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Document Title

Summary of the fate and behaviour in the environment foramsulfuron + isoxadifen-ethyl OD 45 (22.5+22.5 g/L)

Data Requirements

EU Regulation 1107/2009 & EU Regulation 284/2013
Document MCP
Section 9: Fate and behaviour in the environment

According to the guidance document, SANCO 10181/2013, for preparing dossiers for the approval of a chemical active substance

Date

6th December 2013

Author(s)

[redacted]

Bayer CropScience

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Version history

Date	Data points containing amendments or additions[1]	Document identifier or version number

[1] Changes will be presented according to the approach to showing revisions and version history as outlined in SANCO/10180/2013 Chapter 4 How to revise an Assessment Report

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CP 9 FATE AND BEHAVIOUR IN THE ENVIRONMENT

This document contains updated calculations for the predicted environmental concentrations of foramsulfuron and its metabolites in soil and water. The reports submitted for the first European approval are not included in this document or in the baseline dossier as they are calculations which were not performed to the current standards and thus are not considered to be relevant.

Use pattern considered in the environmental exposure and risk assessment

Table 9- 1: Intended application pattern

Crop	Timing of application (range)	Number of applications	Application interval [days]	Maximum label rate (range) [L/ha]	Maximum application rate, individual treatment (ranges) [g/ha]	
					Foramsulfuron	Isoxadifen-ethyl
Maize	BBCH 12-18	1		2.6	60	60
Maize	BBCH 12-18	2	7	1.3	30	30

Definition of the residue for risk assessment

Justification for the residue definition for risk assessment is provided in MCA Sec 7, Point 7.4.1.

Table 9- 2 Definition of the residue for risk assessment

Compartment	Compound / Code
Soil	Foramsulfuron AE F092944 AE F130619 AE F153745
Groundwater	Foramsulfuron AE F092944 AE F130619 AE F153745
Surface water	Foramsulfuron AE F092944 AE F130619 AE F153745 AE 0338795 AE F099095 4-Amino-N-methylbenzamide 4-Formamido-N-methylbenzamide Foramsulfuron sulfamic acid

CP 9.1 Fate and behaviour in soil

Laboratory studies assessing the fate and behaviour of the preparation in soil have not been performed. Fate and behaviour of foramsulfuron in soil were assessed in the MCA document (Section 7) of the current renewal dossier based on the application of the active substance in laboratory studies. Outdoor studies with the application of a formulation were considered as supportive information. The endpoints derived from studies with the active substance are considered as appropriate to assess the exposure of foramsulfuron after application of the formulation FSN+IDF OD 45 (22.5+22.5).

CP 9.1.1 Rate of degradation in soil

CP 9.1.1.1 Laboratory studies

Experimental studies with the formulation have not been performed. Please refer to Document MCA7.1.2.1.

CP 9.1.1.2 Field studies

CP 9.1.1.2.1 Soil dissipation studies

Please refer to Document MCA 7.1.2.2.

CP 9.1.1.2.2 Soil accumulation studies

Please refer to Document MCA 7.1.2.2.

CP 9.1.2 Mobility in the soil

CP 9.1.2.1 Laboratory studies

Experimental studies with the formulation have not been performed. Please refer to Document MCA 7.1.3.

CP 9.1.2.2 Lysimeter studies

Please refer to Document MCA 7.1.4.2.

CP 9.1.2.3 Field leaching studies

Please refer to CP 9.1.

CP 9.1.3 Estimation of concentrations in soil

Predicted environmental concentrations in soil (PEC_S)

Report:	[redacted];[redacted];[redacted];2013;M-456836-01
Title:	FSN: PECsoil EUR - Use in maize in Europe
Report No:	EnSa-13-0395
Document No:	M-456836-01-1
Guidelines:	**EU Commission, 2000, Guidance Document on Persistence in Soil (Working Document), 9188/VI/97 rev.8** **FOCUS 1997, Soil persistence models and EU registration** **FOCUS, 2002, Generic Guidance for FOCUS Groundwater Scenarios, Version 1.1**
GLP/GEP:	**no**

Methods and Materials:

The predicted environmental concentrations in soil (PEC_{soil}) of foramsulfuron and its metabolites were estimated using a simple first tier approach (Excel sheet). A bulk density of 1.5 kg/L and a soil mixing depth of 5 cm were used as recommended by FOCUS (1997) and EU Commission (1995, 2000). Detailed application data used for simulation of PEC_{soil} were compiled in Table 9.1.3- 1.

Table 9.1.3- 1: Application pattern used for PEC_{soil} calculations of foramsulfuron

Individual Crop	FOCUS Crop Used for Interception	Application				Amount reaching the soil per season application
		Rate per Season	Interval	Plant Interception	BBCH Stage	
		[g a.s. /ha]	[days]	[%]		[g a.s./ha]
Maize	maize	1 × 60	-	25	12-18	1 × 45
Maize	maize	2 × 30	7	25	12-18	2 × 22.5

Substance Specific Parameters:

PEC_{soil} calculations were based on the maximum DT_{50} of laboratory studies, normalized to 20°C and field capacity according to FOCUS (2000). Further compound specific input parameters are summarized below.

Table 9.1.3- 2: Input parameters for PEC_{soil} for foramsulfuron and its metabolites

Compound	DT_{50} [1] [days]	Max. occurrence in soil [%]	Molar mass [g/mol]	Molar mass correction factor	Metabolite application rate on soil	
					60 g a.s./ha	30 g a.s./ha
Foramsulfuron	82	100	452.49	1	(45)	(22.5)
AE F130619	25.7	29.1	424.44	0.938	12.28	6.14
AE F153745	3.68	7.8	271.30	0.5996	2.1	1.05
AE F092944	147.6	17.8	155.16	0.3429	2.75	1.37

1) Maximum DT_{50} of laboratory studies, normalized to 20°C and field capacity - for details please refer to CA 7.1.2.1 and CA 7.1.2.2

Findings:

The maximum PEC_{soil} values for foramsulfuron and its metabolites are summarised in the following table. The maximum, short-term and long-term PEC_{soil} values and the time weighted average values ($TWAC_{soil}$) of foramsulfuron and its metabolites are provided thereafter for 1 x 60 g a.s./ha and 2 x 30 g a.s./ha.

Table 9.1.3- 3: Maximum PEC_{soil} of foramsulfuron and its metabolite for the uses assessed

Use pattern	Foramsulfuron [mg/kg]	AE F130619 [mg/kg]	AE F153745 [mg/kg]	AE F092944 [mg/kg]
Maize, 1 × 60 g a.s./ha	0.060	0.016	0.003	0.004
Maize, 2 × 30 g a.s./ha	0.058	0.015	0.002	0.004

Table 9.1.3- 4: PEC_{soil} (actual) and $TWAC_{soil}$ of foramsulfuron

	Time [days]	Foramsulfuron			
		1 x 60 g a.s./ha		2 x 30 g a.s./ha	
		PEC_{soil} [mg/kg]	$TWAC_{soil}$ [mg/kg]	PEC_{soil} [mg/kg]	$TWAC_{soil}$ [mg/kg]
Initial	0	0.060	---	0.058	---
Short term	1	0.059	0.060	0.058	0.058
	2	0.059	0.059	0.057	0.058
	4	0.058	0.059	0.056	0.057
Long term	7	0.057	0.058	0.055	0.057
	14	0.053	0.057	0.052	0.055
	21	0.050	0.055	0.049	0.053
	28	0.047	0.053	0.046	0.052
	42	0.042	0.051	0.041	0.049
	50	0.039	0.049	0.038	0.048
	100	0.026	0.040	0.025	0.039

Table 9.1.3- 5: PEC_{soil} (actual) and $TWAC_{soil}$ of AE F130619

	Time [days]	AE F130619			
		1 x 60 g a.s./ha		2 x 30 g a.s./ha	
		PEC_{soil} [mg/kg]	$TWAC_{soil}$ [mg/kg]	PEC_{soil} [mg/kg]	$TWAC_{soil}$ [mg/kg]
Initial	0	0.016	---	0.015	---
Short term	1	0.016	0.016	0.015	0.015
	2	0.016	0.016	0.014	0.015
	4	0.015	0.016	0.013	0.014
Long term	7	0.014	0.015	0.012	0.014
	14	0.011	0.014	0.010	0.012
	21	0.009	0.013	0.008	0.011
	28	0.008	0.011	0.007	0.011
	42	0.005	0.010	0.005	0.009
	50	0.004	0.009	0.004	0.008
	100	0.001	0.006	0.001	0.005

Table 9.1.3- 6: PEC_{soil} (actual) and $TWAC_{soil}$ of AE F153745

	Time [days]	AE F153745			
		1 x 60 g a.s./ha		2 x 30 g a.s./ha	
		PEC_{soil} [mg/kg]	$TWAC_{soil}$ [mg/kg]	PEC_{soil} [mg/kg]	$TWAC_{soil}$ [mg/kg]
Initial	0	0.003	---	0.002	---
Short term	1	0.002	0.003	0.001	0.002
	2	0.002	0.002	0.001	0.001
	4	0.001	0.002	<0.001	0.001
Long term	7	<0.001	0.002	<0.001	< 0.001
	14	<0.001	< 0.001	<0.001	< 0.001
	21	<0.001	< 0.001	<0.001	< 0.001
	28	<0.001	< 0.001	<0.001	< 0.001
	42	<0.001	< 0.001	<0.001	< 0.001
	50	<0.001	< 0.001	<0.001	< 0.001
	100	<0.001	< 0.001	<0.001	< 0.001

Table 9.1.3- 7: PEC_{soil} (actual) and $TWAC_{soil}$ of AE F092944

	Time [days]	AE F092944			
		1 x 60 g a.s./ha		2 x 30 g a.s./ha	
		PEC_{soil} [mg/kg]	$TWAC_{soil}$ [mg/kg]	PEC_{soil} [mg/kg]	$TWAC_{soil}$ [mg/kg]
Initial	0	0.004	---	0.004	---
Short term	1	0.004	0.004	0.004	0.004
	2	0.004	0.004	0.004	0.004
	4	0.004	0.004	0.004	0.004
Long term	7	0.004	0.004	0.003	0.004
	14	0.003	0.004	0.003	0.003
	21	0.003	0.003	0.003	0.003
	28	0.003	0.003	0.003	0.003
	42	0.003	0.003	0.003	0.003
	50	0.003	0.003	0.003	0.003
	100	0.002	0.003	0.002	0.003

Potential accumulation in soil:

The accumulation potential of foramsulfuron and its metabolites AE F130619, AE F153745 and AE F092944 after long term use was also assessed, employing a larger soil depth for the calculation of the background concentration in cases where tillage is relevant. The results are presented below for both a standard mixing depth of 5 cm (Table 9.1.3- 8) and a non- standard mixing depth of 20 cm (Table 9.1.3- 9).

Table 9.1.3- 8: PEC_{soil} of foramsulfuron and its metabolites for the uses assessed, taking the effect of accumulation into account (standard mixing depth of 5 cm – non-tillage situation)

Use Pattern	PECsoil	Foramsulfuron [mg/kg]	AE F130619 [mg/kg]	AE F153745 [mg/kg]	AE F092944 [mg/kg]
Maize 1 × 60 g a.s./ha	plateau	0.003	<0.001	<0.001	<0.001
	total*	0.063	0.016	0.003	0.004
Maize 2 × 30 g a.s./ha	plateau	0.003	<0.001	<0.001	<0.001
	total*	0.061	0.015	0.002	0.004

* total = plateau (background concentration after multi-year use) + max. PEC_{soil} (see Table 9.1.3- 3)

Table 9.1.3- 9: PEC_{soil} of foramsulfuron and its metabolites for the uses assessed, taking the effect of accumulation into account (non-standard mixing depth of 20 cm – tillage considered)

Use Pattern	PECsoil	Foramsulfuron [mg/kg]	AE F130619 [mg/kg]	AE F153745 [mg/kg]	AE F092944 [mg/kg]
Maize 1 × 60 g a.s./ha	plateau	<0.001	<0.001	<0.001	<0.001
	total*	0.061	0.016	0.003	0.004
Maize 2 × 30 g a.s./ha	plateau	<0.001	<0.001	<0.001	<0.001
	total*	0.059	0.015	0.002	0.004

* Total = plateau (background concentration after multi-year use) + max. PEC_{soil} (see Table 9.1.3- 3)

CP 9.2 Fate and behaviour in water and sediment

Laboratory studies assessing the fate and behaviour of the preparation in water and sediment have not been performed. The fate and behaviour of foramsulfuron in aquatic environment were assessed in the MCA document of the current review dossier, based on laboratory studies with application of the active substance. The endpoints derived from these studies are considered appropriate to assess the exposure of foramsulfuron after application of the formulation FSN+IDF OD 45 (22.5+22.5).

CP 9.2.1 Aerobic mineralisation in surface water

Experimental studies with the formulation have not been performed. Please refer to Document MCA 7.2.2.2.

CP 9.2.2 Water/sediment study

Experimental studies with the formulation have not been performed. Please refer to Document MCA 7.2.2.3.

CP 9.2.3 Irradiated water/sediment study

Experimental studies with the formulation have not been performed. Please refer to Document MCA 7.2.2.4.

CP 9.2.4 Estimation of concentrations in groundwater

CP 9.2.4.1 Calculation of concentrations in groundwater

This data requirement was addressed in the Dossier submitted and evaluated for the Annex I inclusion of foramsulfuron, as published in the corresponding Monograph and its amendments, written by Germany, as RMS (April 01, 2001).

Following latest guidance on PECgw modeling and considering compound related input parameters from new experimental studies and kinetic evaluations new PECgw values have been calculated therefore superseding the previous data.

Predicted environmental concentrations in groundwater (PEC_{GW})

Report:	[redacted];2013;M-455495-01
Title:	FSN+IDF PECgw-EU - Predicted environmental concentrations in groundwater recharge based on model Focus Pearl and Focus Pelmo - Use in maize in Europe
Report No:	EnSa-13-0336
Document No:	M-455495-01-1
Guidelines:	**FOCUS 2000, SANCO/321/2000 rev. 2** **FOCUS 2009, SANCO/13144/2010 v. 1** **FOCUS 2012, Generic Guidance for Tier 1 FOCUS Groundwater Assessments, v. 2.1**
GLP/GEP:	**no**

Materials and Methods:

The predicted environmental concentrations in groundwater (PEC_{gw}) for foramsulfuron and its metabolites were calculated using the simulation model FOCUS PEARL (version 4.4.4) and FOCUS PELMO (version 4.4.3). Detailed application data used for simulation of PEC_{gw} were compiled in Table 9.2.4.1- 1.

Table 9.2.4.1- 1: Application pattern used for PEC_{gw} calculations

Individual Crop	FOCUS Crop Used for Interception	Application				Amount Reaching the Soil per Season application
		Rate per Season	Interval	Plant Interception	BBCH Stage	
		[g a.s./ha]	[days]	[%]		[g a.s./ha]
Maize	maize	1 × 60	-	25	12-18	1 × 45
Maize	maize	2 × 30		2 × 25	12-18	2 × 22.5

Application dates for the simulation runs were defined following the crop event dates of the respective crop and scenario (Table 9.2.4.1- 2) as given by FOCUS (2009). Crop interception was taken into account according to the BBCH growth stage, as recommended by FOCUS (2012).

Table 9.2.4.1- 2: First application dates and related information for foramsulfuron as used for the simulation runs

Individual crop	Maize	Maize
Repeat Interval for App. Events	Every Year	Every Year
Application Technique	Spray	Spray
Absolute / Relative to	Emergence	Emergence
Scenario	1st App. Date (Julian day) Offset	1st App. Date (Julian day) Offset
Chateaudun	06 May (126) 5	06 May (126) 5
Hamburg	10 May (130) 5	10 May (130) 5
Jokioinen	- -	- -
Kremsmuenster	10 May (130) 5	10 May (130) 5
Okehampton	30 May (150) 5	30 May (150) 5
Piacenza	20 May (140) 5	20 May (140) 5
Porto	06 May (126) 5	06 May (126) 5
Sevilla	12 Mar (71) 5	12 Mar (71) 5
Thiva	25 Apr (115) 5	25 Apr (115) 5

Substance specific and model related input parameters for PECgw modelling are summarised in Table 9.2.4.1- 3.

Table 9.2.4.1- 3: Substance specific and model related input parameter for PEC_{gw} calculation of foramsulfuron and its metabolites (model parameters not listed are kept as default)

Parameter	Unit	Foramsulfuron	AE F130619	AE F153745	AE F092944
Common					
Molar mass	[g/mol]	452.5	424.4	271.3	155.2
Water solubility	[mg/L]	3293	35.5	5830	5484
Vapour Pressure	[Pa]	4.20E-11	5.80E-13	3.47E-08	3.72E-02
Freundlich Exponent [1)]	[-]	0.870	0.930	0.970	0.670
Plant uptake factor	[-]	0.0	0.0	0.0	0.0
Walker Exponent	[-]	0.7	0.7	0.7	0.7
PEARL parameters					
Substance Code	[-]	foram	F619	F745	F944
DT_{50} [2)]	[days]	13.5	2.3	0.9	25.9
Molar activ. energie	[kJ/mol]	65.4	65.4	65.4	65.4
Kom [3)]	[mL/g]	40,700	36.6	27.8	360.0
Kf	[mL/g]	-	-	-	-
PELMO parameters					
Substance Code	[-]	AS	A1	B1	C1
Rate Constant [2)]	[1/day]	0.06980	0.30137	0.81547	0.02676
Q10	[-]	2.58	2.58	2.58	2.58
Koc[3)]	[mL/g]	69.7	63.2	48.0	621.0
Degradation fraction from → to (FOCUS PEARL)	0.92 foram -> F619 0.22 foram -> F745 0.22 foram -> F944				
Degradation rate from → to (FOCUS PELMO)	0.047 Active Substance -> A1 0.011 Active Substance -> B1 0.011 Active Substance -> C1 0.301 A1 -> <BR/CO2 0.815 B1 -> <BR/CO2 0.026 C1 -> <BR/CO2				

1) arithmetic mean of 1/n values from different soils (For detailed values please refer to CA 7.1.3.1 and CA 7.1.3.2.)
2) geometric mean of normalised DT_{50} in aerobic soil under laboratory conditions (For detailed values please refer to CA 7.1.2.1 and CA 7.1.2.2.)
3) geometric mean of Koc values from different soils. The Koc values were converted into Kom values with the standard conversion factor of 1.724. (For detailed values please refer to CA 7.1.3.1 and CA 7.1.3.2.)

Findings:

PEC_{gw} were evaluated as the 80th percentile of the mean annual leachate concentration at 1 m soil depth. PEC_{gw} values for foramsulfuron and its metabolites are given in the following tables.

Table 9.2.4.1- 4: Maize: PEC_{gw} (PEARL and PELMO) of foramsulfuron

FOCUS Scenario	Foramsulfuron			
	1 x 60 g a.s./ha		2 x 30 g a.s./ha	
	PEARL	PELMO	PEARL	PELMO
	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]
Châteaudun	<0.001	<0.001	<0.001	<0.001
Hamburg	<0.001	<0.001	<0.001	<0.001
Kremsmuenster	<0.001	<0.001	<0.001	<0.001
Okehampton	<0.001	<0.001	<0.001	<0.001
Piacenza	<0.001	<0.001	<0.001	<0.001
Porto	<0.001	<0.001	<0.001	<0.001
Sevilla	<0.001	<0.001	<0.001	<0.001
Thiva	<0.001	<0.001	<0.001	<0.001

Table 9.2.4.1- 5: Maize: PEC_{gw} (PEARL and PELMO) of AE F130619

FOCUS Scenario	AE F130619			
	1 x 60 g a.s./ha		2 x 30 g a.s./ha	
	PEARL	PELMO	PEARL	PELMO
	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]
Châteaudun	<0.001	<0.001	<0.001	<0.001
Hamburg	<0.001	<0.001	<0.001	<0.001
Kremsmuenster	<0.001	<0.001	<0.001	<0.001
Okehampton	<0.001	<0.001	<0.001	<0.001
Piacenza	<0.001	<0.001	<0.001	<0.001
Porto	<0.001	<0.001	<0.001	<0.001
Sevilla	<0.001	<0.001	<0.001	<0.001
Thiva	<0.001	<0.001	<0.001	<0.001

Table 9.2.4.1- 6: Maize: PEC_{gw} (PEARL and PELMO) of AE F153745

FOCUS Scenario	AE F153745			
	1 x 60 g a.s./ha		2 x 30 g a.s./ha	
	PEARL	PELMO	PEARL	PELMO
	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]
Châteaudun	<0.001	<0.001	<0.001	<0.001
Hamburg	<0.001	<0.001	<0.001	<0.001
Kremsmuenster	<0.001	<0.001	<0.001	<0.001
Okehampton	<0.001	<0.001	<0.001	<0.001
Piacenza	<0.001	<0.001	<0.001	<0.001
Porto	<0.001	<0.001	<0.001	<0.001
Sevilla	<0.001	<0.001	<0.001	<0.001
Thiva	<0.001	<0.001	<0.001	<0.001

Table 9.2.4.1- 7: Maize: PEC_{gw} (PEARL and PELMO) of AE F092944

FOCUS Scenario	AE F092944			
	1 x 60 g a.s./ha		2 x 30 g a.s./ha	
	PEARL	PELMO	PEARL	PELMO
	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]	PEC_{gw} [µg/L]
Châteaudun	<0.001	<0.001	<0.001	<0.001
Hamburg	<0.001	<0.001	<0.001	<0.001
Kremsmuenster	<0.001	<0.001	<0.001	<0.001
Okehampton	<0.001	<0.001	<0.001	<0.001
Piacenza	<0.001	<0.001	<0.001	<0.001
Porto	<0.001	<0.001	<0.001	<0.001
Sevilla	<0.001	<0.001	<0.001	<0.001
Thiva	<0.001	<0.001	<0.001	<0.001

Conclusion:

There are no concerns for groundwater from the use of foramsulfuron in accordance with the use pattern for the representative formulation.

CP 9.2.4.2 Additional field tests

Additional field tests to assess the leaching behaviour of foramsulfuron and its metabolites are not considered necessary.

CP 9.2.5 Estimation of concentrations in surface water and sediment

This data requirement was addressed in the Dossier submitted and evaluated for the Annex I inclusion of foramsulfuron, as published in the corresponding Monograph and its amendments written by Germany as RMS (April 01, 2001).

New PEC_{sw} values, following latest guidance on PEC_{sw} modeling, and considering compound related input parameters from new experimental studies and kinetic evaluations have been calculated, therefore superseding the previous data.

Predicted environmental concentrations in surface water (PEC_{SW})

Predicted environmental concentrations in sediment (PEC_{SED})

Report:	[redacted];[redacted];[redacted];2013;M-458837-02; Amended: 2013-09-03
Title:	Foramsulfuron (FSN) and metabolites: PECsw,sed FOCUS EUR - Use in maize in Europe - Foramsulfuron (AE F130360) AE F130619, AE F092944, AE F153745, AE 0338795, AE F099095 - Foramsulfuron-4-amino-N-methylbenzamide - Foramsulfuron-4-formylmido-N-methylbenzamide - Foramsulfuron-sulfamic acid
Report No:	EnSa-13-0365
Document No:	M-458837-02-1
Guidelines:	**FOCUS 2003, SANCO/4802/2001 rev 2** **FOCUS 2000, SANCO/321/2000/rev. 2** **FOCUS 2007, SANCO/10422/2005 v. 2.0**
GLP/GEP:	**no**

Materials and Methods:

Predicted environmental concentrations in surface water and sediment (PEC_{sw} and PEC_{sed}) of foramsulfuron and its metabolites AE F130619, AE F092944, AE F153745, AE 0338795, AE F099095, 4-amino-N-methylbenzamide, 4-formamido-N-methylbenzamide and foramsulfuron-sulfamic acid have been calculated for the use in maize in Europe.

At FOCUS step 2 the application period was set to March to May and calculations considered the use in Northern and Southern Europe. Details of the application pattern used in the Step 2 calculations are summarised in Table 9.2.5- 1.

Table 9.2.5- 1: Application pattern used for PEC_{sw} calculations (for FOCUS step 1&2)

Individual Crop	FOCUS Crop Used for Interception	Application				Amount Reaching the Soil per Season application
		Rate per Season	Interval	Plant Interception	Growth Stage	
		[g a.s. /ha]	[days]	[%]		[g a.s. /ha]
Maize	Maize (arable crops)	1 × 60	-	Minimal crop cover (35%)	12-18	1 × 45.0
Maize	Maize (arable crops)	2 × 30	7	Minimal crop cover (25%)	12-18	2 × 22.5

At FOCUS step 3, actual application dates were determined by the PAT (pesticide application timer) included within SWASH. Details of the parameters used in the Step 3 calculations are summarised in Table 9.2.5- 2.

Table 9.2.5- 2: Application dates of foramsulfuron for the FOCUS Step 3 calculations (Emg. stands for the emergence date)

Parameter	Maize 1 x 60 g/ha		Maize 2 x 30 g/ha	
PAT start date rel./absolute	Emg., 0 days		Emg., 0 days	
Appl. method (appl. type)	ground spray (CAM 2)		ground spray (CAM 2)	
No of appl.	1		2	
PAT window range	30		var. Range	
Appl. interval	1		7	
Application Details	PAT Start Date (Julian Day)	Appl. Date	PAT Start Date (Julian Day)	1st Appl. Date
D3 (1st)	05-May (125)	04-May	05-May (125)	04-May 14-May
D4 (1st)	10-May (130)	30-May	10-May (130)	30-May 06-Jun
D5 (1st)	10-May (130)	11-May	10-May (130)	11-May 27-May
D6 (1st)	20-Apr (110)	23-Apr	20-Apr (110)	23-Apr 03-May
R1 (1st)	03-May (123)	03-May	03-May (123)	08-May 15-May
R2 (1st)	01-May (121)	07-May	01-May (121)	07-May 20-May
R3 (1st)	01-May (121)	18-May	01-May (121)	18-May 01-Jun
R4 (1st)	10-Apr (100)	10-Apr	10-Apr (100)	10-Apr 20-Apr

Compound specific input data are summarised below for FOCUS Steps 1-2 (Table 9.2.5- 3 and Table 9.2.5- 4) and FOCUS Steps 3-4 (Table 9.2.5- 5).

Table 9.2.5- 3: Substance parameters used for foramsulfuron and its metabolites at Steps 1-2 level

Parameter	Unit	Foramsulfuron	AE F130619	AE F092944	AE F153745	AE 0338795
Molar Mass	g/mol	452.49	424.44	155.16	271.3	438.42
Water Solubility	mg/L	3293	35.5	5484	6830	200000
Koc	mL/g	69.7 [1)]	63.2 [1)]	621 [1)]	48 [1)]	17.6 [2)]
Degradation						
Soil	days	13.5 [3)]	2.3 [3)]	25.9 [3)]	0.9 [3)]	1000 [4)]
Total System	days	32.9 [5)]	15.7 [5)]	110 [5)]	72.1 [5)]	65.4 [5)]
Water	days	32.9 [5)]	15.7 [5)]	110 [5)]	72.1 [5)]	65.4 [5)]
Sediment	days	32.9 [5)]	15.7 [5)]	110 [5)]	72.1 [5)]	65.4 [5)]
Max Occurrence						
Water / Sediment	%	100	10.7	26.5	24.6	23.7
Soil	%	100	29.1	17.8	7.8	0.001

[1)] Geometric mean Koc
[2)] Estimated by calculation using KOCWIN (US EPA, 2000)
[3)] Normalised geometric mean value
[4)] Default value (worst case)
[5)] Geometric mean of total system

Table 9.2.5- 4: Substance parameters used for the foramsulfuron metabolites at Steps 1-2 level

Parameter	Unit	AE F099095	4-amino-N-methylbenzamide	4-formamido-N-methylbenzamide	Foramsulfuron-sulfamic acid
Molar Mass	g/mol	198.18	150.18	178.19	278.24
Water Solubility	mg/L	1000 [1)]	1000 [1)]	1000 [1)]	1000 [1)]
Koc	mL/g	351 [2)]	0 [1)]	0 [1)]	0 [1)]
Degradation					
Soil	days	1000 [1)]	1000 [1)]	1000 [1)]	1000 [1)]
Total System	days	1000 [1)]	1000 [1)]	1000 [1)]	1000 [1)]
Water	days	1000 [1)]	1000 [1)]	1000 [1)]	1000 [1)]
Sediment	days	1000 [1)]	1000 [1)]	1000 [1)]	1000 [1)]
Max Occurrence					
Water / Sediment	%	35.2	12.8	19.7	17.6
Soil	%	0.001	0.001	0.001	0.001

[1)] Default value
[2)] Geometric mean Koc – study was submitted in the dossier for Annex I inclusion of Mesosulfuron; agreed Koc values are listed in SANCO/10298/2003-Final of 25 June 2004.

Table 9.2.5- 5: Substance specific and model related input parameter for PEC_{sw} calculation of foramsulfuron and metabolite at Step 3-4 level (model parameters not listed are kept as default)

Parameter	Unit	Foramsulfuron	AE F130619
Company Code	-	AE F130360	AE F130619
SWASH Code	-	Foram2	F619
General Parameters			
Molar Mass	g/mol	452.5	424.4
Water Solubility	mg/L	3293.0	35.5
Vapour Pressure	Pa	4.2E-11	5.8E-13
Plant Uptake Factor	-	0.0	0.0
Wash-Off Factor PRZM	1/cm	0.5	0.5
Wash-Off Factor MACRO	1/mm	0.05	0.05
Sorption			
Koc	mL/g	70 [1)]	63 [1)]
Freundlich Exponent	-	0.87 [2)]	0.93 [2)]
Degradation			
Soil	days	13.5 [3)]	2.3 [3)]
Form. Frac. PRZM	molar basis	-	0.920
Form. Frac. MACRO	mass basis	-	0.863
Water	days	32.9 [4)]	15.7 [4)]
Sediment	days	1000 [5)]	1000 [5)]
Walker Exponent	-	0.7	0.7
Effect of Temperature			
Activation Energy	J/mol	65400	65400
Exponent	1/K	0.095	0.095
Q10	-	2.58	2.58

[1)] Geometric mean Koc
[2)] Arithmetic mean 1/n
[3)] Normalised geometric mean value
[4)] Geometric mean of total system
[5)] Default value (worst case)

Findings:

Step 1 and 2: The maximum PEC values for Steps 1 and 2 are given in the tables below for foramsulfuron and its metabolites.

Table 9.2.5- 6: Maximum PEC_{sw} and PEC_{sed} values for foramsulfuron and metabolites at Step 1& 2

Use pattern	FOCUS scenario	Foramsulfuron		AE F130619		AE F092944	
		PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]
Maize 1× 60 g a.s./ha	Step 1	18.85	12.75	5.071	3.182	0.682	4.147
	Step 2						
	N-EU Single	2.713	1.842	0.255	0.155	0.099	0.601
	S-EU Single	4.948	3.368	0.481	0.298	0.189	1.156
Maize 2× 30 g a.s./ha	Step 1	18.85	12.75	5.071	3.182	0.682	4.147
	Step 2						
	N-EU Multi	2.291	1.556	0.149	0.090	0.090	0.547
	S-EU Multi	4.189	2.851	0.276	0.170	0.172	1.055
	N-EU Single	1.357	0.921	0.128	0.078	0.049	0.300
	S-EU Single	2.474	1.684	0.241	0.149	0.094	0.578

Table 9.2.5- 7: Maximum PEC_{sw} and PEC_{sed} values for foramsulfuron metabolites at Step 1& 2

Use pattern	FOCUS scenario	AE F153745		AE 0338795		AE F099095	
		PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]
Maize 1× 60 g a.s./ha	Step 1	0.961	0.422	0.127	<0.001	0.085	<0.001
	Step 2						
	N-EU Single	0.081	0.038	0.127	0.021	0.085	0.203
	S-EU Single	0.087	0.041	0.127	0.021	0.085	0.203
Maize 2× 30 g a.s./ha	Step 1	0.961	0.422	0.127	<0.001	0.085	<0.001
	Step 2						
	N-EU Multi	0.068	0.031	0.107	0.018	0.066	0.179
	S-EU Multi	0.070	0.033	0.107	0.018	0.066	0.179
	N-EU Single	0.041	0.019	0.063	0.010	0.043	0.101
	S-EU Single	0.044	0.020	0.063	0.010	0.043	0.101

Table 9.2.5- 8: Maximum PEC_{sw} and PEC_{sed} values for foramsulfuron metabolites at Step 1& 2

Use pattern	FOCUS scenario	4-amino-N-methylbenzamide		4-formylmido-N-methylbenzamide		Sulfamic acid	
		PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]
Maize 1× 60 g a.s./ha	Step 1	0.024	<0.001	0.043	<0.001	0.060	<0.001
	Step 2						
	N-EU Single	0.023	<0.001	0.043	<0.001	0.060	<0.001
	S-EU Single	0.023	<0.001	0.043	<0.001	0.060	<0.001
maize 2× 30 g a.s./ha	Step 1	0.024	<0.001	0.043	<0.001	0.060	<0.001
	Step 2						
	N-EU Multi	0.021	<0.001	0.038	<0.001	0.053	<0.001
	S-EU Multi	0.021	<0.001	0.038	<0.001	0.053	<0.001
	N-EU Single	0.012	<0.001	0.021	<0.001	0.030	<0.001
	S-EU Single	0.012	<0.001	0.021	<0.001	0.030	<0.001

Step 3: The maximum PEC_{sw} and PEC_{sed} values for relevant FOCUS Step 3 scenarios are given in the tables below. Time-weighted average concentrations are not included in this summary, because they were not used in the risk assessment.

Table 9.2.5- 9: Maximum PEC_{sw} and PEC_{sed} of foramsulfuron and the metabolite AE F130619 for all scenarios at Step 3 following application to maize (1 x 60 g a.s./ha)

Use pattern:	Maize, 1 x 60 g a.s./ha				
	Foramsulfuron			AE F130619	
FOCUS scenario	Entry route*	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]
D3 (ditch)	S	0.314	0.075	0.032	0.006
D4 (pond)	S	0.013	0.022	0.001	0.002
D4 (stream)	S	0.271	0.017	0.001	0.001
D5 (pond)	S	0.015	0.031	0.002	0.003
D5 (stream)	S	0.251	0.012	0.001	0.001
D6 (ditch)	S	0.316	0.073	0.032	0.006
R1 (pond)	R	0.025	0.047	0.004	0.005
R1 (stream)	R	1.284	0.230	0.081	0.013
R2 (stream)	R	0.972	0.226	0.108	0.031
R3 (stream)	R	2.225	0.411	0.178	0.028
R4 (stream)	R	2.341	0.550	0.302	0.041

* Entry route: letters S, D, and R correspond to the dominant entry path – spray drift, drainage, and runoff

Table 9.2.5- 10: Maximum PEC_{sw} and PEC_{sed} of foramsulfuron for all scenarios at Step 3 following application to maize (2 x 30 g a.s./ha, 7 d interval)

Use pattern:	Maize, 2 x 30 g a.s./ha, 7 d interval					
	Foramsulfuron, single application			Foramsulfuron, multiple application		
FOCUS scenario	Entry route	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	Entry route	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]
D3 (ditch)	S	**0.157**	0.039	S	0.136	0.044
D4 (pond)	S	0.006	0.011	S	**0.010**	0.019
D4 (stream)	S	**0.136**	0.009	S	0.118	0.010
D5 (pond)	S	0.007	0.016	S	**0.013**	0.037
D5 (stream)	S	**0.126**	0.006	S	0.117	0.017
D6 (ditch)	S	**0.158**	0.037	S	0.138	0.050
R1 (pond)	R	0.013	0.026	R	**0.062**	0.102
R1 (stream)	R	0.622	0.116	R	**1.281**	0.259
R2 (stream)	R	0.456	0.111	R	**0.456**	0.111
R3 (stream)	R	1.084	0.209	R	**1.084**	0.208
R4 (stream)	R	1.151	0.282	R	**1.315**	0.375

* Entry route: letters S, D, and R correspond to the dominant entry path – spray drift, drainage, and runoff

Values in bold are maximum of single and multiple application.

Table 9.2.5- 11: Maximum PEC_{sw} and PEC_{sed} of the metabolite AE F130619 for all scenarios at step 3 following application to maize (2 x 30 g a.s./ha, 7 d interval)

Use pattern:	Maize, 2 x 30 g a.s./ha, 7 d interval			
FOCUS scenario	AE F1130619 single application		AE F1130619 multiple application	
	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]
D3 (ditch)	**0.016**	0.003	0.014	0.003
D4 (pond)	<0.001	<0.001	**<0.001**	0.002
D4 (stream)	<0.001	<0.001	**0.001**	<0.001
D5 (pond)	<0.001	0.001	**0.001**	0.004
D5 (stream)	<0.001	<0.001	**0.001**	0.002
D6 (ditch)	**0.016**	0.003	0.014	0.005
R1 (pond)	0.002	0.002	**0.010**	0.010
R1 (stream)	0.040	0.006	**0.099**	0.017
R2 (stream)	0.052	0.010	**0.052**	0.013
R3 (stream)	0.089	0.014	**0.089**	0.014
R4 (stream)	0.101	0.021	**0.121**	0.029

Values in bold are maximum of single and multiple application.

Step 4: The maximum PEC_{sw} and PEC_{sed} values for relevant FOCUS Step 4 scenarios considering different buffer zones are given in the tables below.

Table 9.2.5- 12: Maximum PEC_{sw} and PEC_{sed} values of foramsulfuron and the metabolite AE F130619 at Step 4 with mitigation options after single application in maize (1 x 60 g/ha)

Step 4		Maize, 1 x 60 g a.s./ha			
		Foramsulfuron		AE F130619	
Buffer Width & Type	FOCUS Scenario	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]
10m (SD & RO)	D3 (ditch)	0.055	0.015	<0.001	<0.001
	D4 (pond)	0.008	0.015	<0.001	0.001
	D4 (stream)	0.061	0.005	0.001	<0.001
	D5 (pond)	0.010	0.024	<0.001	0.002
	D5 (stream)	0.057	0.008	<0.001	0.001
	D6 (ditch)	0.058	0.039	0.008	0.004
	R1 (pond)	0.010	0.025	<0.001	<0.001
	R1 (stream)	0.547	0.101	0.035	0.005
	R2 (stream)	0.426	0.101	0.046	0.009
	R3 (stream)	1.006	0.192	0.080	0.013
	R4 (stream)	1.065	0.258	0.092	0.019
20m (SD & RO)	D3 (ditch)	0.028	0.008	<0.001	<0.001
	D4 (pond)	0.006	0.013	<0.001	0.001
	D4 (stream)	0.032	0.004	0.001	<0.001
	D5 (pond)	0.008	0.020	<0.001	0.002
	D5 (stream)	0.030	0.007	<0.001	0.001
	D6 (ditch)	0.032	0.028	0.008	0.004
	R1 (pond)	0.007	0.015	<0.001	<0.001
	R1 (stream)	0.276	0.053	0.018	0.003
	R2 (stream)	0.221	0.054	0.024	0.005
	R3 (stream)	0.526	0.104	0.042	0.007
	R4 (stream)	0.558	0.140	0.048	0.010

SD and RO: Spray drift and run-off buffer

Table 9.2.5- 13: Maximum PEC_{sw} and PEC_{sed} values of foramsulfuron and the metabolite AE F130619 at Step 4 with mitigation options after single application in maize (1 x 30 g/ha)

Step 4		Maize, 1 x 30 g a.s./ha			
		Foramsulfuron		AE F130619	
Buffer Width & Type	FOCUS Scenario	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]
10m (SD & RO)	D3 (ditch)	**0.027**	0.008	<0.001	<0.001
	D4 (pond)	0.004	0.008	<0.001	<0.001
	D4 (stream)	**0.030**	0.002	<0.001	<0.001
	D5 (pond)	0.005	0.012	<0.001	<0.001
	D5 (stream)	**0.028**	0.004	<0.001	<0.001
	D6 (ditch)	0.029	0.013	0.004	0.002
	R1 (pond)	0.006	0.013	<0.001	<0.001
	R1 (stream)	0.265	0.051	0.017	0.003
	R2 (stream)	0.200	0.049	0.023	0.005
	R3 (stream)	0.490	0.097	0.040	0.007
	R4 (stream)	0.523	0.132	0.046	0.010
20m (SD & RO)	D3 (ditch)	**0.014**	0.004	<0.001	<0.001
	D4 (pond)	0.003	0.007	<0.001	<0.001
	D4 (stream)	**0.016**	0.002	<0.001	<0.001
	D5 (pond)	0.004	0.010	<0.001	<0.001
	D5 (stream)	**0.015**	0.003	<0.001	<0.001
	D6 (ditch)	0.016	0.013	0.004	0.002
	R1 (pond)	0.004	0.008	<0.001	<0.001
	R1 (stream)	0.135	0.027	0.009	0.001
	R2 (stream)	0.104	0.026	0.012	0.002
	R3 (stream)	0.256	0.053	0.021	0.004
	R4 (stream)	0.274	0.072	0.024	0.005

SD and RO: Spray drift and run-off buffer

Values in bold are maximum of single and multiple application.

Table 9.2.5- 14: Maximum PEC_{sw} and PEC_{sed} values of foramsulfuron and the metabolite AE F130619 at Step 4 with mitigation options after multiple application in maize (2 x 30 g/ha)

Step 4		Maize, 2 x 30 g a.s./ha, 7 d interval			
		Foramsulfuron		AE F130619	
Buffer Width & Type	FOCUS Scenario	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]	PEC_{sw} [µg/L]	PEC_{sed} [µg/kg]
10m (SD & RO)	D3 (ditch)	0.022	0.008	**<0.001**	<0.001
	D4 (pond)	**0.006**	0.016	**<0.001**	0.002
	D4 (stream)	0.025	0.005	**0.001**	<0.001
	D5 (pond)	**0.009**	0.032	**0.001**	0.003
	D5 (stream)	0.026	0.014	**0.001**	0.002
	D6 (ditch)	**0.034**	0.022	**0.008**	0.004
	R1 (pond)	**0.059**	0.097	**0.002**	0.002
	R1 (stream)	**0.580**	0.120	**0.045**	0.008
	R2 (stream)	**0.200**	0.049	**0.023**	0.006
	R3 (stream)	**0.490**	0.097	**0.040**	0.007
	R4 (stream)	**0.598**	0.175	**0.055**	0.013
20m (SD & RO)	D3 (ditch)	0.012	0.004	**<0.001**	<0.001
	D4 (pond)	**0.004**	0.014	**<0.001**	0.002
	D4 (stream)	0.013	0.005	**0.001**	<0.001
	D5 (pond)	**0.007**	0.029	**0.001**	0.003
	D5 (stream)	0.014	0.014	**0.001**	0.002
	D6 (ditch)	**0.034**	0.026	**0.008**	0.004
	R1 (pond)	**0.014**	0.026	**<0.001**	<0.001
	R1 (stream)	**0.303**	0.065	**0.024**	0.004
	R2 (stream)	**0.104**	0.026	**0.012**	0.003
	R3 (stream)	**0.256**	0.052	**0.021**	0.004
	R4 (stream)	**0.313**	0.095	**0.029**	0.007

SD and RO: Spray drift and run-off buffer

CP 9.3 Fate and behaviour in air

No volatility studies on the preparation have been performed. Details of volatility for the active substance are given in Document MCA Section 1. Please refer to Document MCA 7.3.2.

CP 9.3.1 Route and rate of degradation in air and transport via air

Please refer to Document MCA 7.3.2.

Predicted environmental concentrations from airborne transport
Due to the low half-life in air and the very low vapour pressure no exposure via air is expected.

CP 9.4 Estimation of concentrations for other routes of exposure

There are no other routes of exposure to be considered if the product is used according to good agricultural practice.