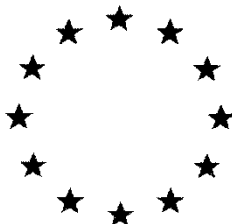


# ***European Commission***



**Draft Renewal Assessment Report prepared according to the Commission  
Regulation (EU) N° 1107/2009**

**Ethofumesate**

**Volume 3 – B.8 (PPP) – Ethofol 500 SC**

Rapporteur Member State: Austria

Co-Rapporteur Member State: Denmark

---

**Version History**

<b>When</b>	<b>What</b>
2015/01	DRAR

---

Table of contents

<b>B.8. ENVIRONMENTAL FATE AND BEHAVIOUR .....</b>	<b>4</b>
<b>B.8.1. FATE AND BEHAVIOUR IN SOIL .....</b>	<b>4</b>
B.8.1.1. Route and rate of degradation in soil .....	4
B.8.1.2. Mobility in soil .....	4
<b>B.8.2. PREDICTED ENVIRONMENTAL CONCENTRATIONS IN SOIL (PEC<sub>S</sub>) .....</b>	<b>5</b>
<b>B.8.3. PREDICTED ENVIRONMENTAL CONCENTRATIONS IN GROUND WATER (PEC<sub>GW</sub>) .....</b>	<b>10</b>
<b>B.8.4. FATE AND BEHAVIOUR IN WATER AND SEDIMENT .....</b>	<b>16</b>
B.8.4.1. Aerobic mineralisation in surface water .....	16
B.8.4.2. Water/sediment study .....	16
B.8.4.3. Irradiated water/sediment study .....	17
<b>B.8.5. PREDICTED ENVIRONMENTAL CONCENTRATIONS IN SURFACE WATER AND SEDIMENT (PEC<sub>SW</sub>, PEC<sub>SD</sub>) .....</b>	<b>FEHLER! TEXTMARKE NICHT DEFINIERT.</b>
<b>B.8.6. FATE AND BEHAVIOUR IN AIR .....</b>	<b>34</b>
B.8.6.1. Route and rate of degradation in air and transport via air .....	34
B.8.6.2. Predicted environmental concentrations from airborne transport .....	34
<b>B.8.7. PREDICTED ENVIRONMENTAL CONCENTRATIONS FROM OTHER ROUTES OF EXPOSURE .....</b>	<b>34</b>
<b>B.8.8. REFERENCES RELIED ON .....</b>	<b>35</b>

## **B.8. ENVIRONMENTAL FATE AND BEHAVIOUR**

### **B.8.1. FATE AND BEHAVIOUR IN SOIL**

#### **B.8.1.1. Route and rate of degradation in soil**

In the aerobic metabolism studies evaluated in the course of the first approval, ethofumesate was slowly degraded (lab DT50 up to 211 days). The main degradation products were carbon dioxide and non-extractable residues. Ethofumesate was degraded in soil through the action of soil micro flora via either dealkylation (NC 8493, ethofumesate- 2- hydroxy) followed by oxidation (NC 9607, ethofumesate-lactone) and ring opening (NC 20645, ethofumesate-carboxylic acid). These studies, however, were often characterized by inappropriate handling of the experimental soils (storage of the soils outdoors or under ambient conditions for up to three months, low microbial biomass levels, no pre-incubation prior application of the spiking solutions). The newly submitted aerobic soil degradation studies confirmed the previously established degradation route, but degradation was faster due to the use of freshly sampled soils. Considering the valid studies from the previous evaluation and the new studies, ethofumesate was generally moderately fast degraded (Dt50 lab: 9.4 – 137 d; geomean = 18.7 d; n =17). The main degradation products were carbon dioxide and unextractable residues. Ethofumesate is degraded to NC 8493 (ethofumesate- 2- hydroxy) followed by NC 9607 (ethofumesate-lactone) and NC 20645 (ethofumesate-carboxylic acid) or the loss of the methanesulfonate moiety to transient degradates which are converted to non-extractable residues (21 - 64% AR; n = 17) and mineralized to CO<sub>2</sub> (4 - 60% AR; n = 17 ) at 100 days. Metabolites were detected in minor amounts only (< 5% AR).

#### **B.8.1.2. Mobility in soil**

Ethofumesate was rapidly and strongly adsorbed to soil in laboratory tests with Koc ranging between 97 and 208 mL/g (geomean 118 mL/g; n = 12). An additional time-dependent sorption study was submitted by the notifier Taskforce. The increase of sorption over time was defined as the ratio of concentration of [Phenyl-UL-14C]Ethofumesate in soil to the concentration in aqueous 0.01 M CaCl<sub>2</sub> extracts (RTDS value). At study end (91 days), the mean RTDS value increased by a factor of 1.4-3.0 indicating effects of ageing on adsorption of ethofumesate. Adsorption to soil of the metabolites NC 8493, NC 9607 and NC 20645 was investigated. Due to the fast degradation of these metabolites, the sorption to soil could not be determined for NC 8493 with batch equilibrium tests and was instead estimated via EPI WIN to 20.82 mL/g. For NC 20645 (ethofumesate-carboxylic acid) the Koc could be determined in 4 of 5 investigated soils. The adsorption to soil was low (geomean KFOC: 5.6 mL/g).

Due to several experimental deficiencies, only one column study could be regarded as valid. In this study, aged ethofumesate residue (corresponding to field rate of 7.25 kg/ha) was leached with a solution simulating approximately 500mm of artificial rain. Over the study, 2.7% AR mainly consisting of ethofumesate and NC20645 were found in the leachate.

In the course of the first approval of ethofumesate, 5 lysimeter studies covering a period of two or three years with either one or two applications of ethofumesate were evaluated. Spring application rates of 1.25 and 1.5 kg/ha were studied in lysimeters planted with sugar or fodder beet followed by wheat. Mean annual precipitation ranged between 857 and 820 mm/year. Ethofumesate was not detected in the leachate of any of the lysimeter and at termination of the studies the majority of the radioactivity remained in the top 30 cm of the soil layers. Concentrations below 0.1 µg/L of NC9607 were observed in some leachates. The majority of the radioactivity in the leachate was attributed to ethofumesate derived fragments metabolized by soil micro-organisms and subsequently incorporated into soil organic matter. However, in one study an individual peak ("Peak A") was identified. The highest maximum concentration was 0.5 µg/L (annual mean, calculated as a.s. equivalent). It was not evaluated whether this peak consisted of one or more components. In a targeted study, the notifier Taskforce could identify the structure of both metabolites potentially representing Peak A as glycoside conjugates of the respective soil metabolites NC 8493 and NC 20645. Two new lysimeter studies were submitted by the notifier UPL. In the first study, Ethofumesate and its degradation products did not exceed 0.1 µg/L in the leachate. In this two year study, unidentified polar material – attributable neither to ethofumesate nor to NC9607 - ranged between 0.7 and 1.89 µg/L parent equivalents. Similar results were obtained in the second lysimeter study, where the concentration in the leachate was similar and the majority of Ethofumesate was incorporated into large organic structures. Furthermore, up to 14 unknown fractions were detected in this two year study and none exceeded 0.1 µg/L (annual average concentrations). Therefore, it can be assumed that also in the first the unidentified polar material belongs to a larger number of fractions.

### B.8.2. PREDICTED ENVIRONMENTAL CONCENTRATIONS IN SOIL (PEC<sub>s</sub>)

The initial PEC<sub>s</sub> [mg kg<sup>-1</sup>] of the active ingredient from a single application depends on the application rate A [g ha<sup>-1</sup>] of the compound, on the crop interception C [%], on the bulk density BD of the dry soil [g cm<sup>-3</sup>] (standard value 1.5 g cm<sup>-3</sup>) and on the assumed mixing depth d [cm] (standard value 5 cm), according to

$$PEC_{S,init} = A \times (1 - 0.01 \times C) / (100 \times BD \times d)$$

In single application scenarios, the initial PEC<sub>s</sub> is equal to the overall maximum. Based on the maximum PEC<sub>s</sub> and assuming simple first-order kinetics (SFO) with degradation rate k [d<sup>-1</sup>] ( $k = \ln(2)/DT_{50}$ ), the soil concentration over time [d] are given by

$$PEC_S(t) = PEC_{S,max} \times e^{-k \times t}$$

For a comparison with effect endpoints from long-term (chronic) ecotoxicological studies, it is sometimes more appropriate to use time-weighted average (TWA) exposure concentrations.

For SFO kinetics, the TWA concentrations are given by

$$TWA_S(t) = PEC_{S,max} \times 1 / (k \times t) \times (1 - e^{-k \times t})$$

The relevant application data are shown in the table below.

The worst case non-normalized  $DT_{50, field}$  was the relevant degradation half-time to be considered.

**Table 8-1: Ethofumesate rate of degradation field soil dissipation studies**

Parent	Aerobic conditions								
Soil type (indicate if bare or cropped soil was used).	Location (country or USA state).		pH <sup>a)</sup>	Depth (cm)	DT <sub>50</sub> (d) actual	DT <sub>90</sub> (d) actual	St. ( $\chi^2$ )	DT <sub>50</sub> (d) Norm <sup>b)</sup> .	Method of calculation
MainzA Loamy silt	Germany	bare soil	7,5	0-30	116	384	13.3	69.5	SFO
MainzB Loamy silt	Germany	bare soil	7,5	0-30	114	379	11.3	47.4	SFO
SpeyerA Silty sand	Germany	bare soil	6.7	0-30	19.5 k1 = 0.10862 k2 = 0.00695 g = 0.4963	233	10.5	47.2*	DFOP
SpeyerB Silty sand	Germany	bare soil	6.7	0-30	13.6 k1 = 0.09528 k2 = 0.00772 g = 0.6392	166	3.9	46.5*	DFOP
Isleham Loamy sand bare	UK	bare soil	7.5	0-30	59	147	12.3	25.7	SFO
Willingham Sandy clay loam bare	UK	bare soil	7.5	0-30	44	196	22	18.0	SFO
Fresno Sandy loam	California	bare soil	6.5	0-90	89	295	20.7	112	SFO
Keeken loam	Germany	bare soil	6.1	0-30	40	134	21.1	22.1	SFO
Weeze sand	Germany	bare soil	5.8	0-30	157	522	15.0	75.7	SFO

Parent	Aerobic conditions								
Soil type (indicate if bare or cropped soil was used).	Location (country or USA state).		pH <sup>a)</sup>	Depth (cm)	DT <sub>50</sub> (d) actual	DT <sub>90</sub> (d) actual	St. ( $\chi^2$ )	DT <sub>50</sub> (d) Norm <sup>b)</sup> .	Method of calculation
NZ11007/1 Clay loam	UK	bare soil	7.13	0-30	21.6	72	16	15.2	SFO
NZ11007/2 Silty clay loam	Germany	bare soil	7.57	0-30	10.2	74	4.1	13.5	DFOP SFO
NZ11007/3 Silty clay loam	France	bare soil	7.72	0-30	35.9 k1 = 0.03878 k2 = 0.003795 g = 0.5968	367	6.1	110 c)	DFOP
NZ11007/4 Loam	Spain	bare soil	7.7	0-30	12.3 k1 = 0.1805 k2 = 0.00662 g = 0.0518	237	12.0	60 c)	DFOP
Geometric mean (if not pH dependent)								40.7	
pH dependence					No				

\*...from slow phase degradation constant

Soil photolysis metabolite NC8493 occurred at a maximum of 24.2 % in one study. The respective PEC<sub>soil</sub> for the metabolite was calculated assuming a maximum occurrence of 24.2% and a molecular correction factor of 0.902.

**Table 8-2: Rate of degradation in soil of metabolite NC8493**

NC8493	Dark aerobic conditions Metabolite dosed.							
Soil type	X <sup>7</sup>	pH <sup>a)</sup>	t. °C / % MWHC	DT <sub>50</sub> / DT <sub>90</sub> (d)	f. f. k <sub>f</sub> / k <sub>dp</sub>	DT <sub>50</sub> (d) 20 °C pF2/10kPa <sup>b)</sup>	St. ( $\chi^2$ )	Method of calculation
Silt loam	Fisli	6.82	20°C / pF 2.5	0.05/0.18	-	0.04	27.2	SFO
Loam	Horn	7.23	20°C / pF 2.5	0.07/0.24	-	0.06	10.5	SFO
Sandy loam	Sevelen	7.51	20°C / pF 2.5	0.05/0.17	-	0.04	21.1	SFO
Sandy loam	AX	5.5	20°C / 55%	0.02/0.07	-	0.02	5.1	SFO
Silt loam	HH	6.1	20°C / 55%	0.02/0.07	-	0.02	1.4	SFO
Clay loam	DD	7.2	20°C / 55%	0.01/0.03	-	0.01	1.4	SFO
Sandy loam	WW	5.0	20°C / 55%	0.02/0.06	-	0.06*	2.2	DFOP

Geometric mean (if not pH dependent)			0.03		
Arithmetic mean		-			
pH dependence,	No				

The following PEC soil were calculated.

#### Ethofumesate PEC soil (mg/kg) applied post-emergence as Ethofol 500 SC

Parent	DT <sub>50</sub> (d): 157 days Kinetics: SFO Field or Lab: representative worst case from field studies.
Method of calculation	
Application data	Crop: sugar beet Depth of soil layer: 20cm Soil bulk density: 1.5g/cm <sup>3</sup> % plant interception: 20% Number of applications: 1-3 Interval (d): 5 Application rate(s): 3 x 333 g a.s./ha Application every 3 years

PEC <sub>(s)</sub> (mg/kg)			3 x 333 g/ha		
				Multiple application Actual	Multiple application Time weighted average
Initial				0.355	
Short term 24h				0.354	1.041
2d				0.352	1.038
4d				0.349	1.034
Long term 7d				0.696	1.027
28d				0.963	0.981
50d				0.874	0.936
100d				0.701	0.844
Plateau concentration	0.002 mg/kg after 50 yr				

NC8493

Method of calculation

Molecular weight relative to the parent: 0.902  
 DT<sub>50</sub> (d): 0.07 days



Application data

Kinetics: SFO

Field or Lab: representative worst case from lab studies.

Application rate assumed:

3 x 73 g/ha

(assumed NC8493 is formed at a maximum of 24.2 % of the applied dose and a molecular weight rel. to parent of 0.902)

				3 x 333 g/ha	
PEC <sub>(s)</sub> (mg/kg)				Multiple application Actual	Multiple application Time weighted average
Initial				0.078	
Short term 24h				<0.001	0.021
2d				<0.001	0.011
4d				<0.001	0.005
Long term 7d				<0.001	0.006
28d				<0.001	0.002
50d				<0.001	0.001
100d				<0.001	0.001
Plateau concentration	<0.001 mg/kg after 50 yr				

**Ethofumesate PEC soil (mg/kg) applied pre-emergence as Ethofol 500 SC**

Parent

Method of calculation

DT<sub>50</sub> (d): 157 days

Kinetics: SFO

Field or Lab: representative worst case from field studies.

Application data

Crop: sugar beet

Depth of soil layer: 20cm

Soil bulk density: 1.5g/cm<sup>3</sup>

% plant interception: 0%

Number of applications: 1

Interval (d): -

Application rate(s): 1 x 1000 g a.s./ha

Application every 3 years

<b>PEC<sub>(s)</sub></b> (mg/kg)	Single application Actual	Single application Time weighted average
Initial	1.333	
Short term 24h	1.327	1.331
2d	1.322	1.328
4d	1.310	1.322
Long term 7d	1.293	1.314
28d	1.178	1.255
50d	1.069	1.197
100d	0.857	1.079
Plateau concentration	0.003 mg/kg after 50 yr	

NC8493

Method of calculation

Molecular weight relative to the parent: 0.902

DT<sub>50</sub> (d): 0.07 days

Kinetics: SFO

Field or Lab: representative worst case from lab studies.

Application data

Application rate assumed:

1 x 218g/ha

(assumed NC8493 is formed at a maximum of 24.2 % of the applied dose)

<b>PEC<sub>(s)</sub></b> (mg/kg)	Single application Actual	Single application Time weighted average
Initial	0.291	
Short term 24h	<0.001	0.079
2d	<0.001	0.040
4d	<0.001	0.020
Long term 7d	<0.001	0.011
28d	<0.001	0.003
50d	<0.001	0.002
100d	<0.001	0.001
Plateau concentration	<0.001 mg/kg after 50 yr	

**B.8.3. PREDICTED ENVIRONMENTAL CONCENTRATIONS IN GROUND WATER (PEC<sub>GW</sub>)**

---

<b>Reference:</b>	<b>CALCULATION OF PREDICTED ENVIRONMENTAL CONCENTRATIONS IN GROUND WATER (PECGW) FOR THE ACTIVE SUBSTANCE ETHOFUMESATE USING THE MODEL SOFTWARE FOCUS PELMO 5.5.3 AND FOCUS PEARL 4.4.4 - PRODUCT ETHOFOL 500 SC</b>
Notifier:	UPL
Author(s), year:	Stangelj, A.; 2014a
Report/Doc. number:	118608-CP-09020401-01
Guideline(s):	FOCUS GW Generic Guidance for Tier 1, FOCUS Ground Water Assessments Version 2.0, January 2011
GLP:	No
Deviations:	None
Validity:	Valid

---

### Executive Summary

The PEC values of Ethofumesate in ground water (PEC<sub>GW</sub>) have been assessed with the endpoints established in the EU review (SANCO/6503/VI/99 – final - 15/05/2002) as well as with the endpoints resulting from the studies provided by the sponsor in the CA document. Following current recommendations of the PPR-Panel<sup>1</sup> a Q<sub>10</sub> value of 2.58 (or corresponding activation energy of 65.4 kJ mol<sup>-1</sup>) was used in models.

The PEC<sub>GW</sub> calculations were performed assuming a pre-emergence application of 2.0 L product/ha (equivalent to 1.0 kg/Ethofumesate) on sugar beet with a maximum of 1 application per growing season; or assuming a maximum of 3 post emergence applications of 0.66 L product/ha (corresponding to 0.33 kg Ethofumesate/ha) per year on sugar beet. However, in the PEC calculations, succeeding application of Ethofol 500 SC was considered, representing worst case compared to application to the same field every 3<sup>rd</sup> year, as proposed in the GAP of Ethofol 500 SC. Furthermore, no plant interception was considered for pre-emergence or post-emergence application, as a worst case assumption.

The application rate and frequency for each use correspond to the maximum recommended application rate and number per year. For FOCUS PELMO 5.5.3 and PEARL 4.4.4, all scenarios were considered and remained unchanged.

The FOCUS PELMO 5.5.3 and FOCUS PEARL 4.4.4 results indicate that Ethofumesate is not predicted to leach into ground water in relevant amounts following a 26-years period of one or three applications per year at an application rate of 1.0 kg and 0.33 kg Ethofumesate/ha, respectively. For all scenarios, the 80<sup>th</sup> percentile reporting endpoints are below the regulatory threshold value of 0.1 µg/L.

### Comments RMS:

PECGW were calculated by the RMS based on the new LoEP.

---

<sup>1</sup> Scientific Opinion of the Panel on Plant Protection Products and their Residues on a request from EFSA related to the default Q<sub>10</sub> value used to describe the temperature effect on transformation rates of pesticides in soil. The EFSA Journal (2007) 622, 1-32.

In the course of the first approval of ethofumesate, 5 lysimeter studies covering a period of two or three years with either one or two applications of ethofumesate were evaluated. The majority of the radioactivity in the leachate was attributed to ethofumesate derived fragments metabolized by soil micro-organisms and subsequently incorporated into soil organic matter. However, in one study an individual peak ("Peak A") was identified. The highest maximum concentration was 0.5 µg/L (annual mean, calculated as a.s. equivalent). It was not evaluated whether this peak consisted of one or more components. In a targeted study, the structure of both metabolites potentially representing Peak A could be identified as glycoside conjugates of the respective soil metabolites NC 8493 and NC 20645. In the first of two new lysimeter studies, Ethofumesate and its degradation products did not exceed 0.1 µg/L in the leachate. In this two year study, unidentified polar material – attributable neither to ethofumesate nor to NC9607 - ranged between 0.7 and 1.89 µg/L parent equivalents. Similar results were obtained in the second lysimeter study, where the concentration in the leachate was similar and the majority of Ethofumesate was incorporated into large organic structures. Furthermore, up to 14 unknown fractions were detected in this two year study and none exceeded 0.1 µg/L (annual average concentrations). Therefore, it can be assumed that also in the first the unidentified polar material belongs to a larger number of fractions.

Groundwater exposure assessments were carried out using FOCUS (FOCUS, 2009) scenarios and the models PEARL 4.4.4 for the active substance ethofumesate and its metabolites NC8493 (soil photolysis, aglycon of lysimeter metabolite) and NC20645 (aglycon of lysimeter metabolite). Statistical evaluation according to the "EFSA Guidance Document for evaluating laboratory and field dissipation studies to obtain DegT50 values of active substances of plant protection products and transformation products of these active substances in soil" (EFSA, 2014) showed that lab and field DT50 of ethofumesate were not from two different populations; therefore, the combined DT50 of 26.2 was used. One ground water modelling run was conducted for ethofumesate alone, and another ground water modelling run was conducted for NC8493 and NC20645 (NC8493 applied as parent and degraded to NC20645). NC8493 was calculated as pseudo-application taking into account the maximum occurrence in soil photolysis at 24.2% and a molecular correction factor of 0.902. NC8493 was calculated as pseudo-application taking into account the maximum occurrence in soil photolysis at 24.2% and a molecular correction factor of 0.902. For NC20645 a formation fraction of 1 (from NC8493) was assumed as a worst case. The potential for groundwater exposure from the representative uses by these compounds above the parametric drinking water limit of 0.1 µg/L was concluded to be low in geoclimatic situations that are represented by all 9 FOCUS groundwater scenarios.

The relevant input parameters are.

**Table 8-3: Substance parameters for ethofumesate and metabolites relevant for Pearl 4.4.4 PECGW calculations for Ethofol 500 SC**

Parameter	Unit	Ethofumesate	NC8493	NC20645

Molar Mass	[g/mol]	286.3	258.3	274.3
Solubility	[mg/L]	50.0	2019	16170
Vapour Pressure	[Pa]	$6.5 \times 10^{-4}$	$3.73 \times 10^{-6**}$	$7.4 \times 10^{-7**}$
Freundlich Exponent		0.905	1	0.93
Kfoc	[L/kg]	118	20.82	5.1
Plant Uptake Factor		0.5	0	0
Walker Exponent		0.7	0.7	0.7
DT50	[d]	26.2	0.1*	0.12
Molar Activ. Energy	[kJ/mol]	65.4	65.4	65.4
Formation Fraction		-	-	1 (from NC8493)
Maximum Occurrence	[%]	-	24.2	-
Mol. Correction factor		-	0.902	-

\*values below 0.1 cannot be handled by FOCUS Pearl 4.4.4

\*\* calculated with EPI Suite (EPA, 2012)

**Table 8-4: Application parameters for ethofumesate and metabolites relevant for Pearl 4.4.4 PECGW calculations for Ethofol 500 SC**

	Application rate Every third year	Interval [d]	Relative application date	BBCH stage	Interception [%]
Pre-emergence	1 x 1000 g/ha	-	7d before emergence	00	0
Post-emergence	3 x 333 g/ha	5	10 d after emergenc	11	20

**PEC ground water (Regulation (EU) N° 284/2013, Annex Part A, point 9.2.4.1)**

Method of calculation and type of study (e.g. modelling, field leaching, lysimeter)

For FOCUS gw modelling, values used –  
Modelling using FOCUS model(s), with appropriate FOCUSgw scenarios, according to FOCUS guidance.  
Model(s) used: Pearl 4.4.4.  
Crop: Sugar beet  
Crop uptake factor: 0.5  
Water solubility (mg/L): 50 at pH 7 and 25°C  
Vapour pressure:  $6.5 \times 10^{-4}$  Pa at 25°C  
Geometric mean parent  $DT_{50 \text{ combined}}$  26.2 d  
(normalisation to 10kPa or pF2, 20 °C with Q10 of 2.58 and Walker equation coefficient 0.7).  
 $K_{FOC}$ : geometric mean 118 mL/g, arithmetic mean  $1/n = 0.905$

Metabolites:

NC 8493

Applied as parent taking into account:  
Max. occurrence in soil: 24.2 %  
Mol.correction factor: 0.902  
Molecular mass: 258.3  
Crop uptake factor: 0  
Water solubility (mg/L): 2019 at pH 7 and 25°C  
(Calculated with EPI Suite)  
Vapour pressure:  $3.73 \times 10^{-6}$  Pa at 25°C  
Geometric mean parent  $DT_{50 \text{ lab}}$  0.03 d (0.1 d used for modelling)  
 $K_{FOC}$ : geometric mean 20.82 mL/g, arithmetic mean  $1/n = 1$  (calculated with EPIWIN)

NC 20645

Molecular mass: 274.3  
Crop uptake factor: 0  
Water solubility (mg/L): 16170 at pH 7 and 25°C  
(Calculated with EPI Suite)  
Vapour pressure:  $7.4 \times 10^{-7}$  Pa at 25°C  
(Calculated with EPI Suite)  
Geometric mean parent  $DT_{50 \text{ lab}}$  0.12 d  
 $K_{FOC}$ : geometric mean 5.1 mL/g, arithmetic mean  $1/n = 0.93$   
f.f.: 1 (from NC8493)

Application rate

Pre emergence 1000 g/ha, every third year  
Gross application rate: 1000 g/ha.  
Crop growth stage: 00  
Canopy interception %: 0

Application rate net of interception: 1000 g/ha.  
 No. of applications: 1  
 Time of application (absolute or relative application dates): 7 d before emergence

Post emergence 333 g/ha  
 Gross application rate: 1000 g/ha.  
 Crop growth stage: 11  
 Canopy interception %: 20  
 Application rate net of interception: 266 g/ha.  
 No. of applications: 3  
 Interval: 5 d  
 Time of application (absolute or relative application dates): 10 d after emergence

**PEC(gw) - FOCUS modelling results (80<sup>th</sup> percentile annual average concentration at 1m) for pre-emergence application 1x1000g/ha**

Model / Crop	Scenario	Parent (µg/L)	Metabolite (µg/L)	
			NC20645	NC8493
	Chateaudun	0.024	<0.001	<0.001
	Hamburg	0.011	<0.001	<0.001
	Jokioinen	0.001	<0.001	<0.001
	Kremsmunster	0.008	<0.001	<0.001
	Okehampton	0.014	<0.001	<0.001
	Piacenza	0.014	<0.001	<0.001
	Porto	0.002	<0.001	<0.001
	Sevilla	<0.001	<0.001	<0.001
	Thiva	<0.001	<0.001	<0.001

**PEC(gw) - FOCUS modelling results (80<sup>th</sup> percentile annual average concentration at 1m) for post-emergence application 3x333g/ha**

Model /Crop	Scenario	Parent (µg/L)	Metabolite (µg/L)	
			NC20645	NC8493
	Chateaudun	0.041	<0.001	<0.001
	Hamburg	0.017	<0.001	<0.001
	Jokioinen	0.001	<0.001	<0.001
	Kremsmunster	0.010	<0.001	<0.001
	Okehampton	0.020	<0.001	<0.001
	Piacenza	0.017	<0.001	<0.001
	Porto	0.002	<0.001	<0.001
	Sevilla	0.001	<0.001	<0.001
	Thiva	0.001	<0.001	<0.001

#### **B.8.4. FATE AND BEHAVIOUR IN WATER AND SEDIMENT**

Ethofumesate is stable to hydrolysis at pH 4, pH 7 and pH 9. No major degradation products were observed.

In the first evaluation for approval, the photolytic degradation of ethofumesate was reported for a number of studies with variable results. Aqueous photolysis at pH 7 with filtered light from an Hg-arc lamp resulted in a DT50 of 28-31 hours (3-5 fold intensity of natural sunlight) in irradiated solutions. Due to 41% of unidentified radioactivity in this study and experimental deficiencies in other aqueous photolysis studies, new studies were conducted by both notifiers. In both studies, a multitude of transformation products was formed due to photolysis with maximum formation of 9.57% of a degradation product tentatively identified as 2,3,5-trihydroxy-4-(1-hydroxyethyl)-hexanedioic acid. A similar degradation pattern is observed in a study investigating the photolysis of ethofumesate in natural water. This study was performed for registration in Japan and is an optional data requirement. The result confirmed the result of the aqueous photolysis in buffered solution. A large number of unidentified photodegradates were formed, two of them above 5% AR.

##### **B.8.4.1. Aerobic mineralisation in surface water**

Contrasting results were reported for the new aerobic mineralization studies in water. In the study by the notifier UPL, ethofumesate was found to be stable in natural surface water until day 62 of incubation and the mineralisation was marginal with a maximum of 1.1% (high-dose test) and 0.8% (low-dose test) at the end of the incubation period. The new study on aerobic mineralization in surface water submitted by the notifier Taskforce, however, showed that after a lag phase of 60 days a significant degradation of ethofumesate was observed: the remaining amounts of ethofumesate after 88 days were 58.3% AR and 79.3% AR in the low- (10 µg/L) and



high-dose (100 µg/L) experiment, respectively. The main metabolite formed was NC 8493 (ethofumesate-2-hydroxy) with a maximum amount of 18.3% AR. The metabolite identified as BCS CW35117 (ethofumesate acetic acid) was formed at 13.4% AR and 2.4% AR in the low-dose and high-dose experiment, respectively.

#### **B.8.4.2. Water/sediment study**

Three dark water/sediment studies submitted for the previous evaluation were found to be not valid anymore, mainly due to experimental insufficiencies. For instance, in two of these studies only the pH of the water phase was reported whereas in one study only the sediment pH was determined. In addition, metabolites above 10% AR were not identified within these studies. Therefore, new water sediment studies were submitted by both notifiers. Mineralisation of the active substance ranged between 1.2 % AR and 15.3% AR after 103 and 125 days, respectively. Non-extractable residues in the sediment compartment ranged between 14.2 % AR and 43.2% AR at study end. Whole system half-lives ranged between 89 and 294 days (geomean 170 d; n = 8). In both new studies, NC20645 was identified as a major metabolite (max. occurrence in whole system 18.8% AR after 125 days). However, metabolite NC20645 did not reach the maximum occurrence at study end in two out of four water/sediment systems.

#### **B.8.4.3. Irradiated water/sediment study**

Not requested.

### **B.8.5. PREDICTED ENVIRONMENTAL CONCENTRATIONS IN SURFACE WATER AND SEDIMENT (PECSW, PECSO)**

Reference:	Calculation of predicted environmental concentrations in surface water (PECSW) and sediment (PECS <sub>SED</sub> ) for the active substance Ethofumesate and major metabolites using FOCUS SW modelling software and scenarios - product Ethofol 500 SC -
Notifier:	UPL
Author(s), year:	Stangelj, A.; 2014b
Report/Doc. number:	118608-CP-090205-01
Guideline(s):	SANCO/4802/2001 Generic guidance for FOCUS surface water scenarios, version 1.0, January 2011
GLP:	No
Deviations:	None
Validity:	Valid

### Executive summary

The PEC of Ethofumesate and metabolites in surface water and aquatic sediment (PEC<sub>SW</sub> and PEC<sub>SED</sub>) has been assessed with the FOCUS SW models and the endpoints established in the EU review or based on new studies presented. In those cases in which an endpoint was not available, worst case assumptions were selected.

### Comments RMS

PECSW/SED were calculated by the RMS based on the new LoEP.

PECSw/SED were calculated by the RMS based on the endpoints established in the re-evaluation. The "Generic guidance for FOCUS surface water scenarios" states that experience of following this FOCUS kinetics guidance has shown that in the vast majority of cases first order whole system DT50 are selected for calculating the geometric mean (in accordance with the procedures defined for P-I, as the statistical criteria for accepting a P-II approach are rarely satisfied). In this situation (only P-I assessment accepted) the usual evaluation practice has been to ascribe the whole system DT50 to the water phase for compounds with a K<sub>oc</sub> < ca. 100 mL/g or to the sediment phase for compounds with a K<sub>oc</sub> > ca. 2000 mL/g and use a default of 1000 days for the other compartment. This is considered by Member State regulators to be a reasonable „rule of thumb“. For compounds with K<sub>oc</sub> between 100 and 2000 mL/g, the FOCUS kinetics advice regarding running simulations with both combinations for ascribing the whole system DT50 and default and selecting the results that give the highest concentrations for the risk assessment should be followed. In this case, both combinations were run and the worst case is shown.

**Table 8-5: PEC surface water and PEC sediment for Pre-emergence application of Ethofol 500 SC 1 x 1000 g**

Parent

Parameters used in FOCUSsw step 1 and 2

Version control no. of FOCUS calculator:  
Steps 1-2 Vs 2.1  
Molecular weight (g/mol): 286.3  
K<sub>OC</sub>/K<sub>OM</sub> (mL/g): 118 / 68  
DT<sub>50</sub> soil (d): 26.2 days  
DT<sub>50</sub> water/sediment system (d): 170 d

Parameters used in FOCUSsw step 3 (if performed)	DT <sub>50</sub> water (d): 170 d DT <sub>50</sub> sediment (d): 170 d Crop interception: no interception
	Version control no.'s of FOCUS software: Swash 3.1 Macro 5.5.3 PRZM 3.5.2 TOXSWA 2.6 Water solubility (mg/L): 50 Vapour pressure: $6.5 \times 10^{-4}$ Pa at 25°C K <sub>OC</sub> /K <sub>OM</sub> (mL/g): 118 / 68 1/n: 0.905 Q10=2.58, Walker equation coefficient 0.7 Crop uptake factor: 0.5 DT <sub>50</sub> water (d): 170 d DT <sub>50</sub> sediment (d): 1000 d
Application rate	Crop and growth stage: sugar beets BBCH 00 Number of applications: 1 Interval (d): - Application rate(s): 1000 g a.s./ha Application window: Step 1-2: March-May (N + S EU) Step 3: Scenario D3: 94 - 124 Scenario D4: 103 - 133 Scenario R1: 85 - 115 Scenario R3: 58 - 88

FOCUS STEP 1 Scenario	Day after overall maximum	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
	0 h	297.2151		339.8618	
	24 h	294.7606	295.9878	347.8175	343.8396
	2 d	293.5612	295.0742	346.4022	345.4745
	4 d	291.1770	293.7208	343.5889	345.2341
	7 d	287.6370	291.8705	339.4117	343.6320
	14 d	279.5435	287.7208	329.8614	339.1229
	21 d	271.6778	283.6778	320.5798	334.4815
	28 d	264.0333	279.7177	311.5593	329.8731
	42 d	249.3837	272.0247	294.2727	320.8600

FOCUS STEP 2 Scenario	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
Northern EU	0 h	59.9661	---	70.0360	---
	24 h	59.3525	59.6593	69.7510	69.8935
	2 d	59.1110	59.4455	69.4672	69.7513
	4 d	58.6309	59.1581	68.9030	69.4680
	7 d	57.9181	58.7792	68.0653	69.0460
	14 d	56.2884	57.9393	66.1501	68.0746
	21 d	54.7046	57.1238	64.2888	67.1215
	28 d	53.1653	56.3257	62.4798	66.1861
	42 d	50.2155	54.7760	59.0132	64.3674
Southern EU	0 h	111.7432	---	130.8844	---
	24 h	110.9190	111.3311	130.3518	130.6181
	2 d	110.4676	111.0122	129.8214	130.3523
	4 d	109.5705	110.5154	128.7670	129.8230
	7 d	108.2384	109.8245	127.2016	129.0344
	14 d	105.1928	108.2665	123.6224	127.2190
	21 d	102.2329	106.7463	120.1439	125.4377
	28 d	99.3562	105.2567	116.7633	123.6897
	42 d	93.8436	102.3624	110.2848	120.2909

FOCUS STEP 3 Scenario	Water body	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
			Actual	TWA	Actual	TWA
D3	ditch	0 h	5.239			
		24 h	2.374	4.038		
		2 d	0.277	2.543		
		4 d	0.010	1.306		
		7 d	0.003	0.749		
		14 d	0.001	0.375		
		21 d	< 0.001	0.250		
		28 d	< 0.001	0.188		
		42 d	< 0.001	0.126		
D4	pond	0 h	0.431			
		24 h	0.431	0.431		
		2 d	0.430	0.431		
		4 d	0.427	0.431		

FOCUS STEP 3 Scenario	Water	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
	body		Actual	TWA	Actual	TWA
		7 d	0.421	0.430		
		14 d	0.405	0.427		
		21 d	0.389	0.423		
		28 d	0.381	0.417		
		42 d	0.359	0.406		
D4	stream	0 h	4.255			
		24 h	0.057	0.352		
		2 d	0.057	0.329		
		4 d	0.056	0.324		
		7 d	0.054	0.303		
		14 d	0.050	0.267		
		21 d	0.054	0.239		
		28 d	0.052	0.215		
		42 d	0.051	0.169		
R1	pond	0 h	4.455			
		24 h	4.408	4.432		
		2 d	4.364	4.410		
		4 d	4.279	4.367		
		7 d	4.159	4.305		
		14 d	3.900	4.232		
		21 d	3.663	4.187		
		28 d	3.426	4.101		
		42 d	2.992	3.898		
R1	stream	0 h	47.568			
		24 h	0.068	23.151		
		2 d	0.017	11.594		
		4 d	0.006	5.985		
		7 d	0.003	3.426		
		14 d	0.002	2.148		
		21 d	<0.001	1.433		
		28 d	<0.001	1.075		
		42 d	<0.001	0.719		

FOCUS STEP 3 Scenario	Water	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
	body		Actual	TWA	Actual	TWA
R3	stream	0 h	11.509			
		24 h	2.126	9.306		
		2 d	0.027	4.933		
		4 d	0.006	2.473		
		7 d	0.002	1.415		
		14 d	0.001	0.708		
		21 d	<0.001	0.473		
		28 d	<0.001	0.360		
		42 d	<0.001	0.279		

		Vegetated filter strip (VFS)	
Scenario	application	10m	20m
	g/ha	µg/L	
R1 stream	1x1000	21.692	11.377

Metabolite NC8493

Parameters used in FOCUSsw step 1 and 2

Molecular weight: 258.3

Soil or water metabolite: soil photolysis

Koc/Kom (mL/g): 20.8

DT<sub>50</sub> soil (d): 0.03 daysDT<sub>50</sub> water/sediment system (d): 1000 dDT<sub>50</sub> water (d): 1000DT<sub>50</sub> sediment (d): 1000

Crop interception (%): no interception

Maximum occurrence observed (% molar basis with respect to the parent):

Total Water and Sediment: -

Soil: 24.2

Main routes of entry

Run-off

Drainage

FOCUS STEP 1 Scenario	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
	0 h	70.8136		14.7292	
	24 h	70.7645	70.7891	14.7190	14.7241
	2 d	70.7155	70.7646	14.7088	14.7190
	4 d	70.6176	70.7155	14.6885	14.7088
	7 d	70.4709	70.6421	14.6579	14.6936
	14 d	70.1298	70.4711	14.5870	14.6580
	21 d	69.7903	70.3007	14.5164	14.6226
	28 d	69.4525	70.1309	14.4461	14.5872
	42 d	68.7818	69.7928	14.3066	14.5169

FOCUS STEP 2 Scenario	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
Northern EU	0 h	<0.001		<0.001	
	24 h	<0.001	<0.001	<0.001	<0.001
	2 d	<0.001	<0.001	<0.001	<0.001
	4 d	<0.001	<0.001	<0.001	<0.001
	7 d	<0.001	<0.001	<0.001	<0.001
	14 d	<0.001	<0.001	<0.001	<0.001
	21 d	<0.001	<0.001	<0.001	<0.001
	28 d	<0.001	<0.001	<0.001	<0.001
	42 d	<0.001	<0.001	<0.001	<0.001
Southern EU	0 h	<0.001		<0.001	
	24 h	<0.001	<0.001	<0.001	<0.001
	2 d	<0.001	<0.001	<0.001	<0.001
	4 d	<0.001	<0.001	<0.001	<0.001
	7 d	<0.001	<0.001	<0.001	<0.001
	14 d	<0.001	<0.001	<0.001	<0.001
	21 d	<0.001	<0.001	<0.001	<0.001
	28 d	<0.001	<0.001	<0.001	<0.001
	42 d	<0.001	<0.001	<0.001	<0.001

Metabolite NC 20645

Parameters used in FOCUSsw step 1 and 2

Molecular weight: 274.3  
 Soil or water metabolite: water  
 Koc/Kom (mL/g): 5.1  
 DT<sub>50</sub> soil (d): 0.12 days  
 DT<sub>50</sub> water/sediment system (d): 208 d  
 DT<sub>50</sub> water (d): 208  
 DT<sub>50</sub> sediment (d): 208  
 Crop interception (%): no interception  
 Maximum occurrence observed (% molar basis with respect to the parent):  
 Total Water and Sediment: 18.8  
 Soil: 1.82

Main routes of entry

Runoff, Drainage, Drift

FOCUS STEP 1 Scenario	Day after overall maximum	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
	0 h	7.4296		0.2944	
	24 h	7.3938	7.4117	0.3771	0.3358
	2 d	7.3692	7.3966	0.3758	0.3561
	4 d	7.3202	7.3706	0.3733	0.3653
	7 d	7.2474	7.3334	0.3696	0.3680
	14 d	7.0803	7.2485	0.3611	0.3667
	21 d	6.9170	7.1651	0.3528	0.3634
	28 d	6.7576	7.0831	0.3446	0.3597
	42 d	6.4495	6.9228	0.3289	0.3521

FOCUS STEP 2 Scenario	Day after overall maximum	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
Northern EU	0 h	1.6565	---	0.0825	---
	24 h	1.6436	1.6500	0.0823	0.0824
	2 d	1.6381	1.6454	0.0820	0.0823
	4 d	1.6272	1.6390	0.0814	0.0820
	7 d	1.6074	1.6292	0.0806	0.0816
	14 d	1.5703	1.6090	0.0788	0.0806
	21 d	1.5341	1.5900	0.0769	0.0797
	28 d	1.4987	1.5716	0.0752	0.0788
	42 d	1.4304	1.5359	0.0717	0.0770
Southern EU	0	1.6565	---	0.0825	---



FOCUS STEP 2 Scenario	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
	1	1.6436	1.6500	0.0823	0.0824
	2	1.6381	1.6454	0.0820	0.0823
	4	1.6272	1.6390	0.0814	0.0820
	7	1.6074	1.6292	0.0806	0.0816
	14	1.5703	1.6090	0.0788	0.0806
	21	1.5341	1.5900	0.0769	0.0797
	28	1.4987	1.5716	0.0752	0.0788
	42	1.4304	1.5359	0.0717	0.0770

Metabolite CW35117

Parameters used in FOCUS<sub>sw</sub> step 1 and 2

Molecular weight: 316.3

Soil or water metabolite: water

Koc/Kom (mL/g): 13.4

DT<sub>50</sub> soil (d): 0.01 daysDT<sub>50</sub> water/sediment system (d): 1000DT<sub>50</sub> water (d): 1000DT<sub>50</sub> sediment (d): 1000

Crop interception (%): no interception

Maximum occurrence observed (% molar basis with respect to the parent):

Total Water and Sediment: 13.4

Soil: -

Main routes of entry

Drift

FOCUS STEP 1 Scenario	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
	0 h	1.3618		0.0000	
	24 h	1.3370	1.3494	0.1792	0.0896
	2 d	1.3361	1.3430	0.1790	0.1344
	4 d	1.3342	1.3391	0.1788	0.1566
	7 d	1.3315	1.3364	0.1784	0.1660
	14 d	1.3250	1.3323	0.1776	0.1720
	21 d	1.3186	1.3288	0.1767	0.1737
	28 d	1.3122	1.3255	0.1758	0.1744
	42 d	1.2996	1.3189	0.1741	0.1746

**Table 8-6: PEC surface water and PEC for Post emergence application of Ethofol 500 SC 3 x 333 g**

Parent

Parameters used in FOCUS<sub>sw</sub> step 1 and 2

Version control no. of FOCUS calculator:

Steps 1-2 Vs 2.1

Molecular weight (g/mol): 286.3

K<sub>OC</sub>/K<sub>OM</sub> (mL/g): 118 / 68DT<sub>50</sub> soil (d): 26.2 daysDT<sub>50</sub> water/sediment system (d): 170 dDT<sub>50</sub> water (d): 170 dDT<sub>50</sub> sediment (d): 170 d

Crop interception: minimal crop cover

Parameters used in FOCUS<sub>sw</sub> step 3 (if performed)

Version control no.'s of FOCUS software:

Swash 3.1

Macro 5.5.3

PRZM 3.5.2

TOXSWA 2.6

Water solubility (mg/L): 50

Vapour pressure:  $6.5 \times 10^{-4}$  Pa at 25°CK<sub>OC</sub>/K<sub>OM</sub> (mL/g): 118 / 68

1/n: 0.905

Q10=2.58, Walker equation coefficient 0.7

Crop uptake factor: 0.5

Application rate

Crop and growth stage: sugar beets BBCH 10

Number of applications: 3

Interval (d): 5

Application rate(s): 333 g a.s./ha

Application window:

Step 1-2:

March-May (N + S EU)

Step 3:

Scenario D3: 101 - 141

Scenario D4: 110 - 150

Scenario R1: 92 - 132

Scenario R3: 65 - 105

FOCUS STEP 1 Scenario	Day after overall maximum	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
	0 h	296.9179		339.5219	
	24 h	294.4658	295.6918	347.4697	343.4958
	2 d	293.2676	294.7791	346.0558	345.1290
	4 d	290.8858	293.4271	343.2453	344.8888
	7 d	287.3494	291.5786	339.0723	343.2884
	14 d	279.2640	287.4330	329.5315	338.7838
	21 d	271.4061	283.3941	320.2592	334.1470
	28 d	263.7693	279.4380	311.2478	329.5432
	42 d	249.1343	271.7527	293.9785	320.5391

FOCUS STEP 2 Scenario	Day after overall maximum	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
Northern EU	0 h	42.3121	---	49.4120	---
	24 h	41.8746	42.0934	49.2109	49.3114
	2 d	41.7042	41.9414	49.0107	49.2111
	4 d	41.3655	41.7380	48.6126	49.0113
	7 d	40.8626	41.4704	48.0216	48.7136
	14 d	39.7128	40.8777	46.6704	48.0282
	21 d	38.5953	40.3023	45.3572	47.3557
	28 d	37.5094	39.7392	44.0809	46.6958
	42 d	35.4282	38.6457	41.6351	45.4127
Southern EU	0 h	78.7432	---	92.2257	---
	24 h	78.1574	78.4503	91.8504	92.0380
	2 d	77.8393	78.2243	91.4767	91.8508
	4 d	77.2072	77.8736	90.7337	91.4778
	7 d	76.2685	77.3865	89.6306	90.9221
	14 d	74.1225	76.2885	87.1086	89.6429
	21 d	72.0368	75.2173	84.6576	88.3877
	28 d	70.0099	74.1676	82.2755	87.1561

FOCUS STEP 2 Scenario	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
	42 d	66.1254	72.1281	77.7105	84.7612

FOCUS STEP 3 Scenario	Water body	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
			Actual	TWA	Actual	TWA
D3	ditch	0 h	1.269			
		24 h	0.694	1.023		
		2 d	0.124	0.688		
		4 d	0.005	0.361		
		7 d	0.001	0.207		
		14 d	<0.001	0.185		
		21 d	<0.001	0.133		
		28 d	<0.001	0.145		
		42 d	<0.001	0.097		
D4	pond	0 h	0.509			
		24 h	0.509	0.509		
		2 d	0.507	0.509		
		4 d	0.504	0.508		
		7 d	0.497	0.507		
		14 d	0.480	0.504		
		21 d	0.462	0.499		
		28 d	0.454	0.493		
		42 d	0.429	0.481		
D4	stream	0 h	1.124			
		24 h	0.072	0.408		
		2 d	0.072	0.384		
		4 d	0.071	0.377		
		7 d	0.069	0.353		
		14 d	0.074	0.312		
		21 d	0.075	0.281		
		28 d	0.075	0.253		
		42 d	0.075	0.202		

FOCUS STEP 3 Scenario	Water	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
	body		Actual	TWA	Actual	TWA
R1	pond	0 h	0.470			
		24 h	0.463	0.466		
		2 d	0.457	0.463		
		4 d	0.447	0.457		
		7 d	0.448	0.453		
		14 d	0.431	0.447		
		21 d	0.400	0.436		
		28 d	0.373	0.424		
		42 d	0.322	0.398		
R1	stream	0 h	7.787			
		24 h	0.009	4.023		
		2 d	0.002	2.014		
		4 d	0.065	1.008		
		7 d	0.001	0.652		
		14 d	0.007	0.358		
		21 d	<0.001	0.264		
		28 d	<0.001	0.207		
		42 d	<0.001	0.144		
R3	stream	0 h	19.176			
		24 h	12.947	7.665		
		2 d	0.034	6.132		
		4 d	0.006	3.074		
		7 d	4.919	1.808		
		14 d	0.007	1.109		
		21 d	0.015	0.760		
		28 d	<0.001	0.584		
		42 d	0.003	0.585		

## Step 4

Scenario	application	VFS	
		10m	20m
	g/ha	µg/L	
R3 stream	3x333	8.718	4.565

Metabolite NC8493

Parameters used in FOCUSsw step 1 and 2

Molecular weight: 258.3

Soil or water metabolite: soil photolysis

Koc/Kom (mL/g): 20.8

DT<sub>50</sub> soil (d): 0.03 daysDT<sub>50</sub> water/sediment system (d): 1000 dDT<sub>50</sub> water (d): 1000DT<sub>50</sub> sediment (d): 1000

Crop interception (%): no interception

Maximum occurrence observed (% molar basis with respect to the parent):

Total Water and Sediment: -

Soil: 24.2

Main routes of entry

Runoff, Drainage

FOCUS STEP 1 Scenario	Day after overall maximum	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
	0 h	70.8136		14.7292	
	24 h	70.7645	70.7891	14.7190	14.7241
	2 d	70.7155	70.7646	14.7088	14.7190
	4 d	70.6176	70.7155	14.6885	14.7088
	7 d	70.4709	70.6421	14.6579	14.6936
	14 d	70.1298	70.4711	14.5870	14.6580
	21 d	69.7903	70.3007	14.5164	14.6226
	28 d	69.4525	70.1309	14.4461	14.5872
	42 d	68.7818	69.7928	14.3066	14.5169

FOCUS STEP 2 Scenario	Day after overall maximum	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
Northern EU	0 h	<0.001		<0.001	
	24 h	<0.001	<0.001	<0.001	<0.001
	2 d	<0.001	<0.001	<0.001	<0.001
	4 d	<0.001	<0.001	<0.001	<0.001
	7 d	<0.001	<0.001	<0.001	<0.001
	14 d	<0.001	<0.001	<0.001	<0.001
	21 d	<0.001	<0.001	<0.001	<0.001
	28 d	<0.001	<0.001	<0.001	<0.001
	42 d	<0.001	<0.001	<0.001	<0.001
Southern EU	0 h	<0.001		<0.001	
	24 h	<0.001	<0.001	<0.001	<0.001
	2 d	<0.001	<0.001	<0.001	<0.001
	4 d	<0.001	<0.001	<0.001	<0.001
	7 d	<0.001	<0.001	<0.001	<0.001
	14 d	<0.001	<0.001	<0.001	<0.001
	21 d	<0.001	<0.001	<0.001	<0.001
	28 d	<0.001	<0.001	<0.001	<0.001
	42 d	<0.001	<0.001	<0.001	<0.001

Metabolite NC 20645

Parameters used in FOCUSsw step 1 and 2

Molecular weight: 274.3  
 Soil or water metabolite: water  
 Koc/Kom (mL/g): 5.1  
 DT<sub>50</sub> soil (d): 0.12 days  
 DT<sub>50</sub> water/sediment system (d): 208 d  
 DT<sub>50</sub> water (d): 208  
 DT<sub>50</sub> sediment (d): 208  
 Crop interception (%): no interception  
 Maximum occurrence observed (% molar basis with respect to the parent):  
 Total Water and Sediment: 18.8  
 Soil: 1.82

Main routes of entry

Runoff, Drainage, Drift

FOCUS STEP 1 Scenario	Day after overall maximum	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
	0 h	7.4296		0.2944	
	24 h	7.3938	7.4117	0.3771	0.3358
	2 d	7.3692	7.3966	0.3758	0.3561
	4 d	7.3202	7.3706	0.3733	0.3653
	7 d	7.2474	7.3334	0.3696	0.3680
	14 d	7.0803	7.2485	0.3611	0.3667
	21 d	6.9170	7.1651	0.3528	0.3634
	28 d	6.7576	7.0831	0.3446	0.3597
	42 d	6.4495	6.9228	0.3289	0.3521

FOCUS STEP 2 Scenario	Day after overall maximum	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
Northern EU	0 h	1.1905	---	0.0595	---
	24 h	1.1847	1.1876	0.0593	0.0594
	2 d	1.1808	1.1852	0.0591	0.0593
	4 d	1.1729	1.1810	0.0587	0.0591
	7 d	1.1586	1.1741	0.0581	0.0588
	14 d	1.1319	1.1597	0.0568	0.0581
	21 d	1.1058	1.1460	0.0555	0.0575
	28 d	1.0803	1.1328	0.0542	0.0568
	42 d	1.0311	1.1070	0.0517	0.0555



FOCUS STEP 2 Scenario	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
Southern EU	0 h	1.1905	---	0.0595	---
	24 h	1.1847	1.1876	0.0593	0.0594
	2 d	1.1808	1.1852	0.0591	0.0593
	4 d	1.1729	1.1810	0.0587	0.0591
	7 d	1.1586	1.1741	0.0581	0.0588
	14 d	1.1319	1.1597	0.0568	0.0581
	21 d	1.1058	1.1460	0.0555	0.0575
	28 d	1.0803	1.1328	0.0542	0.0568
	42 d	1.0311	1.1070	0.0517	0.0555

Metabolite CW35117

Parameters used in FOCUSsw step 1 and 2

Molecular weight: 316.3  
 Soil or water metabolite: water  
 Koc/Kom (mL/g): 13.4  
 DT<sub>50</sub> soil (d): 0.01 days  
 DT<sub>50</sub> water/sediment system (d): 1000  
 DT<sub>50</sub> water (d): 1000  
 DT<sub>50</sub> sediment (d): 1000  
 Crop interception (%): no interception  
 Maximum occurrence observed (% molar basis with respect to the parent):  
 Total Water and Sediment: 13.4  
 Soil: -

Main routes of entry

Drift

FOCUS STEP 1 Scenario	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
	0 h	1.3618		0.0000	
	24 h	1.3370	1.3494	0.1792	0.0896

FOCUS STEP 1 Scenario	Day after overall maximum	PEC <sub>SW</sub> (µg/L)		PEC <sub>SED</sub> (µg/kg)	
		Actual	TWA	Actual	TWA
	2 d	1.3361	1.3430	0.1790	0.1344
	4 d	1.3342	1.3391	0.1788	0.1566
	7 d	1.3315	1.3364	0.1784	0.1660
	14 d	1.3250	1.3323	0.1776	0.1720
	21 d	1.3186	1.3288	0.1767	0.1737
	28 d	1.3122	1.3255	0.1758	0.1744
	42 d	1.2996	1.3189	0.1741	0.1746

### B.8.6. FATE AND BEHAVIOUR IN AIR

#### B.8.6.1. Route and rate of degradation in air and transport via air

The vapour pressure of ethofumesate is 0.00065 Pa at 25°C indicating a moderate potential for volatilization from plant and soil. Since the compound is rapidly degraded in air ( $DT_{50} = 4.1$  hours), no further investigation of its transport in air is required. It is unlikely that the compound is transported in air over long distances or accumulates in air.

#### B.8.6.2. Predicted environmental concentrations from airborne transport

Negligible.

### B.8.7. PREDICTED ENVIRONMENTAL CONCENTRATIONS FROM OTHER ROUTES OF EXPOSURE

Not relevant.

**B.8.8. REFERENCES RELIED ON**

Data Point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Data protection claimed Y/N	Justification if data protection is claimed	Owner	Previous evaluation
KCP 9.2.4 .1/01	Stangelj, A.	2014 a	CALCULATION OF PREDICTED ENVIRONMENTAL CONCENTRATIONS IN GROUND WATER (PECGW) FOR THE ACTIVE SUBSTANCE ETHOFUMESATE USING THE MODEL SOFTWARE FOCUS PELMO 5.5.3 AND FOCUS PEARL 4.4.4 - PRODUCT ETHOFOL 500 SC - United Phosphorus Ltd., 118608-CP-09020401-01 GAB Consulting GmbH, Lamstedt, Germany GLP/GEP: no Published: no	N	Y	New data for existing formulation, not previously submitted nor evaluated	UPL	Submitted for the purpose of renewal (2014)
KCP 9.2.5 /01	Stangelj, A.	2014 b	CALCULATION OF PREDICTED ENVIRONMENTAL CONCENTRATIONS IN SURFACE WATER (PECSW) AND SEDIMENT (PECSSED) FOR THE ACTIVE SUBSTANCE ETHOFUMESATE AND MAJOR METABOLITES USING FOCUS SW MODELLING SOFTWARE AND SCENARIOS - PRODUCT ETHOFOL 500 SC - United Phosphorus Ltd., 118608-CP-090205-01 GAB Consulting GmbH, Lamstedt, Germany GLP/GEP: no Published: no	N	Y	New data for existing formulation, not previously submitted nor evaluated	UPL	Submitted for the purpose of renewal (2014)