculated value based on K_{ow}.
BCF (mussel)	[$l.kg^{-1}$]	n.a.	
BMF	[$kg.kg^{-1}$]	1	

No experimental data on bioaccumulation is available. Therefore BCF-value for fish was calculated in the RAR using the log K_{ow}. The estimated BCF-value amounts to 1.4 (l/kg) for fish. Although it is realised that the relationship between BCF and log K_{ow} may not be valid at such low log K_{ow}-values it can be concluded that in view of this BCF, DEGME is expected to have a low bioaccumulating potential in the environment.

3.1.5 Human toxicological threshold limits and carcinogenicity

Classification and labelling according to the 25th ATP of Directive 67/548/EEC:
Classification: Repr. Cat.3; R63
Labelling: Xn R63 S(2-)36/37

No TDI (or equivalent) or TCA (or equivalent) is available for DEGME.
There are no carcinogenicity studies with animals nor human data available. The lack of mutagenic potential and the effects observed in the repeated dose toxicity studies does not give cause for concern for carcinogenicity (RAR information).
The RAR gives a lowest oral NOAEL of 200 mg/kg bw/day for DEGME from an oral developmental study in rats. An inhalatory NOAEL ≥ 189 mg/m^3 is reported from a 90-day rat study.

3.2 Trigger values

This section reports on the trigger values for MPC_{water} derivation (following WFD methodology).

Table 6. DEGME: collected properties for comparison to MPC triggers for water ERL-derivation. N.a. = not available.

Parameter	Value	Unit	Method/Source
log $K_{P,susp-water}$	- 1.5	[-]	$K_{OC} \times f_{OC,susp}$ [1]
BCF	1.4	[$l.kg^{-1}$]	
BMF	1	[-]	
log K_{OW}	- 0.68	[-]	

R-phrases	R63	[-]
A1 value	n.a.	[$\mu g.l^{-1}$]
DW standard	n.a.	[$\mu g.l^{-1}$]

[1] $f_{OC,susp}$ = 0.1 $kg_{OC}.kg_{solid}^{-1}$ ((European Commission (Joint Research Centre), 2003)).
K_{OC} = 0.353 l/kg.

- DEGME has a log $K_{P,\ susp\text{-}water}$ << 3; derivation of $MPC_{sediment}$ is not triggered.
- DEGME has a log $K_{P,\ susp\text{-}water}$ << 3; expression of the MPC_{water} as $MPC_{susp,\ water}$ is not required.
- DEGME is not suspected to bioaccumulate on basis of its low K_{ow}; assessment of secondary poisoning is not triggered.
- DEGME has an R63 classification. Therefore, MPC_{water} for human health via food (fish) consumption ($MPC_{hh\ food,\ water}$) needs to be derived.

3.3 Toxicity data and derivation of ERLs for water

3.3.1 $MPC_{eco,\ water}$ and $MPC_{eco,\ marine}$

Freshwater toxicity data for DEGME as reported in the RAR are listed in Table 7. Only acute data are available for DEGME. No marine toxicity data are presented in the RAR.

Table 7. DEGME: selected aquatic freshwater data for ERL derivation.

Taxonomic group	$L(E)C_{50}$ ($mg.l^{-1}$)
Bacteria	
Pseudomonas putida	>10,000
Algae	
Scenedesmus capricornotum	>1000
Scenedesmus subspicatus	>500
Crustacea	
Daphnia magna	1192
Daphnia magna	>500
Daphnia magna	>1000
Pisces	
Lepomis macrochirus	7500
Pimephales promelas	5700
Onchorhynchus mykiss	>1000

Treatment of fresh- and saltwater toxicity data

No marine toxicity data were presented in the RAR for DEGME. Therefore, the freshwater toxicity data are used to derive an $MPC_{eco,\ marine}$.

Derivation of $MPC_{eco,\ water}$ and $MPC_{eco,\ marine}$

In the RAR the PNEC for the aquatic compartment is extrapolated from the EC50 for Daphnia (1192 mg/l). *"Strictly speaking and following the TGD, the absence of long-term toxicity data for DEGME leads to the use of a factor 1,000. This would result in a PNEC of 1.2 mg/l. It is felt, however, that in the case of DEGME there are a number of reasons to deviate from this rule and use an extrapolation factor of 100:*
a) on top of the base set (fish, daphnids and algae) data from a fourth trophic level, i.e. micro-organisms, is available (test with P. putida)
b) data for several fish species are available
c) DEGME has shown a low short-term toxicity to water organisms (all reported L(E)C50-values are >500 mg/l) and in several tests no effects were observed even at the highest test concentration. This means that the "real" L(E)C50 is probably higher.
d) DEGME can be classified as a compound which acts by non-polar narcosis. This can be concluded from the observation that there is no significant difference between the L(E)C50 values for fish, Daphnia, algae and bacteria (factor <10), which is typical for this category of substances.
This conclusion is further supported by Verhaar et al. (1993 and Bol et al. (1993), who classified linear ethers on structural grounds as "class 1 type compounds", i.e. compounds showing narcosis or baseline toxicity. Using the equations for non-polar narcotics given in Appendix II of Chapter 4 of the TGD, ecotoxicity QSAR data can be estimated (see table below). These data (esp. fish) are reasonably consistent with the experimental data.

Species	*Endpoint*	*Value (mg/l)*
Pimephales promelas	*96 h LC_{50}*	*18,600*
Brachydanio rerio/P. promelas	*28-32 d NOEC*	*2,500*
Daphnia magna	*48 h EC_{50}*	*25,500*
Daphnia magna	*16 d NOEC*	*8,800*
Selenastrum capricornutum	*72-97 h EC_{50}*	*34,000*

The extrapolation with a factor 100 leads to a PNEC for the aquatic environment of 12 mg/l."
The $MPC_{eco,\ water}$ is equal to the $PNEC_{aquatic}$. Thus, $MPC_{eco,\ water}$ = 12 mg.l^{-1}.
It should be noted that in the RAR on DEGME micro-organisms were taken into account when deriving a PNEC for water. In most RARs data on aquatic micro-organisms only serve as input for a PNEC for sewage treatment plants.
In the RAR no effect assessment for the marine environment is carried out. Moreover, no marine data are presented in the RAR. When following the TGD and using the dataset for freshwater organisms an assessment factor of 1000 should be applied to the lowest acute value 1192 mg.l^{-1} ->
$MPC_{eco,marine}$ = 1.2 mg.l^{-1}.

3.3.2 $MPC_{sp,\ water}$ and $MPC_{sp,\ marine}$

DEGME has a BCF<100. Thus, assessment of secondary poisoning is not triggered (Table 6).

3.3.3 $MPC_{hh\ food,\ water}$

Derivation of $MPC_{hh\ food,\ water}$ for DEGME is triggered (Table 6). A TL_{hh} of 2 mg/kg bw/day can be derived from the NOAEL of 200 mg/kg bw/day applying a factor of 100. From this an $MPC_{hh\ food}$ can be derived: $(0.1*TL_{hh}\ 70)/0.115 = (0.1*2*70)/0.115 = 14/0.115 = 122\ mg/kg_{food}$. The $MPC_{hh\ food,\ water}$ then becomes 122/ (BCF*BMF)= 122/(1.4*1) = 87 $mg.l^{-1}$..

3.3.4 $MPC_{dw,\ water}$

No A1 value and DW standard are available for DEGME. In the RAR for DEGME, an oral NOAEL of 200 mg/kg bw/day is used. The TL_{hh} = 200/100 = 2 mg/kg bw/day. The $MPC_{dw,\ water,\ provisional}$ = $(0.1*TL_{hh} * BW)$/uptake = (0.1 * 2 * 70)/2 = 7 $mg.l^{-1}$. According to the model of Zwolsman et al. (2004) the fraction not removable by simple surface water treatment amounts to 0.999 for DEGME. The $MPC_{dw,\ water,}$ is therefore 7 $mg.l^{-1}$.

3.3.5 Selection of the MPC_{water} and MPC_{marine}

In the Fraunhofer document (Lepper, 2005) it is prescribed that the lowest MPC value should be selected as the general MPC. In the proposal for the daughter directive Priority Substances, a standard based on drinking water was not included. Provisionally, in the Netherlands the $MPC_{dw,\ water}$ will always be noted as a separate value from the other MPC_{water} values ($MPC_{eco,\ water}$., $MPC_{sp,\ water}$ or $MPC_{hh,\ food,\ water}$). From these other MPC's$_{water}$ (thus excluding the $MPC_{dw,\ water}$) the lowest one is taken forward as the 'overall' MPC_{water}. Subsequently, the NC_{water} is always based on this overall MPC_{water} value (1/100th). This irrespective if this value is lower than the $MPC_{dw,\ water}$ or not. The $MPC_{dw,\ water,}$ = 7 $mg.l^{-1}$.
The MPC_{water} is the $MPC_{water,\ eco}$ (lowest value of the other values) of 12 $mg.l^{-1}$.
The only marine MPC of 1.2 $mg.l^{-1}$ is set as MPC_{marine}. MPC_{marine} = 1.2 $mg.l^{-1}$.

3.3.6 $MAC_{eco,\ water}$

The EC_{50}-value of 1192 $mg.l^{-1}$ for *Daphnia magna* is the lowest reported acute toxicity value in the RAR. The base set is complete and DEGME has no potential to bioaccumulate. Furthermore the mode of action is assumed to be known (narcotic). Therefore, an assessment factor of 10 is applied. The MAC_{eco} for fresh water is 1192 $mg.l^{-1}$/10 = 120 $mg.l^{-1}$.

The $\mathbf{MAC_{eco,\ marine}}$ amounts to 120/10 = 12 $mg.l^{-1}$. It has to be noted that this procedure for $MAC_{eco,\ marine}$ is currently not agreed upon. Therefore, the $MAC_{eco,marine}$ value needs to be re-evaluated once an agreed procedure is available.

3.3.7 NC_{water}

The NC_{water} is set to a factor of 100 below the MPC_{water}. NC_{water} is 12/100 = 0.12 $mg.l^{-1}$.

3.3.8 $SRC_{eco,\ water}$

For the calculation of the geometric mean of acute freshwater toxicity data, the following values were used: 1192 $mg.l^{-1}$ for *Daphnia magna,* 5700 $mg.l^{-1}$ for *Pimephales promelas* and 7500 $mg.l^{-1}$ for *Lepomis macrochirus*. Other data referred to unbounded values (>). It is realised that algae data are not directly considered in this derivation. An assessment factor of 10 needs to be applied on the geometric mean value. The resulting $SRC_{eco,\ water}$ is 3700/10 = 370 $mg.l^{-1}$.

3.4 Toxicity data and derivation of ERLs for sediment

The log $K_{p,\ susp\text{-}water}$ of DEGME is below the trigger value of 3, therefore, ERLs are not derived for sediment.

3.5 Toxicity data and derivation of ERLs for soil

No experimental data on toxicity to soil organisms are reported in the RAR.

3.5.1 $MPC_{soil,\ sp}$

The $MPC_{soil,\ sp}$ is not triggered for DEGME (no potential to bioaccumulate).

3.5.2 $MPC_{eco,\ soil}$

In the RAR, the equilibrium partitioning method is applied according to the TGD. EUSES is reported to have generated a $PNEC_{terrestrial}$ of 1.6 mg/kg. MPC_{soil} = 1.6 $mg.kg_{dwt}^{-1}$ (1.4 $mg.kg_{wwt}^{-1}$).After conversion to Dutch standard soil the value becomes 1.6*5.88/2 = 4.9 $mg.kg_{dwt}^{-1}$. It should be noted that the use of the equilibrium partitioning method is questionable for chemicals with a very low hydrophobicity (log K_{ow} of – 0.682).

3.5.3 $MPC_{human,\ soil}$

The $MPC_{human,\ soil}$ is based on the NOAEL of 200 mg/kg bw/day (see paragraph 3.1.1.5). The TL_{hh} = 200/100 = 2 mg/kg bw/day. Specific human intake routes are allowed to contribute 10% of the human toxicological threshold limit. Four different routes contributing to human exposure have been incorporated: consumption of leafy crops, root crops, milk and meat. The critical route for DEGME was calculated to be consumption of leaf crops. The $MPC_{soil,\ human}$ was determined to be 0.3 $mg.kg_{dwt}^{-1}$ Dutch standard soil.

3.5.4 Selection of the MPC_{soil}

The lowest MPC_{soil} is the $MPC_{human,\ soil}$ of 0.3 $mg.kg_{dwt}^{-1}$ Dutch standard soil.

3.5.5 NC_{soil}

The NC_{soil} is set a factor 100 lower than the MPC_{soil}. NC_{soil} = 3 $\mu g.kg_{dwt}^{-1}$ Dutch standard soil.

3.5.6 $SRC_{eco,\ soil}$

No terrestrial data are presented in the RAR for DEGME. The SRC_{eco}-value can be based on equilibrium partitioning, but it is again emphasized that the validity of the partitioning coefficients is questionable (low log K_{ow}). From the $SRC_{eco,\ water}$ of 370 mg/l an $SRC_{eco,\ soil}$ of 51* 5.88/2 = 152 $mg.kg_{dwt}^{-1}$ is derived for Dutch standard soil.

3.6 Derivation of ERLs for groundwater

3.6.1 $MPC_{eco, gw}$

Since groundwater-specific ecotoxicological information is absent, the derived ERLs for surface water based on ecotoxicological data are taken as substitute. Thus, $MPC_{eco, gw} = MPC_{eco, water} = 12$ mg.l^{-1}.

3.6.2 $MPC_{human, gw}$

The $MPC_{human, gw}$ is set equal to the $MPC_{dw, water}$. Thus, $MPC_{human, gw} = MPC_{dw, water} = 7$ mg.l^{-1}.

3.6.3 Selection of MPC_{gw}

The lowest available MPC is the $MPC_{human, gw}$ of 7 mg.l^{-1}. Thus, the final $MPC_{gw} = 7$ mg.l^{-1}.

3.6.4 NC_{gw}

The NC_{gw} is set a factor 100 lower than the MPC_{gw}. Thus, $NC_{gw} = 7/100 = 0.07$ mg.l^{-1}.

3.7 Derivation of ERLs for air

In the RAR for DEGME no ecotoxicological data are available for the atmospheric compartment. Therefore, no $MPC_{eco, air}$ can be derived.
In the RAR, risk for humans exposed via the atmosphere is estimated on basis of a inhalatory NOAEL of ≥ 189 mg/m^3. However, because of the low Henry's Law constant and its short residence time in air, the derivation of an MPC_{air} was considered not relevant for DEGME.

4 Conclusions

In this report, the environmental risk limits negligible concentration (NC), maximum permissible concentration (MPC), maximum acceptable concentration for aquatic ecosystems (MAC_{eco}), and serious risk concentration for ecosystems (SRC_{eco}) are derived for DEGME in water, groundwater and soil. No risk limits were derived for the sediment compartment because exposure of sediment is considered negligible. Also no ERLs for air were derived for DEGME. The ERLs that were obtained are summarised in Table 8 below.

Table 8. Derived MPC, NC, MAC_{eco}, and SRC_{eco} values for DEGME.

ERL	unit	value			
		MPC	NC	MAC_{eco}	SRC_{eco}
$MPC_{eco, water}$	*$mg.l^{-1}$*	*12*			
$MPC_{dw, water}$	*$mg.l^{-1}$*	*7*			
$MPC_{sp, water}$	*$mg.l^{-1}$*	*n.d.*			
$MPC_{hh\ food, water}$	*$mg.l^{-1}$*	*87*			
water [a]	$mg.l^{-1}$	12	0.12	120	370
drinking water [a]	$mg.l^{-1}$	7			
marine, eco	$mg.l^{-1}$	1.2		12 [b]	
sediment		n.d.			
soil [c]	$mg.kg_{dw}^{-1}$	0.3	0.003		152
groundwater	$mg.l^{-1}$	7	0.07		

n.d. = not determined

[a] the $MPC_{dw, water}$ is always noted as a separate value from the other MPC_{water} values ($MPC_{eco, water}$., $MPC_{sp, water}$ or $MPC_{hh, food, water}$). From these other MPC's$_{water}$ (thus excluding the $MPC_{dw, water}$) the lowest one is taken forward as the 'overall' MPC_{water}. Subsequently, the NC_{water} is always based on this overall MPC_{water} value (1/100th). This irrespective if this value is lower than the $MPC_{dw, water}$ or not.

[b] provisional value

[c] expressed on Dutch standard soil

References

European Commission. 2000. 2-(2-Methoxyethoxy)ethanol. European Union Risk Assessment Report, Vol. 1. Luxembourg: Office for Official Publications of the European Communities.

European Commission (Joint Research Centre) (2003) Technical Guidance Documents, European Chemicals Bureau, Institute for Health and Consumer Protection, Ispra, Italy.

Lepper P. 2005. Manual on the Methodological Framework to Derive Environmental Quality Standards for Priority Substances in accordance with Article 16 of the Water Framework Directive (2000/60/EC). Schmallenberg, Germany: Fraunhofer-Institute Molecular Biology and Applied Biology.

Van Vlaardingen PLA, Verbruggen EMJ. 2007. Guidance for the derivation of environmental risk limits within the framework of 'International and national environmental quality standards for substances in the Netherlands (INS). Bilthoven, the Netherlands: National Institute for Public Health and the Environment. Report no. 601782001/2007.

Zwolsman JJG, Bernhardi L, IJpelaar GF, van den Berg GA. 2004. Bescherming drinkwaterfunctie: Bescherming van oppervlaktewater voor de drinkwatervoorziening onder de Europese Kaderrichtlijn Water. Rijswijk, the Netherlands: VEWIN, report no. 2004/43/4243.