ATTRIBUT SG70
(700 g/kg propoxycarbazone-sodium)

Herbicide

Dossier for Renewal of Approval according to Commission Regulation 844/2012

Document M-CP, Section 9

Fate and behaviour in the environment

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CP 9 FATE AND BEHAVIOUR IN THE ENVIRONMENT

INTRODUCTION

ATTRIBUT SG70, the formulation supporting the renewal of approval of propoxycarbazone-sodium (MKH 6561), was not the representative formulation for first Annex I inclusion of the active substance. ATTRIBUT SG70 is considered to be similar to MKH 6561 WG70 which has been the representative formulation during the approval of propoxycarbazone-sodium. Please refer to the Document J of this dossier for an evaluation of the similarity of both formulations. It is proposed to use environmental fate data from MKH 6561 WG70 to support ATTRIBUT SG70.

The environmental fate of the formulation is determined by the properties of the active substance propoxycarbazone-sodium. Thus the exposure assessment of ATTRIBUT SG70 is relying upon the information on fate and behaviour of the active substance.

Concentrations of propoxycarbazone-sodium in various environmental compartments are predicted following the proposed use pattern. The predicted environmental concentrations (PEC) in soil, surface water, sediment, and groundwater following the proposed use pattern are provided.

The GAP of the representative uses of ATTRIBUT SG70 are given in the following table:

Table 9- 1: Intended application pattern of ATTRIBUT SG70

Crop	Application method	Maximum individual application rate (kg a.s./ha)	Number of applications	Minimum application interval (days)	Application timing BBCH
Winter & spring cereals	Spray	0.07	1	-	BBCH 11- 33
		0.042	1	-	BBCH 11- 33

The fate and behaviour of propoxycarbazone-sodium in the different compartments has been evaluated during the approval evaluation of the active substance as provided in Document M-CA, Section 7 of this dossier. Therefore, specific studies on the product have not been performed.

Data on the fate and behaviour of propoxycarbazone-sodium in soil, water, sediment and air were submitted within the EU Dossier (Baseline Dossier), which resulted in the Annex I inclusion under Directive 91/414/EEC in 2003. In this Supplemental Dossier for renewal of approval of propoxycarbazone-sodium, only those environmental fate studies are described in Document M-CA 7.1 to CA 7.5, which were not submitted within the Baseline Dossier. However, for a better understanding of the behaviour of propoxycarbazone-sodium in the environment, short summaries including the results of all environmental fate studies are given additionally in the summary in Documents M-CA: 7.1.1, 7.1.2, 7.1.3, 7.1.4, 7.2.1, 7.2.2 and 7.3.

Six PEC reports (KCP 9.1.3 /01 – 03, KCP 9.2.4.1 /01 – 03) evaluated during the Annex I inclusion are not considered relevant for this Supplemental Dossier for the renewal of approval and are replaced by new simulations according to current FOCUS guidance. Details are given in CP 9.1 and CP 9.2.

CP 9.1 Fate and behaviour in soil

Propoxycarbazone-sodium is moderately fast to slowly degraded in soil under aerobic and anaerobic conditions to the final degradation product CO_2 and the major metabolites MKH 6561-sulfonamide methyl ester - M05, MKH 6561-saccharin - M07, MKH 6561-4-hydroxy-saccharin - M08, MKH 6561-N-methyl propoxy triazolinone amide - M09, MKH 6561-N-methyl propoxy triazolinone - M10 and MKH 6561-4-methoxy saccharin - M11. Furthermore, non-extractable residues were formed depending on the soil type investigated. In the presence of light, propoxycarbazone-sodium is degraded to a certain extend to minor amounts of metabolites. However, photodegradation on soil is not to be expected the major route for dissipation of the compound from the environment.

CP 9.1.1 Rate of degradation in soil

The route and rate of degradation of the active substance propoxycarbazone-sodium and its metabolites in soil is described in detail in the Document M-CA, section 7, point 7.1. Here below a summary is presented:
Propoxycarbazone-sodium degraded to its major degradation products MKH 6561-sulfonamide methyl ester (M05; max. 20.9% at day 6), MKH 6561-saccharin (M07; max. 26.7% at day 14), MKH 6561-4-hydroxy saccharin (M08; max. 21.9% at day 180) (phenyl pathway) as well as MKH 6561-N-methyl propoxy triazolinone amide (M09; max. 13.2% at day 253) and MKH 6561-N-methyl propoxy triazolinone (M10; max. 55.2% at day 182) (triazolinone pathway). Additionally, some minor degradation products (<5% AR) were observed (MKH 6561-carboxylic acid (M04) and MKH 6561-sulfonamide acid (M06)).
Another major metabolite (MKH 6561-4-methoxy saccharin, M11, max. 17.1% at day 28) was observed in an anaerobic study. Due to the fact that the conditions in this study were not strictly anaerobic, it cannot definitely be concluded that M11 is solely formed in anaerobic environments. The presence of M11 was confirmed in a further study and observed with 4.5% at day 6 and 5.5% at day 13, while M07 was not detected in any sample. The degradation pathway of propoxycarbazone-sodium in soil will therefore be revised: the retransformation M08 to M07 will be neglected and the new metabolite M11 will be included and newly addressed as soil degradation product. The new postulated pathway is shown in Figure 9.1-1.

CP 9.1.1.1 Laboratory studies

The aerobic degradation rates of propoxycarbazone-sodium and its major degradation products in soil were studied using two different radiolabel positions, [phenyl-U-^{14}C] and [triazolinone-3-^{14}C], and unlabelled compounds. The studies have been performed in a number of soils in the dark in the laboratory at temperatures at 20 °C at different soil moistures.

propoxycarbazone-sodium
Non-normalised laboratory half-lives (persistence endpoints) ranged from 7.2 to 215.5 days ($DegT_{50}$). The maximum non-normalised $DegT_{50}$ of 215.5 days was used for the PEC_s calculations.

From the laboratory studies on the route of degradation in soil it can be concluded that propoxycarbazone-sodium was moderately fast to slowly degrade in soil to the final degradation product CO_2 depending on the soil type investigated. In parallel to mineralisation, bound residues were formed. Eight degradates were found and identified. Major metabolites (> 10 % of the applied radioactivity) were M05, M07, M08, M09, M10 and M11. Minor metabolites were M04 and M06.

Propoxycarbazone-sodium is degraded in first steps via cleavage of the ester bond yielding M04 and/or cleavage of the triazolinone amide bond resulting in M05 or M09 which is further degraded to M10. M05 and M04 are further degraded to M06 followed by the formation of M07 and M08. Final degradation product is CO_2, (see Figure 9.1-1).

Figure 9.1-1 Proposed degradation pathway of propoxycarbazone-sodium in soil under aerobic conditions

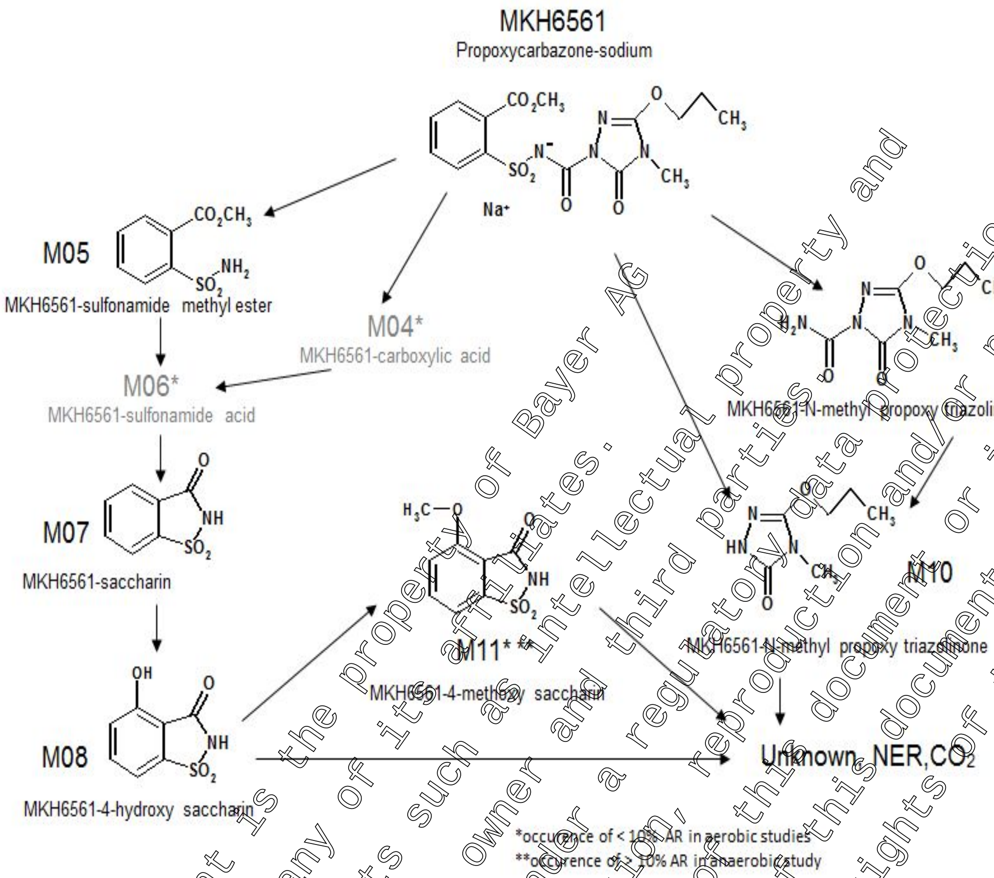

Table 9.1-1 Overview of the laboratory aerobic rate of degradation studies for the active substance propoxycarbazone-sodium

Soil characteristics				Persistence endpoints[1]			Modelling endpoints[1]		
Soil origin	Soil type	pH	OC (%)	Kinetic model	$DegT_{50}$ (days)	$DegT_{90}$ (days)	Kinetic model	Non-normalised $DegT_{50}$ (d)	Normalised $DegT_{50}$ (d) (20°C, pF2)
[redacted]	loamy sand	6.4[2]	0.81	FOMC	70.2	277.2	SFO	75.5	57.3
[redacted]	loamy sand	6.4[2]	0.86	SFO	101.1	335.8	SFO	101.1	60.7
[redacted]	silt	7.2	2.62	DFOP	7.2	28.0	SFO	7.8	4.9
[redacted]	loamy sand	6.4	1.80	SFO	45.7	151.8	SFO	45.7	38.1
BBA 2.2	loamy sand	6.3	2.48	SFO	215.5	715.8	SFO	215.5	179.7
[redacted]	silt	7.2	2.62	DFOP	18.1	67.4	SFO	19.6	12.3
[redacted]	loamy sand	6.4	1.80	DFOP	15.0	52.6	SFO	15.3	12.7
BBA 2.2	loamy sand	6.3	2.48	SFO	81.9	272.0	SFO	81.9	68.3

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Calculated according to current FOCUS kinetics guidance (refer to Document M-CA 7.1.2.1.1/05)
2) pH in H_2O

M05

Non-normalised laboratory half-lives (persistence endpoints) ranged from 2.8 to 17.4 days ($DegT_{50}$). The maximum non-normalised $DegT_{50}$ of 17.4 days was used for the PEC_s calculations together with the maximum occurrence of 20.9%.

Table 9.1-2 Overview of the laboratory aerobic rate of degradation studies for the metabolite M05

Soil characteristics				Persistence endpoints[1)]			Modelling endpoints[1)]		
Soil origin	Soil type	pH	OC (%)	Kinetic model	$DegT_{50}$ (days)	$DegT_{90}$ (days)	Kinetic model	Non-normalised $DegT_{50}$ (d)	Normalised $DegT_{50}$ (d) (20°C, pF2)
[redacted]	loamy sand	6.4[2)]	0.81	SFO[4)]	2.8	9.3	SFO[5)]	3.1	2.3
[redacted]	silt	7.2	2.62	SFO[6)]	3.0	10.1	SFO[6)]	2.8	1.8
[redacted]	loamy sand	6.4	1.80	SFO[6)]	17.4	57.8	SFO[6)]	17.4	14.5
BBA 2.2	loamy sand	6.3	2.48	-[8)]	-[8)]	-[8)]	-[8)]	-[8)]	-[8)]
LUFA 2.2	loamy sand	5.5	1.87	FOMC	5.9	30.1	SFO	6.4	5.8
LUFA 2.3	sandy loam	6.8	0.94	SFO	8.4	27.9	SFO	8.4	6.8
LUFA 6S	clay	7.1	1.64	SFO	3.8	12.6	SFO	3.8	2.6

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Calculated according to current FOCUS kinetics guidance (refer to Document M- CA 7.1.2.1.2/10)
2) pH in H2O
3) at 1/3 bar
4) Pathway fit (parent: FOMC; M05, M08: SFO)
5) Pathway fit (parent: SFO; M05: SFO; without M08)
6) Pathway fit (parent: DFOP; M05, M07, M08: SFO; without M11)
7) Pathway fit (parent: SFO; M05, M07, M08: SFO, without M11)
8) Pathway fit not acceptable, decline fit not possible

M07

Non-normalised laboratory half-lives (persistence endpoints) ranged from 4.6 to 39.8 days ($DegT_{50}$). The maximum non-normalised $DegT_{50}$ of 39.8 days was used for the PEC_s calculations together with the maximum occurrence of 26.7%.

Table 9.1-3 Overview of the laboratory aerobic rate of degradation studies for the metabolite M07

Soil characteristics				Persistence endpoints[1]			Modelling endpoints[1]		
Soil origin	**Soil type**	**pH**	**OC (%)**	**Kinetic model**	**$DegT_{50}$ (days)**	**$DegT_{90}$ (days)**	**Kinetic model**	**Non-normalised $DegT_{50}$ (d)**	**Normalised $DegT_{50}$ (d) (20°C, pF2)**
[redacted]	loamy sand	6.4[2]	0.81	- [3]	- [3]	- [2]	- [3]	- [3]	- [3]
[redacted]	Silt	7.2	2.62	SFO[4]	4.6	15.2	SFO[5]	4.4	2.8
[redacted]	loamy sand	6.4	1.80	SFO[5]	39.8	132.2	SFO[5]	39.8	33.2
BBA 2.2	loamy sand	6.3	2.48	- [6]	- [6]	- [6]	- [6]	- [6]	- [6]
[redacted]	loamy sand	6.4[2]	0.47[7]	SFO	22.7	75.4	SFO	22.7	16.7
[redacted]	Silt	7.8[2]	2.62	- [8]	- [8]	- [8]	- [8]	- [8]	- [8]
[redacted]	loamy sand	7.0[2]	1.80	- [8]	- [8]	- [8]	- [8]	- [8]	- [8]
[redacted]	loamy sand	6.4[2]	0.47	- [8]	- [8]	- [8]	- [8]	- [8]	- [8]

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Calculated according to current FOCUS kinetics guidance (refer to Document M-CA 7.1.2/1.2/10)
2) pH in H2O
3) Not detected in relevant amounts (all values below LOD)
4) Pathway fit (parent: DFOP; M05, M07, M08: SFO; without M11)
5) Pathway fit (parent: SFO; M05, M07, M08: SFO, without M11)
6) Pathway fit not acceptable; decline fit not possible
7) OC was not given in the original study report and was therefore calculated as OC (%) = OM (%) / 1.724.
8) M07 was detected in the original study, but since the formation of M07 from M08 seems chemically unusual and due to the likelihood of analytical confusion with M11, the values were not considered for the kinetic evaluation.

M08

Non-normalised laboratory half-lives (persistence endpoints) ranged from 8.5 to >1000 days ($DegT_{50}$). The default worst-case $DegT_{50}$ of 1000 days was used for the PEC_s calculations because the maximum non-normalised $DegT_{50}$ was >1000 days. The maximum occurrence of 21.9% was considered.

Table 9.1-4 Overview of the laboratory aerobic rate of degradation studies for the metabolite M08

Soil characteristics				Persistence endpoints[1]			Modelling endpoints[1]		
Soil origin	**Soil type**	**pH**	**OC (%)**	**Kinetic model**	**$DegT_{50}$ (days)**	**$DegT_{90}$ (days)**	**Kinetic model**	**Non-normalised $DegT_{50}$ (d)**	**Normalised $DegT_{50}$ (d) (20°C, pF2)**
[redacted]	loamy sand	6.4[2]	0.81	SFO[3]	>1000	>1000	-[3]	-[3]	-[3]
[redacted]	Silt	7.2	2.62	SFO[5]	432.1	>1000	SFO[6]	496.7	312.9
[redacted]	loamy sand	6.4	1.80	SFO[6]	75.0	249.1	SFO[6]	75.0	62.5
BBA 2.2	loamy sand	6.3	2.48	-[7]	-[7]	-[7]	-[7]	-[7]	-[7]
[redacted]	loamy sand	6.4[2]	0.47[8]	-[9]	-[9]	-[9]	-[9]	-[9]	-[9]
[redacted]	Silt	7.8[2]	2.62	SFO	167.2	555.4	SFO	167.2	105.3
[redacted]	loamy sand	7.0[2]	1.80	FOMC	328.6	>1000	-[9]	-[9]	-[9]
[redacted]	loamy sand	6.4[2]	0.47	-[9]	-[9]	-[9]	-[9]	-[9]	-[9]
LUFA 2.2	loamy sand	5.5	1.77	FOMC	8.5	152.9	DFOP	32.3[10]	29.5[10]
LUFA 2.3	sandy loam	6.8	0.94	SFO	88.8	294.8	SFO	88.8	69.7
LUFA 6S	Clay	7.1	1.64	-[9]	-[9]	-[9]	-[9]	-[9]	-[9]

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Calculated according to current FOCUS kinetics guidance (refer to Document M- CA 7.1.2.1.2/10)
2) pH in H2O
3) Pathway fit (parent: FOMC; M05, M08: SFO)
4) k-rate not significant, decline fit not possible
5) Pathway fit (parent: DFOP; M05, M07, M08: SFO; without M11)
6) Pathway fit (parent: SFO; M05, M07, M08: SFO, without M11)
7) Pathway fit not acceptable; decline fit not possible
8) OC was not given in the original study report and was therefore calculated as OC (%) = OM (%) / 1.724.
9) No acceptable fit
10) Calculated from slower k-rate

M09

Non-normalised laboratory half-lives (persistence endpoints) ranged from 13.4 to 385.7 days ($DegT_{50}$). The non-normalised maximum $DegT_{50}$ of 385.7 days was used for the PEC_s calculations together with the maximum occurrence of 13.2%.

Table 9.1-5 Overview of the laboratory aerobic rate of degradation studies for the metabolite M09

Soil characteristics				Persistence endpoints[1)]			Modelling endpoints[1)]		
Soil origin	**Soil type**	**pH**	**OC (%)**	**Kinetic model**	**$DegT_{50}$ (days)**	**$DegT_{90}$ (days)**	**Kinetic model**	**Non-normalised $DegT_{50}$ (d)**	**Normalised $DegT_{50}$ (d) (20°C, pF2)**
[redacted]	loamy sand	6.4[2)]	0.86	SFO[3)]	385.7	>1000	SFO[4)]	385.3	231.2
[redacted]	Silt	7.2	2.62	-[5)]	-[5)]	-[5)]	-[5)]	-[5)]	-[5)]
[redacted]	loamy sand	6.4	1.80	-[5)]	-[5)]	-[5)]	-[5)]	-[5)]	-[5)]
BBA 2.2	loamy sand	6.3	2.48	SFO[4)]	85.3	283.3	SFO[4)]	85.3	71.1
[redacted]	Silt	7.8[2)]	2.62	DFOP	35.1	325.8	DFOP	125.2[6)]	84.9[6)]
[redacted]	loamy sand	7.0[2)]	1.8	FOMC	13.4	>1000	DFOP	108.5[6)]	97.4[6)]
[redacted], Set 1	loamy sand	6.4[2)]	0.47	-[7)]	-[7)]	-[7)]	-[7)]	-[7)]	-[7)]
[redacted], Set 2	loamy sand	6.4[2)]	0.47	-[7)]	-[7)]	-[7)]	-[7)]	-[7)]	-[7)]

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Calculated according to current FOCUS kinetics guidance (refer to Document M-CA 7.1.2.1.2/10)
2) pH in H2O
3) Pathway fit (parent: SFO; M09 and M10: SFO)
4) Pathway fit without M10 (parent and M09: SFO)
5) M09 not detected in relevant amounts above LOD
6) Calculated from slower k-rate of DFOP model
7) No acceptable fit

M10

Non-normalised laboratory half-lives (persistence endpoints) ranged from 5.9 to 275.4 days ($DegT_{50}$). The non-normalised maximum $DegT_{50}$ of 275.4 days was used for the PEC_s calculations together with the maximum occurrence of 55.2%.

Table 9.1-6 Overview of the laboratory aerobic rate of degradation studies for the metabolite M10

Soil characteristics				Persistence endpoints[1)]			Modelling endpoints[1)]		
Soil origin	**Soil type**	**pH**	**OC (%)**	**Kinetic model**	**$DegT_{50}$ (days)**	**$DegT_{90}$ (days)**	**Kinetic model**	**Non-normalised $DegT_{50}$ (d)**	**Normalised $DegT_{50}$ (d) (20°C, pF2)**
[redacted]	loamy sand	6.4[2)]	0.86	SFO[3)]	275.4	915.0	-[4)]	-[4)]	-[4)]
[redacted]	Silt	7.2	2.62	SFO[5)]	122.0	405.1	SFO[4)]	122.0	76.8
[redacted]	loamy sand	6.4	1.80	SFO[5)]	131.1	435.5	SFO[4)]	131.1	109.3
BBA 2.2	loamy sand	6.3	2.48	-[6)]	-[6)]	-[6)]	-[6)]	-[6)]	-[6)]
[redacted]	Silt	7.8[2)]	2.62	SFO	140.2	465.8	SFO	140.2	95.1
[redacted]	loamy sand	7.0[2)]	1.8	SFO	134.7	447.6	SFO	114.2	102.5
[redacted], Set 1	loamy sand	6.4[2)]	0.47	-[7)]	-[7)]	-[7)]	-[7)]	-[7)]	-[7)]
[redacted], Set 2	loamy sand	6.4[2)]	0.47	DFOP[8)]	5.9	n.a.[9)]	-[10)]	-[10)]	-[10)]
[redacted]	loamy sand	6.4[2)]	0.47[11)]	FOMC	42.9	760.0	SFO	58.8	43.2

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Calculated according to current FOCUS kinetics guidance (refer to Document M- CA 7.1.2.1.2/10)
2) pH in H2O
3) Pathway fit (parent: SFO; M09 and M10: SFO)
4) No significant k-rate, decline fit for M10 not possible
5) Decline fit (but formation fraction could be obtained from pathway fit)
6) No acceptable fit for M10 (but formation fraction could be obtained from pathway fit)
7) No acceptable fit, decline fit not possible (only 2 data points after maximum)
8) Decline fit
9) DT90 estimated by FOCUS DegKin Tool: >1000 d
10) No acceptable fit
11) OC was not given in the original study report and was therefore calculated as OC (%) = OM (%) / 1.724.

M11

Non-normalised laboratory half-lives (persistence endpoints) ranged from 5.4 to 26.2 days ($DegT_{50}$). The non-normalised maximum $DegT_{50}$ of 26.2 days was used for the PEC_s calculations together with the maximum occurrence of 26.7%.

Table 9.1-7 Overview of the laboratory aerobic rate of degradation studies for the metabolite M11

Soil characteristics				Persistence endpoints[1)]			Modelling endpoints[1)]		
Soil origin	Soil type	pH	OC (%)	Kinetic model	$DegT_{50}$ (days)	$DegT_{90}$ (days)	Kinetic model	Non-normalised $DegT_{50}$ (d)	Normalised $DegT_{50}$ (d) (20°C, pF2)
[redacted]	loamy sand	6.4[2)]	0.81	-[3)]	-[3)]	-[3)]	-[3)]	-[3)]	-[3)]
[redacted]	Silt	7.2	2.62	FOMC[4)]	7.2	24.1	FOMC4[)]	7.3[5)]	4.6[5)]
[redacted]	loamy sand	6.4	1.80	-[6)]	-[6)]	-[6)]	-[6)]	-[6)]	-[6)]
BBA 2.2	loamy sand	6.3	2.48	-[6)]	-[6)]	-[6)]	-[6)]	-[6)]	-[6)]
LUFA 2.2	loamy sand	5.5	1.77	SFO	5.4	18.0	SFO	5.4	5.0
LUFA 2.3	sandy loam	6.8	0.94	SFO	26.2	87.1	SFO	26.2	20.8
LUFA 6S	Clay	7.1	1.64	SFO	21.5	71.3	SFO	21.5	14.1

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Calculated according to current FOCUS kinetics guidance (refer to Document M-CA 7.1.2.1.2/10)
2) pH in H2O
3) M07 / M11 not detected in relevant amounts
4) Decline fit using residues of "M07" from original study report
5) DT50 calculated from DT90 of FOMC model: DT50 = DT90/3.32
6) Pathway fit not acceptable for M11, decline fit not possible

For further information, regarding the behaviour of the substance in soil, please refer to Document M-CA, Section 7 of this dossier, point 7.1.2.

CP 9.1.1.2 Field studies

Please refer below to M-CP point 9.1.1.2.1 of this document.

CP 9.1.1.2.1 Soil dissipation studies

The kinetic evaluation of field data in soil for the parent propoxycarbazone-sodium and its metabolites, as detailed in the EU review during Annex I inclusion, was established before the existence of the Final Report of the Work Group on Degradation Kinetics of FOCUS (2006) [1]. The corresponding data has been consequently updated for kinetics calculation to allow for product evaluation according to latest standards (FOCUS, 2006, 2011[2] and EFSA 2010[3]).

1 FOCUS (2006): Guidance Document on Estimating Persistence and Degradation Kinetics from Environmental Fate Studies on Pesticides in EU Registration. Report of the Work Group on Degradation Kinetics of FOCUS. EC Document Reference SANCO/10058/2005 version 2.0, June 2006.
2 FOCUS (2011): Generic Guidance for Estimating Persistence and Degradation Kinetics from Environmental Fate Studies on Pesticides in EU Registration, version 1.0.
3 EFSA (2010): Guidance for evaluating laboratory and field dissipation studies to obtain $DegT_{50}$ values of plant protection products in soil. EFSA Journal 8(12):1936, 1-67.

The results of field studies performed with unlabelled propoxycarbazone-sodium formulated as WG 70 were already evaluated during the inclusion of the substance into Annex I.
The dissipation and degradation of propoxycarbazone-sodium after application of 70 g a.s/ha on bare soil under field conditions were studied at seven sites, two in Germany, two in United Kingdom, one in Northern France
and two in Southern France using unlabelled propoxycarbazone-sodium formulated as WG 70.

The best-fit half-lives calculated were in the range from 7 to 37 days. The range of DT_{90} values was calculated to be between 22 and 101 days. A new evaluation of the field data was conducted following the recommendations of the FOCUS working group on degradation kinetics (2006) and the EFSA guidance (2010) for modelling purpose. The resulting normalised $DegT_{50}$ *matrix* values for propoxycarbazone-sodium ranged from 3.4 to 10.8 days.

An overview of the data is presented here below, for further details please refer to Document M-CA, Section 7 of this dossier, point 7.1.2.2.

Table 9.1-8 Overview of the field dissipation studies for the active substance propoxycarbazone-sodium

Duration (days)	Site, country	Characteristics upper soil layer							Persistence endpoints			Modelling endpoints	
		Soil type	Sand (%)	Silt (%)	Clay (%)	OC (%)	pH	ρ_{bulk} 1) (g/cm³)	Kinetic model 2)	DT_{50} (days)	DT_{90} (days)	Kinetic model	$DegT_{50}$ matrix
281	[redacted] (UK)	sandy clay loam	52.8	17.2	30.0	1.40	7.39	1.38	1st	20.3	67.4	SFO 3)	9.6
280	[redacted] (France)	silt loam	28.7	54.5	16.8	0.60	7.51	1.52	1st	21.2	70.5	HS 4)	10.8
285	[redacted] (France)	silt loam	27.6	60.6	11.8	1.07	5.48	1.43	Sqrt 1st	2.7	30.0	- 5	- 5)
270	[redacted] (Germany)	sandy loam	68.1	21.0	10.9	0.96	6.47	1.45	1st	6.6	21.9	SFO 3)	3.4
271	[redacted] (Germany)	silt loam	8.2	73.3	18.5	0.89	6.47	1.46	1st	12.0	39.8	SFO 3)	4.8
359	[redacted] (France)	silt loam	13.8	74.2	12.0	0.80	7.40	1.48	Sqrt 1st	9.1	100.8	- 5	- 5)
284	[redacted] (UK)	sandy loam	71.6	15.2	13.2	0.69	6.77	1.50	Sqrt 1st	4.9	54.2	- 5	- 5)

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Calculated with a continuous pedotransfer function (Bollen et al., 1995)
2) After Timme and Frehse using best fit option
3) Data points before cumulative rainfall reached 10 mm were excluded
4) Breakpoint was fixed to the time when rain > 10 mm and slow phase (kslow) was used for $DegT_{50}$ determination
5) No acceptable fit

For further details on soil dissipation studies, please refer to Document M-CA, Section 7 of this dossier, point 7.1.2.2.1.

CP 9.1.1.2.2 Soil accumulation studies

The accumulation potential of propoxycarbazone-sodium residues were already evaluated during the approval of the active substance.
Soil accumulation testing is not necessary since the $DegT_{90}$ of the total residue is less than one year (refer to CA 7.1.2.2.1). This, since no experimental investigation was triggered; no additional studies have been performed.

Please refer to Document M-CA, Section 7 of this dossier, point 7.1.2.2.2.

As $DegT_{50}$ values used for calculation of PEC in soil are >100 days for the active substance propoxycarbazone-sodium and its metabolites M08, M09 and M10, the potential for soil accumulation was assessed for these compounds. For a detailed description and the results of the accumulation assessment, please refer to point 9.1.3 below.

CP 9.1.2 Mobility in soil

The results of mobility and leaching potential of propoxycarbazone-sodium and metabolites were evaluated during the approval procedure of the active substance as provided in Document M-CA, Section 7 of this dossier, point 7.1.4. This information is also applicable for the product. Specific studies on the product have not been performed.

CP 9.1.2.1 Laboratory studies

The adsorption of propoxycarbazone-sodium to seven different soils was evaluated during the Annex I inclusion. The K_{oc} values and the corresponding Freundlich exponents (1/n) obtained are summarised in Table 9.1-9.

Table 9.1-9 Overview of the adsorption studies for the active substance propoxycarbazone-sodium

Soil origin	Soil type	OC [%]	Clay [%]	Silt [%]	Sand [%]	pH [-]	K_f [mL/g]	K_{foc} [mL/g]	Freundl. exp. 1/n [-]
BBA 2.2	Loamy sand [1)]	2.48	7.2	12.3	80.5	6.1 [3)]	0.3191	12.9	0.954
[redacted]	Silt [1)]	2.66	10.2	81.3	8.5	7.8 [3)]	0.6353	23.9	0.942
[redacted] A2	Silt loam [1)]	0.86	12.0	51.1	36.9	8.1 [3)]	0.2479	28.8	0.941
[redacted], USA	Loamy sand [1)]	0.37	3.6	17.6	78.8	6.8 [3)]	0.2188	59.1	0.905
[redacted], USA	Silty clay loam [1)]	1.61	30.4	57.2	12.4	6.7 [3)]	1.7098	106.2	0.920
[redacted]	Sand [2)]	1.1	3.1	8.6	88.3	5.5 - 5.6 [4)]	0.1938	17.2	0.957
[redacted]	Loamy sand [2)]	0.9	6.5	37.4	56.1	6.4 – 6.6 [4)]	0.3233	36.7	0.925
						Arithmetic Mean	**0.5211**	**40.7**	**0.935**
						Geometric Mean	0.3816	32.1	0.935
						Max	1.7098	106.2	0.957
						Min	0.1938	12.9	0.905

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Texture according to USDA
2) Texture according to DIN
3) pH in H_2O
4) pH values were determined in soil slurries after equilibration

M05

The K_{oc} values and the corresponding Freundlich exponents (1/n) obtained are given in Table 9.1-10.

Table 9.1-10 Overview of the adsorption studies for the metabolite M05

Soil origin	Soil type	OC [%]	Clay [%]	Silt [%]	Sand [%]	pH [-]	K_f [mL/g]	K_{foc} [mL/g]	Freundl. exp. 1/n [-]
Lufa 2.1	sand [1]	0.62	2.7	10.1	87.3	5.1	0.104	16.8	0.903
Eurosoil 1	clay [2]	3.27	75.0	21.9	3.3	5.7	2.310	70.7	0.935
Eurosoil 5	loamy sand [2]	5.96	6.0	12.7	71.6	3.1	2.647	44.4	0.840
LUFA 6S	Clay [1]	1.64	41.0	36.8	22.2	7.1	- [3]	- [3]	- [3]
						Arithmetic Mean	1.687	44.0	0.893
						Geometric Mean	0.860	37.5	0.892
						May	2.647	70.7	0.935
						Min	0.104	16.8	0.840

1) Texture according to USDA classification,
2) Texture according to Gawlik et al. (1999), The Science of the Total Environment, 229 (1999) 99-107, (clay: < 0.0002 mm, silt: 0.0002 – 0.063 mm, sand: 0.063 - > 0.2 mm)
3) Not reported
4) Not determined due to instability of the test item

M07

The K_{oc} values and the corresponding Freundlich exponents (1/n) obtained are given in Table 9.1-11.

Table 9.1-11 Overview of the adsorption studies for the metabolite M07

Soil origin	Soil type	OC [%]	Clay [1] [%]	Silt [1] [%]	Sand [1] [%]	pH [2] [-]	K_f [mL/g]	K_{foc} [mL/g]	Freundl. exp. 1/n [-]
BBA 2.2	Loamy sand	2.48	7.2	12.3	80.5	6.1	0.13	5.2	0.951
[redacted]	Silt	2.66	10.2	81.3	8.5	7.8	0.12	4.6	0.937
[redacted] A2	Silt loam	0.86	12.0	51.1	36.9	8.1	0.04	5.2	0.966
[redacted]	Loamy sand	0.37	3.6	17.6	78.8	6.8	0.02	6.7	0.954
[redacted]	Silty clay loam	1.61	30.4	57.2	12.4	6.7	0.25	15.5	0.925
						Arithmetic Mean	**0.11**	**7.4**	**0.947**
						Geometric Mean	0.08	6.6	0.946
						Max	0.25	15.5	0.966
						Min	0.02	4.6	0.925

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Texture according to USDA
2) pH in H_2O

M08

The K_{oc} values and the corresponding Freundlich exponents (1/n) obtained are given in Table 9.1-12.

Table 9.1-12 Overview of the adsorption studies for the metabolite M08

Soil origin	Soil type	OC [%]	Clay [1)] [%]	Silt[1)] [%]	Sand[1)] [%]	pH [2)] [-]	K_f [mL/g]	K_{foc} [mL/g]	Freundl. exp. 1/n [-]
BBA 2.2	Loamy sand	2.48	7.2	12.3	80.5	6.1	11.3	456.9	0.894
[redacted]	Silt	2.14	10.2	81.3	8.5	7.1	18.6	867.5	0.871
[redacted] AIII	Silt loam	0.86	12.0	51.1	36.9	8.1	20.0	2324.3	0.834
[redacted]	Loamy sand	0.37	3.6	17.6	78.8	6.8	7.53	2033.8	0.837
[redacted]	Silty clay loam	1.61	30.4	57.2	12.4	6.7	46.3	2872.7	0.821
						Arithmetic Mean	20.7	1711.0	0.851
						Geometric Mean	17.1	1400.2	0.851
						Max	46.3	2872.7	0.894
						Min	7.5	456.9	0.821

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Texture according to USDA pH in H_2O
2) pH in H_2O

M09

The K_{oc} values and the corresponding Freundlich exponents (1/n) obtained are given in Table 9.1-13.

Table 9.1-13 Overview of the adsorption studies for the metabolite M09

Soil origin	Soil type	OC [%]	Clay [1)] [%]	Silt[1)] [%]	Sand[1)] [%]	pH [2)] [-]	K_f [mL/g]	K_{foc} [mL/g]	Freundl. exp. 1/n [-]
BBA 2.2	Loamy sand	2.48	7.2	12.3	80.5	6.1	0.26	10.4	0.968
[redacted]	Silt	2.14	10.2	81.3	8.5	7.8	1.35	63.1	0.924
[redacted] AIII	Silt loam	0.86	12.0	51.1	36.9	8.1	0.86	99.9	0.945
[redacted]	Loamy sand	0.37	3.6	17.6	78.8	6.8	2.04	551.5	0.947
[redacted]	Silty clay loam	1.61	30.4	57.2	12.4	6.7	3.9.0	242.1	0.909
						Arithmetic Mean	**1.68**	**193.4**	**0.939**
						Geometric Mean	1.19	97.4	0.939
						Max	3.90	551.5	0.968
						Min	0.26	10.4	0.909

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Texture according to USDA
2) pH in H_2O

M10

The K_{oc} values and the corresponding Freundlich exponents (1/n) obtained are given in Table 9.1-14.

Table 9.1-14 Overview of the adsorption studies for the metabolite M10

Soil origin	Soil type	OC [%]	Clay 1) [%]	Silt 1) [%]	Sand 1) [%]	pH 2) [-]	K_f [mL/g]	K_{foc} [mL/g]	Freundl. exp. 1/n [-]
BBA 2.2	Loamy sand	2.48	7.2	12.3	80.5	6.1	0.22	8.9	0.945
[redacted]	Silt	2.66	10.2	81.3	8.5	7.8	0.39	14.5	0.931
[redacted] A2	Silt loam	0.86	12.0	51.1	36.9	8.1	0.18	20.6	0.964
[redacted]	Loamy sand	0.37	3.6	17.6	78.8	6.8	0.26	69.9	0.949
[redacted]	Silty clay loam	1.61	30.4	57.2	12.4	6.7	1.22	75.5	0.908
						Arithmetic Mean	**0.45**	**37.9**	**0.939**
						Geometric Mean	0.35	26.9	0.939
						Max	1.22	75.5	0.964
						Min	0.18	8.9	0.908

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.
1) Texture according to USDA
2) pH in H_2O

Metabolite M11

The K_{oc} values and the corresponding Freundlich exponents (1/n) obtained are given in Table 9.1-15.

Table 9.1-15 Overview of the adsorption studies for the metabolite M11

Soil origin	Soil type	OC [%]	Clay [%]	Silt [%]	Sand [%]	pH [-]	K_f [mL/g]	K_{foc} [mL/g]	Freundl. exp. 1/n [-]
Lufa 2.1	Sand 1)	0.66	2.8 1)	10.5 1)	86.7 1)	5.2	0.079	11.9	1.011
Lufa 6S	Clay 1)	1.66	40.7 1)	34.5 1)	24.8 1)	7.1	0.045	2.7	0.690
Labsoil F	Silt loam 1)	4.91	25.6 1)	57.3 1)	17.1 1)	4.4	0.852	17.4	0.781
Eurosoil 5	Loamy Sand 2)	5.96	6.0 2)	12.7 2)	71.6 2)	3.1	1.018	17.1	0.933
						Arithmetic Mean	**0.499**	**12.3**	**0.854**
						Geometric Mean	0.236	9.9	0.844
						Max	1.018	17.4	1.011
						Min	0.045	2.7	0.690

1) Texture according to USDA classification, only the soil characteristics for the soil batch used in the isotherm experiments are presented
2) Texture according to Gawlik et al. (1999), The Science of the Total Environment, 229 (1999) 99-107; (clay: < 0.0002 mm, silt: 0.0002 – 0.063 mm, sand: 0.063 - > 0.2 mm)

CP 9.1.2.2 Lysimeter studies

Lysimeter experiments have been performed for propoxycarbazone-sodium. These studies were evaluated in the Document M-CA, Section 7 of this dossier, point 7.1.4.2. The results of the lysimeter studies demonstrated a low leaching potential of propoxycarbazone-sodium or its metabolites to groundwater.

CP 9.1.2.3 Field leaching studies

The potential leaching behaviour of propoxycarbazone-sodium after repeated use over several years in soil was assessed during the Annex I inclusion using PELMO calculations with different climatic and regional scenarios, and accepted by the European Commission (SANCO/4067/2001-rev.Final, 30 September 2003).
Field leaching studies are not required due to the results of a tiered leaching assessment; please refer to point 9.2.4.1 of this document. A summary is given here below:

The simulations showed that in all cases tested concentrations of propoxycarbazone-sodium in the leachate were below 0.1 µg/L. These studies are considered as additional information, because PELMO simulations were not according to the current FOCUS guidelines.
New PEC_{gw} values calculated for the use in cereals in Europe by means of current FOCUS PEARL 4.4.4 and FOCUS PELMO 5.5.3 models confirm the results. The maximum 80[th] percentile PEC_{gw} values of the active substance propoxycarbazone-sodium and its metabolites M05, M08 and M09 in the leachate at 1 m soil depth are below 0.1 µg/L for all crops and scenarios. The maximum 80[th] percentile PEC_{gw} values of the metabolites M07, M10 and M11 were above 0.1 µg/L. Therefore, a non-relevance assessment was conducted for these compounds (please refer to Doc N4 of this Dossier).

CP 9.1.3 Estimation of concentrations in soil

Report:	[redacted];[redacted];2014;M-487134-01
Title:	Predicted environmental concentrations of propoxycarbazone-sodium (MKH6561) and its metabolites in soil after application to cereals
Report No:	358535-01
Document No:	**M-487134-01-1**
Guidelines:	**EU Commission (2000): Guidance Document on Persistence in Soil (Working Document) 9188/VI/97 rev. 8, July 12th, 2000. FOCUS (1997): Soil persistence models and EU Registration. The final report of the work of the Soil Modelling Work group of FOCUS. February 1997. FOCUS (2006): Guidance Document on Estimating Persistence and Degradation Kinetics from Environmental Fate Studies on Pesticides in EU Registration. Report of the Work Group on Degradation Kinetics of FOCUS. EC Document Reference SANCO/10058/2005 version 2.0, June 2006. FOCUS (2011): Generic Guidance for Estimating Persistence and Degradation Kinetics from Environmental Fate Studies on Pesticides in EU Registration, version 1.0. FOCUS (2012): Generic Guidance for Tier 1 FOCUS Ground Water Assessments, Version 2.1.**
Deviations:	None
GLP/GEP:	**no**

Executive Summary

Predicted environmental concentrations in soil were calculated for the herbicidally active substance propoxycarbazone-sodium and its major soil metabolites M05, M07, M08, M09, M10 and M11.

According to the use pattern, single foliar spray applications of propoxycarbazone-sodium at rates of 42 and 70 g a.s./ha to winter and spring cereals between BBCH 11 and 33 were considered.

The summary of the maximum concentrations of propoxycarbazone-sodium and its soil metabolites are presented in the table below.

Table 9.1-16 Maximum PEC_s of propoxycarbazone-sodium and its metabolites for the intended uses

Application scenario	$PEC_{s,max}$ (mg/kg)						
	MKH6561[1)]	M05	M07	M08	M09	M10	M11
Winter /spring cereals (1x42 g a.s./ha)	0.042	0.004	0.005	0.004	0.003	0.009	0.006
Winter /spring cereals (1x70 g a.s./ha)	0.070	0.007	0.008	0.007	0.004	0.014	0.009

1) MKH6561 = propoxycarbazone-sodium

As $DegT_{50}$ values are >100 days for the active substance and its metabolites M08, M09 and M10, the potential for soil accumulation was assessed for these compounds. The $PEC_{Plateau,}$ overall values were calculated to be 0.047 (propoxycarbazone-sodium), 0.008 (M08), 0.003 (M09) and 0.010 mg/kg (M10) for an application rate of 42 g a.s./ha and 0.078 (propoxycarbazone-sodium), 0.014 (M08), 0.006 (M09) and 0.017 mg/kg (M10) for an application rate of 70 g a.s./ha.

I. MATERIALS AND METHODS

A. MATERIALS

Calculations were conducted using Microsoft® EXCEL spreadsheets. All calculations were run and all assumptions were made according to the Guidance Document on Persistence in soil (EU Commission, 2000) and FOCUS (1997).

B. STUDY DESIGN

The input parameters used for modelling are summarised in Table 9.1-17. As the $DegT_{50}$ values of propoxycarbazone-sodium and its metabolites M08, M09 and M10 are >100 days, the potential for accumulation was additionally assessed for these compounds.

Table 9.1-17 Input parameters of propoxycarbazone-sodium and its metabolites used for modelling

Compound	$DegT_{50}$ (days)	Max. occur. in soil (-)	Molar mass (g/mol)	Molar mass correction factor (-)
Propoxycarbazone-sodium	215.5	1	420.4	1
M05	17.4	0.209	215.2	0.512
M07	39.8	0.267	183.2	0.436
M08	1000	0.219	199.2	0.474
M09	385.7	0.132	200.2	0.476
M10	275.4	0.552	157.2	0.374
M11	26.2	0.267	213.2	0.507

Application and GAP

Based on the GAP, appropriate application scenarios have been defined using worst-case assumptions regarding application rate and timing. Crop interception data were taken from the FOCUS groundwater scenarios workgroup (FOCUS, 2012).

Table 9.1-18 Application scenarios of propoxycarbazone-sodium used for the calculations

Crop	FOCUS crop	Application			Amount reaching the soil per season
		Rate per season (g a.s./ha)	Plant interception (%)	BBCH stage (-)	(g a.s./ha)
Wheat, Triticale, Rye	Winter cereals	1x42	25	11-30	31.5
	Winter cereals	1x70	25	11-33	52.5
	Spring cereals	1x42	25	11-30	31.5
	Spring cereals	1x70	25	11-33	52.5

Calculation methods

Initial, actual and time-weighted average concentrations of propoxycarbazone-sodium and its metabolites in soil ($PEC_{s,\ initial}$, $PEC_{s,\ actual}$, $PEC_{s,\ twa}$) were calculated.

An even distribution of the substances within the top soil layer with a depth of 5 cm and a bulk density of 1.5 g/cm³ were assumed in PEC_s calculations.

Initial /maximum concentrations in soil

The initial PEC_s values for the substances were calculated according to Equation 1 for single application.

Equation 1

$$PEC_{s,max} = \frac{(A_1 - (A_1 * p_1)) * 10}{d * bd} * f_{mol} * f_{met}$$

Where:

PEC_s, max	= initial/maximum predicted environmental concentration in soil after single application	(mg/kg)
A_1	= single application rate of active substance	(g/ha)
p_1	= fraction intercepted by crop canopy at single application	(-)
d	= mixing depth of the soil top layer	(cm)
bd	= soil bulk density	(g/cm³)
f_{mol}	= molar mass correction between active substance and metabolite	(-)
f_{met}	= maximum occurrence of the metabolite in soil	(-)

Actual and time-weighted average concentrations in soil

The actual concentrations in soil (PEC_s) and the time-weighted average concentrations in soil ($PEC_{s,\ twa}$) were calculated using Equation 2 and Equation 3, respectively. The maximum time-weighted average value for each time period is reported in the results.

Equation 2

$$PEC_{s,act,t} = PEC_{s,max} * e^{-k*t}$$

Equation 3

$$PEC_{s,twa,t} = \frac{(PEC_{s,act,t-x} + ... + PEC_{s,act,t})}{x}$$

Where:

$PEC_{s,\ max}$	= initial/maximum concentration in soil after single or multiple applications	(mg/kg)
$PEC_{s,\ act,\ t}$	= actual concentration in soil at time t	(mg/kg)
$PEC_{s,twa,t}$	= time-weighted average concentration in soil over t days	(mg/kg)
x	= time interval	(days)
k	= degradation rate in soil ($k=\ln(2)/DT_{50}$)	(1/d)
t	= time (for $PEC_{S,}$ actual) or time period (for $PEC_{S,}$ twa)	(days)
DT_{50}	= half-life in soil	(days)

The actual and time-weighted values were calculated for all times or time periods t of 1, 2, 4, 7, 14, 21, 28, 50 and 100 days following the last application.

<u>Accumulation potential after long-term use</u>

Potential accumulation after long term use is also assessed, based on the $PEC_{s,\ max}$ concentration of the respective compound, obtained as described before. For single application, the maximum concentration in soil after long-term use can be expressed as described in Equation 4:

Equation 4

$$PEC_{plateau,max} = PEC_{s,max} \cdot \frac{1}{1-e^{-kt}}$$

Where t is the number of days between two events where $PEC_{s,\ max}$ is reached, *i.e.*, 365 days for yearly applications. The maximum plateau concentration in soil resulting from long-term use was calculated for a soil depth of 20 cm, as soil incorporation by ploughing between application schemes could be expected.

The concentration in soil after immediately before the application in the last year ($PEC_{plateau,min}$) can be written as described in Equation 5:

Equation 5

$$PEC_{plateau,min} = PEC_{plateau,max} \cdot e^{-kt}$$

The total $PEC_{plateau,\ overall}$ taking the effect of accumulation into account is then the sum of $PEC_{plateau,min}$ and the maximum PEC_s.

Equation 6

$$PEC_{plateau,overall} = PEC_{plateau,min} + PEC_{soil,max}$$

II. RESULTS AND DISCUSSION

Maximum PEC in soil

The summary of maximum PEC_s values of propoxycarbazone-sodium and its metabolites for the different uses are summarised in Table 9.1-19.

Table 9.1-19 Maximum PEC_s of propoxycarbazone-sodium and its metabolites for the intended uses

Application scenario	$PEC_{s,\ max}$ (mg/kg)						
	MKH6561[1)]	M05	M07	M08	M09	M10	M11
Winter /spring cereals (1x42 g a.s./ha)	0.042	0.004	0.005	0.004	0.003	0.009	0.006
Winter /spring cereals (1x70 g a.s./ha)	0.070	0.007	0.008	0.007	0.004	0.014	0.009

1) MKH6561 = propoxycarbazone-sodium

Actual and time-weighted average PEC_s

propoxycarbazone-sodium

Initial, short- and long-term PEC_s values as well as the time-weighted average concentrations ($PEC_{s,\ twa}$) for the intended uses are presented in Table 9.1-20and Table 9.1-21.

Table 9.1-20 Actual and time-weighted average PEC_s of propoxycarbazone-sodium after spray application of 1x42 g a.s./ha to winter and spring cereals

	Time [d]	Propoxycarbazone-sodium	
		$PEC_{s,\ act}$ (mg/kg)	**$PEC_{s,\ twa}$ (mg/kg)**
Initial	0	0.042	
Short-term	1	0.042	0.042
	2	0.042	0.042
	4	0.041	0.042
Long-term	7	0.041	0.042
	14	0.040	0.041
	21	0.039	0.041
	28	0.038	0.040
	50	0.036	0.039
	100	0.030	0.036

Table 9.1-21 Actual and time-weighted average PEC_s of propoxycarbazone-sodium after spray application of 1x70 g a.s./ha to winter and spring cereals

	Time [d]	Propoxycarbazone-sodium	
		$PEC_{s,\ act}$ (mg/kg)	**$PEC_{s,\ twa}$ (mg/kg)**
Initial	0	0.070	-
Short-term	1	0.070	0.070
	2	0.070	0.070
	4	0.069	0.070
Long-term	7	0.068	0.069
	14	0.067	0.068
	21	0.065	0.068
	28	0.064	0.067
	50	0.060	0.065
	100	0.054	0.060

<u>Metabolites of propoxycarbazone-sodium</u>

Initial, short- and long-term PEC_S values as well as the time-weighted average concentrations ($PEC_{s,\ twa}$) for the representative worst-case (1x70 g a.s./ha to cereals) are presented in Table 9.1-22 to Table 9.1-23.

Table 9.1-22 Actual and time-weighted average PEC$_s$ of M05, M07, M08 and M11, metabolites of propoxycarbazone-sodium (phenyl pathway), after spray application of 1x70 g a.s./ha to winter and spring cereals

	Time [d]	M05 PEC$_{s, act}$ (mg/kg)	M05 PEC$_{s, twa}$ (mg/kg)	M07 PEC$_{s, act}$ (mg/kg)	M07 PEC$_{s, twa}$ (mg/kg)	M08 PEC$_{s, act}$ (mg/kg)	M08 PEC$_{s, twa}$ (mg/kg)	M11 PEC$_{s, act}$ (mg/kg)	M11 PEC$_{s, twa}$ (mg/kg)
Initial	0	0.007	-	0.008	-	0.007	-	0.009	-
Short-term	1	0.007	0.007	0.008	0.008	0.007	0.007	0.009	0.009
	2	0.007	0.007	0.008	0.008	0.007	0.007	0.009	0.009
	4	0.006	0.007	0.008	0.008	0.007	0.007	0.009	0.009
Long-term	7	0.006	0.007	0.007	0.008	0.007	0.007	0.008	0.009
	14	0.004	0.006	0.006	0.007	0.007	0.007	0.007	0.008
	21	0.003	0.005	0.006	0.007	0.007	0.007	0.005	0.007
	28	0.002	0.005	0.005	0.006	0.007	0.007	0.005	0.007
	50	0.001	0.003	0.003	0.005	0.007	0.007	0.003	0.005
	100	<0.001	0.002	0.001	0.004	0.007	0.007	0.001	0.003

Table 9.1-23 Actual and time-weighted average PEC$_s$ of M09 and M10, metabolites of propoxycarbazone-sodium (triazolinone pathway), after spray application of 1x70 g a.s./ha to winter and spring cereals

	Time [d]	M09 PEC$_{s, act}$ (mg/kg)	M09 PEC$_{s, twa}$ (mg/kg)	M10 PEC$_{s, act}$ (mg/kg)	M10 PEC$_{s, twa}$ (mg/kg)
Initial	0	0.004	-	0.014	-
Short-term	1	0.004	0.004	0.014	0.014
	2	0.004	0.004	0.014	0.014
	4	0.004	0.004	0.014	0.014
Long-term	7	0.004	0.004	0.014	0.014
	14	0.004	0.004	0.014	0.014
	21	0.004	0.004	0.014	0.014
	28	0.004	0.004	0.013	0.014
	50	0.004	0.004	0.013	0.014
	100	0.004	0.004	0.011	0.013

Accumulation potential in soil

The accumulation potential of propoxycarbazone-sodium and its metabolites M08, M09, and M10 after long term use was also assessed. Results are presented in Table 9.1-24.

Table 9.1-24 Assessment of soil accumulation of propoxycarbazone-sodium and its metabolites M08, M09, and M10 for the intended uses

Application scenario	PEC_s (mg/kg)	MKH6561[1)]	M08	M09	M10
Winter /spring cereals (1x42 g a.s./ha)	$PEC_{s, max}$	0.042	0.004	0.003	0.009
	$PEC_{plateau, min}$	0.005	0.004	0.001	0.001
	$PEC_{plateau,overall}$	**0.047**	**0.008**	**0.003**	**0.010**
Winter /spring cereals (1x70 g a.s./ha)	$PEC_{s,max}$	0.070	0.007	0.004	0.014
	$PEC_{plateau,min}$	0.008	0.006	0.001	0.002
	$PEC_{plateau,overall}$	**0.078**	**0.014**	**0.006**	**0.017**

1) MKH6561 = propoxycarbazone-sodium

III. CONCLUSIONS

Predicted environmental concentrations for propoxycarbazone-sodium and its metabolites in soil (PEC_s) were calculated for the use in cereals in Europe in accordance with recommendations of FOCUS (1997) and EU Commission (2000).

The results for PEC_s for the active substance and its metabolites were used for the eco-toxicological risk assessment.

For details, please refer to the corresponding PEC reports (CP 9.1.3/04) submitted within this dossier.

CP 9.2 Fate and behaviour in water and sediment

The fate and behaviour of propoxycarbazone-sodium in water and sediment has been evaluated during the approval evaluation of the active substance. Therefore, specific studies on the product have not been performed.

For details about the behaviour of the active substance and metabolites in the water/sediment compartment please refer to the Document M-CA, Section 7 of this dossier, point 7.2. A short summary overview of the data is given in the subsections below.

CP 9.2.1 Aerobic mineralisation in surface water

A study on the aerobic mineralisation in surface water was performed (Document M-CA 7.2.2.2/01 of this dossier) which was not provided in the former Annex I inclusion dossier and is submitted within this Supplemental Dossier for the propoxycarbazone-sodium renewal of approval. This type of study (OECD 309) is a new data requirement according to Commission Regulation (EU) No 283/2013.

The test indicated that propoxycarbazone-sodium was stable in the used microbial active surface water during 61 days of incubation under aerobic conditions in the dark at 20°C ± 2°C.

For further details please refer to document M-CA section 7 of this dossier, point 7.2.2.2.

CP 9.2.2 Water/sediment study

The route and rate of degradation of propoxycarbazone-sodium in water/sediment systems under aerobic conditions were evaluated during the Annex I inclusion using two radiolabel positions, [phenyl-UL-^{14}C] and [triazolinone-3-^{14}C], and were accepted by the European Commission (SANCO/4067/2001-Final, 30 September 2003).

The proposed pathway for the degradation of propoxycarbazone-sodium in water/sediment systems is presented in Figure 9.2-1.

For the major metabolites detected in the water/sediment systems, only a few reliable half-lives could be determined: For M04 and M10, neither M-I dissipation nor degradation endpoints could be estimated. For M05, a geometric mean DT_{50} of 32.56 days for modelling purpose could be derived. The DT_{50} value of M05 for trigger evaluation was calculated in all systems to be 1.06 days with a corresponding DT_{90} of 3.52 days. The DT_{50} of M06 in all systems was given with 29.88 days as persistence endpoint. For modelling purposes for M06, default DT_{50} values of 1000 days need to be used for PEC_{SW} modelling at Steps1-2. However, a geometric half-life of 172.86 days would be available for FOCUS Step 3 modelling (for more details please refer to CA 7.2.2.3/04).

Figure 9.2-1 Degradation pathway of propoxycarbazone-sodium in water/sediment systems

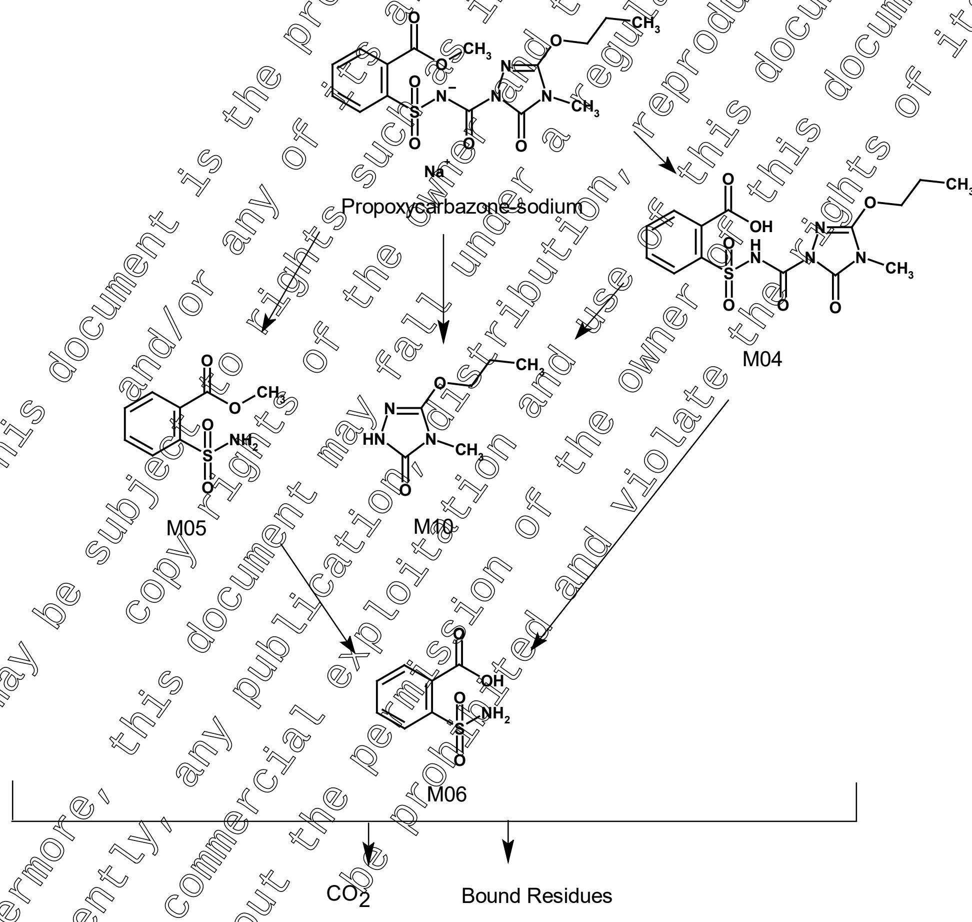

Table 9.2-1 Overview of the results of the water/sediment study

Reference	Guidelines	Test Conditions	System		Maximum amounts (% AR)			
					M04	M05	M06	M10
[redacted] 1998	BBA-Guidelines Part IV, 5-1 (1990), Commission Directive 95/36/EC (1995), SETAC (1995)	Application Rate: 68 g/ha Temperature: 20°C Duration: 100 days	[redacted] Pond	Water	50.2	2.6	16.2	21.2
				Sediment	19.3	0.0	3.2	13.2
				Total	68.5	2.6	19.4	34.4
			[redacted] Lake	Water	0.1	3.7	1.6	3.1
				Sediment	0.0	7.6	0.0	3.8
				Total	0.1	11.3	1.6	6.3

Studies shaded in grey have been reviewed as part of the first EU review of propoxycarbazone-sodium.

Table 9.2-2 Overview of the persistence and modelling endpoints of propoxycarbazone-sodium in water/sediment systems

Reference	Guidelines	System		Persistence endpoints at level P-I			Modelling endpoints at level P-I	
				Model	DT_{50} 1) (days)	DT_{90} 1) (days)	Model	SFO DT_{50} 1) (days)
[redacted], S., 2014	FOCUS (2006, 2011)	Total system	[redacted] Pond	HS	12.37	33.35	SFO	11.85
			[redacted] Lake	SFO	194.57	646.34	SFO	194.57
			Geometric Mean		**49.06**	**146.82**		**48.00**
		Water Phase	[redacted] Pond	SFO	10.00	33.22	SFO	10.00
			[redacted] Lake	DFOP	94.46	378.28	SFO	103.56
			Geometric Mean		**30.73**	**112.10**		**32.18**
		Sediment Phase	[redacted] Pond	SFO	8.84	29.39	SFO	8.84
			[redacted] Lake	- 2)	- 2)	- 2)	- 2)	1000 3)
			Geometric Mean		**8.84**	**29.39**		**94.02**

1) DT_{xx} = $DegT_{xx}$ for total system but $DisT_{xx}$ for water and sediment phase.
2) not calculated due to insufficient number of data points after peak.
3) FOCUS default DT_{50} for use in surface water modelling.

CP 9.2.3 Irradiated water/sediment study

Photochemical degradation is not of relevance. Furthermore, this type of study is required in case a higher tier option is necessary, which is not the case either for propoxycarbazone-sodium or its metabolites.

CP 9.2.4 Estimation of concentrations in groundwater

CP 9.2.4.1 Calculation of concentrations in groundwater

Report:	**[redacted];2014;M-487139-01**
Title:	Predicted environmental concentrations of propoxycarbazone-sodium (MKH6561) and its metabolites in groundwater after application to cereals using FOCUS PEARL and FOCUS PELMO
Report No:	358535-02
Document No:	**M-487139-01-1**
Guidelines:	**EC Sanco/321/2000; EC SANCO/10058/2005; EC Sanco/13144/2010 version 1, 604 pp. FOCUS (2011): Generic Guidance for Estimating Persistence and Degradation Kinetics from Environmental Fate Studies on Pesticides in EU Registration, version 1.0. FOCUS (2012): Generic Guidance for Tier 1 FOCUS Ground Water Assessments, Version 2.1.**
Deviations:	None
GLP/GEP:	**no**

Executive Summary

Predicted environmental concentrations in groundwater (PEC_{gw}) were calculated for the active substance propoxycarbazone-sodium and its major soil metabolites M05, M07, M08, M09, M10 and M11.

The use in winter and spring cereals was assessed. According to the GAP, single applications at rates of 42 and 70 g a.s./ha are envisaged starting at BBCH stage 11.

The models FOCUS PEARL 4.4.4 and FOCUS PELMO 5.5.3 were used for the simulations.
The maximum 80th percentile PEC_{gw} values in the leachate at 1 m soil depth for propoxycarbazone-sodium and its metabolites for all uses and scenarios are summarised in the table below.

Table 9.2-3 Maximum 80th percentile PEC_{gw} at 1 m soil depth for propoxycarbazone-sodium and its metabolites following application to winter and spring cereals, calculated with FOCUS PEARL and FOCUS PELMO

	PEC_{gw} (µg/L)	
	PEARL 4.4.4	**PELMO 5.5.3**
propoxycarbazone-sodium	<0.001	<0.001
M05	<0.001	<0.001
M07	0.307	0.251
M08	0.077	0.034
M09	0.059	0.065
M10	2.093	1.393
M11	0.296	0.335

I. MATERIALS AND METHODS

A. MATERIALS

Calculations were conducted using the models FOCUS PEARL 4.4.4 and FOCUS PELMO 5.5.3. All calculations were run and all assumptions were made according to the FOCUS guidance documents.

B. STUDY DESIGN

Summary of input parameters used for modelling

FOCUS numerical leaching models make use of the parameter *plant uptake factor* (PUF) to take into account the amount of a component taken up from soil pore water by plants *via* the transpiration stream. For propoxycarbazone-sodium, evidence for root systemic uptake is given and the use of a PUF = 0.5 in exposure simulations is justified. The plant uptake for the metabolites was set to 0.

The input parameters used for modelling are summarised in Table 9.2-4.

Table 9.2-4 Input parameters of propoxycarbazone-sodium and its metabolites used for modelling

Parameter	MKH6561[1)]	M05	M07	M08	M09	M10	M11
Molecular mass (g/mol)	420.4	215.2	183.2	199.2	200.2	157.2	213.2
Half-life in soil (DT_{50}) (days)	6.4	4.3	11.6	84.2	108.0	81.2	9.1
Aqueous solubility at 20°C (mg/L)	42000	2100	10000	8600	13000	1000000	11000
Vapour pressure at 20°C (Pa)	$1x10^{-8}$	$8.14x10^{-4}$	$1.39x10^{-5}$	$5.82x10^{-5}$	$6x10^{-6}$	$5.62x10^{-2}$	$6.27x10^{-7}$
K_{foc} (mL/g)	40.7	44.0	7.4	1711	193.4	37.9	12.3
K_{fom} (mL/g)[1)]	23.6	25.5	4.3	992.5	112.2	22.0	7.1
1/n	0.93	0.89	0.95	0.85	0.94	0.94	0.85
Transformation fraction in soil	-	1.0 from parent	1.0 from M05	1.0 from M07	0.22 from parent	0.78 from parent / 0.84 from M09	1.0 from M08
Plant uptake factor	0.5	0	0	0	0	0	0

1) MKH6561 = propoxycarbazone-sodium

Application and GAP

Application scenarios

Based on the GAP, appropriate application scenarios have been defined using worst-case assumptions regarding application rate and timing. Crop interception data were taken from the FOCUS groundwater scenarios workgroup (FOCUS, 2012). Winter and spring cereals were chosen as surrogate crops.

Table 9.2-5 Application scenarios of propoxycarbazone-sodium used for the calculations

Crop	FOCUS crop	Application			Amount reaching the soil per season
		Rate per season	Plant interception	BBCH stage	
		(g a.s./ha)	(%)	(-)	(g a.s./ha)
Wheat, Triticale, Rye	Winter cereals	1x42	25	11-30	31.5
	Winter cereals	1x70	25	11-33	52.5
	Spring cereals	1x42	25	11-30	31.5
	Spring cereals	1x70	25	11-33	52.5

Application timing

Application dates for winter and spring cereals were selected based on recommended growth stages and on emergence dates specified by the FOCUS groundwater working group.
For spring cereals, the application date was set to 7 days after emergence. The application in winter cereals according to GAP is done in spring, usually at the beginning of the vegetation period. For this purpose, the application timing was based on the emergence of the earliest crop in each scenario. The application was then set 14 days before this respective date assuming that this date coincides with the beginning of the vegetation period (Table 9.2-6).

Table 9.2-6 Application dates used for modelling

$FOCUS_{gw}$ crop	Scenario	Application date
Winter cereals	[redacted]	24-Feb
	[redacted]	24-Feb
	[redacted]	04-May
	[redacted]	24-Feb
	[redacted]	01-Mar
	[redacted]	06-Mar
	[redacted]	14-Feb
	[redacted]	15-Feb
	[redacted]	15-Feb
Spring cereals	[redacted]	17-Mar
	[redacted]	08-Apr
	[redacted]	25-May
	[redacted]	08-Apr
	[redacted]	08-Apr
	[redacted]	17-Mar

Simulation tools and scenarios

The FOCUS simulation models FOCUS PEARL 4.4.4 and FOCUS PELMO 5.5.3 were used in the modelling study. The modelling simulations were carried out in accordance with FOCUS guidelines. All standard FOCUS locations defined for the respective crops were considered in the simulations. Simulations were carried out over 26 years as proposed by FOCUS for pesticides that are applied every year. The first 6 years are intended to be a 'warm up' period. The following 20 years were taken into account for the assessment of the leaching behaviour.

II. RESULTS AND DISCUSSION

The PEC_{gw} for propoxycarbazone-sodium and its metabolites were calculated for the use on cereals in Europe in accordance with FOCUS guidelines. Maximum 80th percentile PEC_{gw} values per substance and use are in given in Table 9.2-7. The PEC_{gw} values for each scenario, use and model are presented in Table 9.1-8 and Table 9.2-9.

Table 9.2-7 Maximum 80th percentile PEC_{gw} at 1 m soil depth for propoxycarbazone-sodium and its metabolites following application to winter and spring cereals, calculated with FOCUS PEARL and FOCUS PELMO

	PEC_{gw} (µg/L)							
	Winter cereals (1x42 g/ha)		Winter cereals (1x70 g/ha)		Spring cereals (1x42 g/ha)		Spring cereals (1x70 g/ha)	
	PEARL 4.4.4	PELMO 5.5.3	PEARL 4.4.4	PELMO 5.5.3	PEARL 4.4.4	PELMO 5.5.3	PEARL 4.4.4	PELMO 5.5.3
MKH6561[1)]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
M05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
M07	0.132	0.127	0.227	0.219	0.179	0.145	0.307	0.251
M08	0.039	0.020	0.070	0.034	0.044	0.013	0.077	0.023
M09	0.033	0.036	0.059	0.065	0.026	0.021	0.049	0.038
M10	1.060	0.787	1.828	1.393	1.218	0.663	2.093	1.184
M11	0.166	0.187	0.296	0.335	0.120	0.103	0.224	0.187

1) MKH6561 = propoxycarbazone-sodium

Table 9.2-8 80th percentile PEC_{gw} at 1 m soil depth for propoxycarbazone-sodium and its metabolites following application to winter and spring cereals, calculated with FOCUS PEARL

Crop scenario	Scenario	PEC_{gw} at 1 m soil depth (µg/L)						
		MKH6561[1)]	M05	M07	M08	M09	M10	M11
Winter cereals 1 x 42 g a.s./ha	[redacted]	<0.001	<0.001	0.014	0.001	0.005	0.589	0.017
	[redacted]	<0.001	<0.001	0.132	0.039	0.027	1.060	0.121
	[redacted]	<0.001	<0.001	0.113	0.004	0.006	0.893	0.083
	[redacted]	<0.001	<0.001	0.068	0.006	0.019	0.739	0.106
	[redacted]	<0.001	<0.001	0.098	0.012	0.033	0.775	0.166
	[redacted]	<0.001	<0.001	0.043	0.020	0.017	0.530	0.077
	[redacted]	<0.001	<0.001	0.038	0.002	0.014	0.471	0.094
	[redacted]	<0.001	<0.001	<0.001	<0.001	<0.001	0.046	0.002
	[redacted]	<0.001	<0.001	0.002	<0.001	0.002	0.465	0.003
Winter cereals 1 x 70 g a.s./ha	[redacted]	<0.001	<0.001	0.024	0.002	0.009	1.021	0.032
	[redacted]	<0.001	<0.001	0.227	0.070	0.050	1.828	0.225
	[redacted]	<0.001	<0.001	0.194	0.008	0.011	1.545	0.160
	[redacted]	<0.001	<0.001	0.116	0.011	0.035	1.270	0.191
	[redacted]	<0.001	<0.001	0.169	0.023	0.059	1.331	0.296
	[redacted]	<0.001	<0.001	0.074	0.034	0.030	0.915	0.140
	[redacted]	<0.001	<0.001	0.065	0.005	0.026	0.822	0.173
	[redacted]	<0.001	<0.001	<0.001	<0.001	<0.001	0.088	0.003
	[redacted]	<0.001	<0.001	0.003	<0.001	0.005	0.809	0.007

Table 9.2-8 80th percentile PEC_{gw} at 1 m soil depth for propoxycarbazone-sodium and its metabolites following application to winter and spring cereals, calculated with FOCUS PEARL

Crop scenario	Scenario	PEC_{gw} at 1 m soil depth (µg/L)						
		MKH6561[1)]	M05	M07	M08	M09	M10	M11
Spring cereals 1 x 42 g a.s./ha	[redacted]	<0.001	<0.001	0.010	<0.001	0.003	0.479	0.010
	[redacted]	<0.001	<0.001	0.179	0.044	0.026	1.218	0.120
	[redacted]	<0.001	<0.001	0.149	0.004	0.006	0.794	0.086
	[redacted]	<0.001	<0.001	0.081	0.005	0.020	0.779	0.108
	[redacted]	<0.001	<0.001	0.073	0.006	0.024	0.756	0.114
	[redacted]	<0.001	<0.001	0.006	<0.001	0.009	0.404	0.039
Spring cereals 1 x 70 g a.s./ha	[redacted]	<0.001	<0.001	0.018	0.001	0.007	0.831	0.019
	[redacted]	<0.001	<0.001	0.307	0.077	0.049	2.093	0.224
	[redacted]	<0.001	<0.001	0.257	0.008	0.011	1.381	0.162
	[redacted]	<0.001	<0.001	0.138	0.010	0.037	1.351	0.195
	[redacted]	<0.001	<0.001	0.124	0.011	0.044	1.285	0.208
	[redacted]	<0.001	<0.001	0.011	<0.001	0.017	0.699	0.074

1) MKH6561 = propoxycarbazone-sodium

Table 9.2-9 80th percentile PEC_{gw} at 1 m soil depth for propoxycarbazone-sodium and its metabolites following application to winter and spring cereals, calculated with FOCUS PELMO

Crop scenario	Scenario	PEC_{gw} at 1 m soil depth (µg/L)						
		MKH6561[1)]	M05	M07	M08	M09	M10	M11
Winter cereals 1 x 42 g a.s./ha	[redacted]	<0.001	<0.001	0.011	0.001	0.004	0.385	0.015
	[redacted]	<0.001	<0.001	0.082	0.020	0.030	0.787	0.131
	[redacted]	<0.001	<0.001	0.127	0.003	0.008	0.599	0.095
	[redacted]	<0.001	<0.001	0.078	0.006	0.022	0.602	0.133
	[redacted]	<0.001	<0.001	0.120	0.011	0.036	0.652	0.187
	[redacted]	<0.001	<0.001	0.037	0.018	0.020	0.472	0.102
	[redacted]	<0.001	<0.001	0.046	0.003	0.021	0.405	0.124
	[redacted]	<0.001	<0.001	<0.001	<0.001	<0.001	0.051	0.002
	[redacted]	<0.001	<0.001	0.001	<0.001	0.001	0.177	0.004
Winter cereals 1 x 70 g a.s./ha	[redacted]	<0.001	<0.001	0.019	0.001	0.007	0.698	0.029
	[redacted]	<0.001	<0.001	0.144	0.034	0.056	1.393	0.242
	[redacted]	<0.001	<0.001	0.219	0.005	0.015	1.086	0.182
	[redacted]	<0.001	<0.001	0.133	0.011	0.041	1.068	0.240
	[redacted]	<0.001	<0.001	0.207	0.020	0.065	1.145	0.335
	[redacted]	<0.001	<0.001	0.065	0.031	0.036	0.841	0.183
	[redacted]	<0.001	<0.001	0.080	0.005	0.038	0.719	0.226
	[redacted]	<0.001	<0.001	<0.001	<0.001	<0.001	0.102	0.005
	[redacted]	<0.001	<0.001	0.001	<0.001	0.002	0.326	0.009
Spring cereals 1 x 42 g a.s./ha	[redacted]	<0.001	<0.001	0.006	<0.001	0.002	0.254	0.005
	[redacted]	<0.001	<0.001	0.050	0.013	0.018	0.663	0.081
	[redacted]	<0.001	<0.001	0.145	0.004	0.005	0.512	0.069
	[redacted]	<0.001	<0.001	0.067	0.004	0.017	0.546	0.092
	[redacted]	<0.001	<0.001	0.071	0.006	0.021	0.539	0.103
	[redacted]	<0.001	<0.001	0.014	<0.001	0.012	0.342	0.068
Spring cereals 1 x 70 g a.s./ha	[redacted]	<0.001	<0.001	0.009	0.001	0.004	0.463	0.009
	[redacted]	<0.001	<0.001	0.085	0.023	0.033	1.184	0.154
	[redacted]	<0.001	<0.001	0.251	0.006	0.010	0.922	0.133
	[redacted]	<0.001	<0.001	0.114	0.006	0.031	0.967	0.168
	[redacted]	<0.001	<0.001	0.122	0.010	0.038	0.953	0.187
	[redacted]	<0.001	<0.001	0.024	0.001	0.022	0.602	0.126

1) MKH6561 = propoxycarbazone-sodium

III. CONCLUSIONS

The PEC_{gw} for propoxycarbazone-sodium and its metabolites were calculated for the use in cereals in Europe in accordance with recommendations of FOCUS (2000, 2009, and 2012).

The maximum 80th percentile PEC_{gw} values of the active substance propoxycarbazone-sodium and its metabolites M05, M08 and M09 in the leachate at 1 m soil depth are below 0.1 µg/L for all crops and scenarios. The maximum 80th percentile PEC_{gw} values of the metabolites M07, M10 and M11 were above the trigger value 0.1 µg/L, therefore a non-relevance assessment was conducted (please refer to Doc N4 of this Dossier). It is concluded that M07, M10 and M11 do not pose a toxicological hazard, thus being nonrelevant in the context of the criteria outlined in the Guidance Document on the Assessment of the Relevance of Metabolites in Groundwater[4].

Following the proposed use pattern of the product a safe use can be concluded.

For details, please refer to the corresponding PEC report (CP 9.2.4/04) submitted within this dossier.

CP 9.2.4.2 Additional field tests

Studies have already been submitted to support first Annex I inclusion of propoxycarbazone-sodium, no additional studies are submitted within this Supplemental Dossier.

CP 9.2.5 Estimation of concentrations in surface water and sediment

Estimations relate to direct application to water, drift, run-off, discharge via drains and atmospheric deposition, and include processes such as volatilisation, adsorption, advection, hydrolysis, photolysis, biodegradation, sedimentation and re-suspension, and transfer between water and sediment.

Report:	[redacted];[redacted];2014;M-487145-01
Title:	Predicted environmental concentrations of propoxycarbazone-sodium (MKH6561) and its metabolites in surface water after application to cereals using the FOCUS surface water scenarios
Report No:	358535-03
Document No:	**M-487145-01-1**
Guidelines:	**FOCUS Surface Water Scenarios in the EU Evaluation Process under 91/414/EEC. EC SANCO/4802/2001; EC SANCO/10058/2005 version 2.0, June 2006; EC SANCO/10422/2005, v2.0, 169 pp.; EC SANCO/10422/2005, v2.0, 436 pp; FOCUS (2011): Generic Guidance for Estimating Persistence and Degradation Kinetics from Environmental Fate Studies on Pesticides in EU Registration, version 1.0.; FOCUS (2012): Generic guidance for FOCUS surface water Scenarios, version 1.2.**
Deviations:	None
GLP/GEP:	**no**

Executive Summary

Predicted environmental concentrations in surface water and sediment (PEC_{sw}, PEC_{sed}) were calculated for the active substance propoxycarbazone-sodium and its major metabolites M04, M05, M06, M07, M08, M09, M10 and M11.

The use in winter and spring cereals was assessed. According to the GAP, single applications at rates of 42 and 70 g a.s./ha are envisaged starting at BBCH stage 11.

Calculations for propoxycarbazone-sodium were carried out at Step 1 to 4 using the current versions of the simulation models FOCUS STEPS 1-2 (version 2.1), FOCUS SWASH (version 3.1 using MACRO 4.4.2, PRZM 3.1.1 and TOXSWA 3.3.1) and SWAN (version 3.0.0). Calculations for the metabolites were conducted at Steps 1-2.

The overall maximum PEC_{sw} and PEC_{sed} values of propoxycarbazone-sodium at Step 3 and 4 following applications to winter and spring cereals are summarised in the following table.

[4] Guidance Document on the Assessment of the Relevance of Metabolites in Groundwater of Substances Regulated Under Council Directive 91/414/EEC; SANCO/221/2000 – rev.10 – final, 25 February 2003

Table 9.2-10 Maximum PEC_{sw} and PEC_{sed} values of propoxycarbazone-sodium at Step 3 and Step 4 following application to winter and spring cereals

	Step 3		Step 4					
			5 m D		10 m D + R		20 m D + R	
	1 x 42 g/ha	1 x 70 g/ha	1 x 42 g/ha	1 x 70 g/ha	1 x 42 g/ha	1 x 70 g/ha	1 x 42 g/ha	1 x 70 g/ha
Winter cereals								
Max. PEC_{sw} (µg/L)	4.288 (D2, ditch)	7.291 (D2, ditch)	nc	7.291 (D2, ditch)	4.288 (D2, ditch)	7.291 (D2, ditch)	nc	7.291 (D2, ditch)
Max. PEC_{sed} (µg/kg)	1.358 (D2, ditch)	2.265 (D2, ditch)	nc	2.230 (D2, ditch)	1.332 (D2, ditch)	2.224 (D2, ditch)	nc	2.220 (D2, ditch)
Spring cereals								
Max. PEC_{sw} (µg/L)	0.281 (D1, ditch)	0.468 (D1, ditch)	nc	0.144 (D1, ditch)	nc	nc	nc	nc
Max. PEC_{sed} (µg/kg)	0.086 (D1, ditch)	0.142 (D1, ditch)	nc	0.099 (D1, ditch)	nc	nc	nc	nc

nc = not calculated
D = Drift mitigation, R = run-off mitigation

It can be concluded that the use of propoxycarbazone-sodium is not likely to pose an unacceptable risk to surface water and sediment if the active substance is used in compliance with label instructions.

I. MATERIALS AND METHODS

A. MATERIALS

Calculations were carried out according to FOCUS (2001, 2012) at Step 1 to 4 using the current version of FOCUS STEPS 1-2 (version 2.1), FOCUS SWASH (version 3.1 using MACRO 4.4.2, PRZM 3.1.1 and TOXSWA 3.3.1) and SWAN (version 3.0.0).

B. STUDY DESIGN

For information regarding the behaviour of the active substance propoxycarbazone-sodium and its metabolites in soil, please refer to document M-CA section 7 of this dossier, point 7.1.2 to CP 7.1.3, and point 7.2.

Rate of degradation in soil

propoxycarbazone-sodium

Normalised $DegT_{50}$ matrix values for propoxycarbazone-sodium derived from field trials ranged from 3.4 to 10.8 days, with a geometric mean $DegT_{50}$ matrix of 6.4 days which was used for PEC_{sw} calculations.

M04

The M04 is a minor soil metabolite <5% AR and was therefore not considered relevant in the kinetic evaluation of the soil degradation studies. For PEC_{sw} calculations at Steps 1 and 2, a half-life in soil of $1x10^{-6}$ days and a maximum occurrence in soil of $1x10^{-6}$ % were used as default settings since the modelling software requires such input data.

M05
$DegT_{50}$ values (modelling endpoints) ranged from 2.8 to 17.4 days (non-normalised) and 1.8 to 14.5 days (normalised to 20°C and pF2). The geometric mean of the normalised $DegT_{50}$ of 4.3 days derived from laboratory studies was used for the PEC_{sw} calculations together with the maximum occurrence of 20.9%.

M06
The M06 is a minor soil metabolite <5% AR and was therefore not considered relevant in the kinetic evaluation of the soil degradation studies. For PEC_{sw} calculations at Steps 1 and 2, a half-life in soil of $1x10^{-6}$ days and a maximum occurrence in soil of $1x10^{-6}$ % were used as default settings since the modelling software requires such input data.

M07
$DegT_{50}$ values (modelling endpoints) ranged from 4.4 to 39.8 days (non-normalised) and 2.8 to 33.2 days (normalised to 20°C and pF2). The geometric mean of the normalised $DegT_{50}$ of 11.6 days derived from laboratory studies was used for the PEC_{sw} calculations together with the maximum occurrence of 26.7%.

M08
$DegT_{50}$ values (modelling endpoints) ranged from 32.3 to 496.7 days (non-normalised) and 29.5 to 312.9 days (normalised to 20°C and pF2). The geometric mean of the normalised DT_{50} values of 84.2 days derived from laboratory studies was used for the PEC_{sw} calculations together with the maximum occurrence of 21.9%.

M09
$DegT_{50}$ values (modelling endpoints) ranged from 85.3 to 385.3 days (non-normalised) and 71.1 to 231.2 days (normalised to 20°C and pF2). The geometric mean of the normalised $DegT_{50}$ values of 108.0 days derived from laboratory studies was used for the PEC_{sw} calculations together with the maximum occurrence of 13.2%.

M10
$DegT_{50}$ values (modelling endpoints) ranged from 58.8 to 140.2 days (non-normalised) and 43.2 to 109.3 days (normalised to 20°C and pF2). The geometric mean of the normalised $DegT_{50}$ values of 81.2 days derived from laboratory studies was used for the PEC_{sw} calculations together with the maximum occurrence of 55.2%.

M11
$DegT_{50}$ values (modelling endpoints) ranged from 5.4 to 26.2 days (non-normalised) and 4.6 to 20.8 days (normalised to 20°C and pF2). The geometric mean of the normalised $DegT_{50}$ values of 9.1 days derived from laboratory studies was used for the PEC_{sw} calculations together with the maximum occurrence of 26.7%.

Sorption in soil
propoxycarbazone-sodium
The arithmetic mean K_{foc} of 40.7 mL/g (K_{fom} = 23.6 mL/g) was used for the calculations together with the arithmetic mean Freundlich exponent of 0.93.

M04
The arithmetic mean K_{foc} of 18.8 mL/g was used for the calculations.

M05
The arithmetic mean K_{foc} of 44.0 mL/g was used for the calculations.

M06
Results from a preliminary test indicated that M06 only slightly adsorbed on soil; therefore, a definitive test was not conducted during the sorption study. The maximum K_{oc} value of 6.8 mL/g, calculated from the preliminary test, was used for the PEC calculations.

M07
The arithmetic mean K_{foc} of 7.4 mL/g was used for the calculations.

M08
The arithmetic mean K_{foc} of 1711.0 mL/g was used for the calculations.

M09
The arithmetic mean K_{foc} of 193.4 mL/g was used for the calculations.

M10
The arithmetic mean K_{foc} of 37.9 mL/g was used for the calculations.

M11
The arithmetic mean K_{foc} of 12.3 mL/g was used for the calculations.

Behaviour in aquatic systems
propoxycarbazone-sodium
The geometric mean $DegT_{50}$ of the total system (48.0 days) was used as input parameter for the calculations at Steps 1-2 level for water, sediment and total system. At Step 3 the geometric mean total system $DegT_{50}$ of 48.0 days was used for degradation in the water phase and the FOCUS default of 1000 days was set for the degradation in the sediment phase in accordance with current FOCUS guidance (FOCUS, 2012).

M04
No reliable half-lives could be derived for M04 at Level M-I (dissipation/degradation). Consequently, PEC_{sw} modelling at Steps 1-2 was conducted with the FOCUS default DT_{50} of 1000 days for both water and sediment phase. The maximum occurrence of carboxylic acid (M04) of 68.5 % in total system (was used in the PEC_{sw} calculations.

M05
The geometric mean total system DT_{50} of 32.6 days was used as input parameter for the calculations at Steps 1-2 level for water, sediment and total system. The maximum occurrence of sulfonamide methyl ester (M05) of 11.3% in total system was used in the PEC_{sw} calculations.

M06
No reliable half-lives could be derived for M06 at Level M-I (dissipation/degradation). Consequently, PEC_{sw} modelling at Steps 1-2 was conducted with the FOCUS default DT_{50} of 1000 days for both water and sediment phase. The maximum occurrence of sulfonamide acid (M06) of 19.4% in total system was used in the PEC_{sw} calculations.

M07
Saccharin (M07) was found to be the major metabolite during the photolysis of [phenyl-UL-^{14}C]propoxycarbazone-sodium, accounting for 22.3% at day 19 of the study. Since the concentration of the metabolite increased during the experimental period, and since no half-life was provided in the study report, the use of a FOCUS default DT_{50} of 1000 days was considered appropriate for PEC calculations at Steps 1-2, for both, water and sediment phase.

M08

Since the M08 is a soil metabolite only, FOCUS default DT_{50} values of 1000 days were used for PEC_{sw} calculations at Steps 1-2 together with a maximum occurrence in water/sediment of 0%.

M09

Since the M09 is a soil metabolite only, FOCUS default DT_{50} values of 1000 days were used for PEC_{sw} calculations at Steps 1-2 together with a maximum occurrence in water/sediment of 0%.

M10

No reliable half-lives could be derived for M10 at Level M-I (dissipation/degradation). Consequently, PEC_{sw} modelling at Steps 1-2 was conducted with the FOCUS default DT_{50} of 1000 days for both water and sediment phase. The maximum occurrence of N-methyl propoxy triazolinone (M10) of 34.4% in total system was used in the PEC_{sw} calculations.

M11

Since the M11 is a soil metabolite only, FOCUS default DT_{50} values of 1000 days were used for PEC_{sw} calculations at Steps 1-2 together with a maximum occurrence in water/sediment of 0%.

Summary of input parameters used for modelling

FOCUS numerical leaching models make use of the parameter *plant uptake factor* (PUF) to take into account the amount of a component taken up from soil pore water by plants *via* the transpiration stream. In the absence of experimentally measured data, a default value of 0.5 is proposed by FOCUS groundwater guidance for substances with an indication for root system uptake. For propoxycarbazone-sodium, evidence for root systemic uptake is given based on information available in the respective Monograph for the active substance (DAR, 2001[5]).

With a systemic action demonstrated the use of the FOCUS default PUF = 0.5 in exposure simulations is justified.

The substance related parameters used for propoxycarbazone-sodium and its metabolites in the calculations is summarised in Table 9.2-11.

[5] DAR (2001): Propoxycarbazone-sodium Monograph 01 March 2001, Volume 1: Report and Proposed Decision.

Table 9.2-11 Input parameters of propoxycarbazone-sodium and its metabolites used for modelling

Parameter	MKH6561[1)]	M04	M05	M06	M07	M08	M09	M10	M11
Molecular mass (g/mol)	420.4	384.0	215.2	201.0	183.2	199.2	200.2	157.2	213.2
Aqueous solubility at 20°C (mg/L)	42000	30000	2100	25000	10000	8600	13000	1000000	11000
Vapour pressure at 20°C (Pa)	1×10^{-8}	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]
DT_{50} soil (days)	6.4	10^{-6}	4.3	10^{-6}	11.6	84.2	108.0	81.2	9.1
DT_{50} total system (days)	48	1000	32.6	1000	1000	1000	1000	1000	1000
DT_{50} water (days)	48	1000	32.6	1000	1000	1000	1000	1000	1000
DT_{50} sediment (days)	48	1000	32.6	1000	1000	1000	1000	1000	1000
K_{foc} (mL/g)	40.7	18.8	44.0	6.8	7.4	1711	193.4	37.9	12.3
1/n	0.93	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]
Maximum occurrence in soil (%)	100	10^{-6}	20.9	10^{-6}	26.7	21.9	13.2	55.2	26.7
Maximum occ. in wat/sed (%)	100	68.5	11.3	19.4	22.3	0	0	34.4	0
Plant uptake factor	0.5	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]	-[2)]

1) MKH6561 = propoxycarbazone-sodium
2) Not a relevant input parameter at Steps 1-2 level.

Application and GAP

Application scenarios
Based on the GAP, appropriate application scenarios have been defined using worst-case assumptions regarding application rate and timing. Winter and spring cereals were chosen as surrogate crops.

Applied modelling strategy and application timing
Calculations for propoxycarbazone-sodium were carried out at Step 1 to Step 4. Calculations for the metabolites were conducted at Steps 1-2 level only.

Interception values for Step 1 and 2 were chosen in accordance with FOCUS (2001, 2012) as shown in Table 9.2-12. At Step 2, an interception rate of 25% corresponding to 'minimal crop cover' was taken into account. The application periods 'March – May' and 'October – February' were considered for winter cereals. The regions 'North Europe' and 'South Europe' were taken into account for modelling.

Table 9.2-12 Steps 1 and 2: Application settings used for modelling

FOCUS crop	Application rate (g a.s./ha)	Region	Application period	Interception	Interception value (%)
Winter cereals	1 x 42	North / South Europe	Mar – May Oct - Feb	Minimal crop cover	25
Winter cereals	1 x 70	North / South Europe	Mar – May Oct - Feb	Minimal crop cover	25
Spring cereals	1 x 42	North / South Europe	Mar – May	Minimal crop cover	25
Spring cereals	1 x 70	North / South Europe	Mar – May	Minimal crop cover	25

Step 3 calculations with SWASH 3.1 were carried out applying the Chemical Application Method (CAM) 2 (foliar linear) including a standard application depth of 4 cm. All scenarios which are parameterized for winter and spring cereals were considered. Appropriate application windows were chosen based on recommended growth stages for the use of propoxycarbazone-sodium and on emergence dates specified in FOCUS (2001, 2012). The actual date of application within the windows was determined by the Pesticide Application Timer (PAT) incorporated in FOCUS SWASH 3.1.

For the FOCUS crop 'spring cereals', the beginning of the application window was set to 7 days after emergence. The application in winter cereals according to GAP is done in spring, usually at the beginning of the vegetation period. For this purpose, the application timing was based on the emergence of the earliest crop in each scenario. The beginning of the application window was then set 14 days before this respective date assuming that this date coincides with the beginning of the vegetation period.

A summary of the application dates used for modelling at Step 3 and 4 is presented in Table 9.2-13.

Table 9.2-13 Step 3 and 4: Application dates used for modelling

Crop	FOCUS Scenario	Application window - Step 3 and 4		
		1st date of application window	Last date of application window	Actual application date[1)]
Winter cereals	D1	21-Apr (111)	21-May (141)	25-Apr
	D2	01-Mar (60)	31-Mar (90)	12-Mar
	D3	18-Mar (77)	17-Apr (107)	17-Mar
	D4	01-Apr (91)	01-May (121)	18-Apr
	D5	01-Mar (60)	31-Mar (90)	07-Mar
	D6	11-Feb (42)	13-Mar (72)	27-Feb
	R1	27-Mar (86)	26-Apr (116)	26-Apr
	R3	12-Feb (43)	14-Mar (73)	19-Feb
	R4	12-Feb (43)	14-Mar (73)	02-Mar
Spring cereals	D1	12-May (132)	11-Jun (162)	14-May
	D3	08-Apr (98)	08-May (128)	07-Apr
	D4	03-May (123)	02-Jun (153)	30-May
	D5	22-Mar (81)	21-Apr (111)	08-Apr
	R4	22-Mar (81)	21-Apr (111)	22-Mar

1) determined by PAT
Numbers in brackets indicate 'Julian Days'

Step 4 calculations were carried out with SWAN version 3.0.0. All scenarios which are parameterised for winter and spring cereals were taken into account. Refinements considered at Step 4 were drift mitigation by introducing a 5 m no-spray drift buffer as well as a combined drift and runoff mitigation considering 10 m and 20 m vegetated filter strips

Simulation tools and scenarios
Calculations were carried out according to FOCUS (2001, 2012) at Step 1 to 4 using the current version of FOCUS STEPS 1-2 (version 2.1), FOCUS SWASH (version 3.1 using MACRO 4.4.2, PRZM 3.1.1 and TOXSWA 3.3.1) and SWAN (version 3.0.0).

II. RESULTS AND DISCUSSION

The PEC_{sw} and PEC_{sed} of propoxycarbazone-sodium and its metabolites were calculated with the simulation models STEPS 1-2 (version 2.1), SWASH (version 3.1) and SWAN (version 3.0.0). Calculations at Step 1 and 2 levels were conducted for propoxycarbazone-sodium and its metabolites while calculations at Step 3 and 4 levels were run for the active substance only. The use of propoxycarbazone-sodium in cereals was assessed.

Results of Steps 1-2 – propoxycarbazone-sodium

Maximum PEC_{sw} and PEC_{sed}
Global maximum PEC_{sw} and PEC_{sed} of propoxycarbazone-sodium at Step 1 and 2 levels are shown in Table 9.2-14**.**

Table 9.2-14 Steps 1-2: Maximum PEC_{sw} and PEC_{sed} values for propoxycarbazone-sodium after application to winter and spring cereals

Crop / Application rate	FOCUS Step / Scenario	Propoxycarbazone-sodium	
		PEC_{sw} (µg/L)	PEC_{sed} (µg/kg)
Winter cereals (1 x 42 g a.s./ha)	Step 1	13.666	5.474
	Step 2 NEU- (Oct-Feb)	3.581	1.434
	Step 2 NEU - (Mar-May)	1.643	0.657
	Step 2 SEU - (Oct-Feb)	2.935	1.175
	Step 2 SEU - (Mar-May)	2.935	1.175
Winter cereals (1 x 70 g a.s./ha)	Step 1	22.776	9.124
	Step 2 NEU- (Oct-Feb)	5.968	2.390
	Step 2 NEU - (Mar-May)	2.739	1.095
	Step 2 SEU - (Oct-Feb)	4.892	1.958
	Step 2 SEU - (Mar-May)	4.892	1.958
Spring cereals (1 x 42 g a.s./ha)	Step 1	13.666	5.474
	Step 2 NEU - (Mar-May)	1.643	0.657
	Step 2 SEU - (Mar-May)	2.935	1.175
Spring cereals (1 x 70 g a.s./ha)	Step 1	22.776	9.124
	Step 2 NEU - (Mar-May)	2.739	1.095
	Step 2 SEU - (Mar-May)	4.892	1.958

Actual and time-weighted average PEC_{sw}
The actual and time-weighted average values of propoxycarbazone-sodium in surface water are presented in Table 9.2-15 to Table 9.1-18.

Table 9.2-15 Steps 1-2: Actual and time-weighted average PEC_{sw} values for propoxycarbazone-sodium following application to winter cereals – 1 x 42 g a.s./ha

Time (d)	Step 1		Step 2 – North Europe				Step 2 – South Europe			
			Oct-Feb		Mar-May		Oct-Feb		Mar-May	
	PEC_{sw} (µg/L)									
	ACT	TWA	ACT	TWA	ACT	TWA	ACT	TWA	ACT	TWA
0	13.666	-	3.581	-	1.643	-	2.935	-	2.935	-
1	13.450	13.558	3.524	3.552	1.614	1.629	2.887	2.911	2.887	2.911
2	13.257	13.456	3.473	3.525	1.591	1.616	2.846	2.889	2.846	2.889
4	12.880	13.262	3.374	3.474	1.546	1.592	2.765	2.847	2.765	2.847
7	12.334	12.980	3.231	3.401	1.480	1.558	2.647	2.786	2.647	2.786
14	11.148	12.356	2.921	3.237	1.338	1.483	2.393	2.652	2.393	2.652
21	10.076	11.771	2.640	3.084	1.209	1.413	2.163	2.527	2.163	2.527
28	9.107	11.225	2.386	2.941	1.093	1.347	1.955	2.409	1.955	2.409
42	7.440	10.232	1.949	2.680	0.893	1.228	1.597	2.196	1.597	2.196
50	6.629	9.719	1.737	2.546	0.795	1.166	1.423	2.086	1.423	2.086
100	3.220	7.220	0.844	1.891	0.386	0.866	0.691	1.550	0.691	1.550

Table 9.2-16 Steps 1-2: Actual and time-weighted average PEC_{sw} values for propoxycarbazone-sodium following application to winter cereals – 1 x 70 g a.s./ha

Time (d)	Step 1		Step 2 – North Europe				Step 2 – South Europe			
			Oct-Feb		Mar-May		Oct-Feb		Mar-May	
	PEC_{sw} (µg/L)									
	ACT	TWA	ACT	TWA	ACT	TWA	ACT	TWA	ACT	TWA
0	22.776	-	5.968	-	2.739	-	4.892	-	4.892	-
1	22.417	22.597	5.873	5.920	2.690	2.715	4.812	4.852	4.812	4.852
2	22.096	22.426	5.788	5.875	2.651	2.693	4.743	4.814	4.743	4.814
4	21.467	22.103	5.624	5.791	2.576	2.653	4.608	4.745	4.608	4.745
7	20.556	21.634	5.385	5.668	2.467	2.596	4.412	4.644	4.412	4.644
14	18.580	20.593	4.867	5.395	2.230	2.471	3.988	4.420	3.988	4.420
21	16.794	19.619	4.400	5.140	2.015	2.354	3.605	4.211	3.605	4.211
28	15.179	18.707	3.977	4.901	1.821	2.245	3.258	4.016	3.258	4.016
42	12.401	17.053	3.249	4.467	1.488	2.046	2.662	3.660	2.662	3.660
50	11.048	16.198	2.894	4.244	1.326	1.944	2.371	3.477	2.371	3.477
100	5.367	12.033	1.406	3.152	0.644	1.444	1.152	2.583	1.152	2.583

Table 9.2-17 Steps 1-2: Actual and time-weighted average PEC_{sw} values for propoxycarbazone-sodium following application to spring cereals – 1 x 42 g a.s./ha

Time (d)	Step 1		Step 2 – North Europe		Step 2 – South Europe	
			Mar-May		Mar-May	
	PEC_{sw} (µg/L)					
	ACT	TWA	ACT	TWA	ACT	TWA
0	13.666	-	1.643	-	2.935	-
1	13.450	13.558	1.614	1.629	2.887	2.911
2	13.257	13.456	1.591	1.616	2.846	2.889
4	12.880	13.262	1.546	1.592	2.765	2.847
7	12.334	12.980	1.480	1.558	2.647	2.786
14	11.148	12.356	1.338	1.483	2.393	2.652
21	10.076	11.771	1.209	1.413	2.163	2.527
28	9.107	11.225	1.093	1.347	1.955	2.409
42	7.440	10.232	0.893	1.228	1.597	2.196
50	6.629	9.719	0.795	1.166	1.423	2.086
100	3.220	7.220	0.386	0.866	0.691	1.550

Table 9.2-18 Steps 1-2: Actual and time-weighted average PEC_{sw} values for propoxycarbazone-sodium following application to spring cereals – 1 x 70 g a.s./ha

Time (d)	Step 1		Step 2 – North Europe		Step 2 – South Europe	
			Mar-May		Mar-May	
	PEC_{sw} (µg/L)					
	ACT	TWA	ACT	TWA	ACT	TWA
0	22.776	-	2.739	-	4.892	-
1	22.417	22.597	2.690	2.715	4.812	4.852
2	22.096	22.426	2.651	2.693	4.743	4.814
4	21.467	22.103	2.576	2.653	4.608	4.745
7	20.556	21.634	2.467	2.596	4.412	4.644
14	18.580	20.593	2.230	2.471	3.988	4.420
21	16.794	19.619	2.015	2.354	3.605	4.211
28	15.179	18.707	1.821	2.245	3.258	4.016
42	12.401	17.053	1.488	2.046	2.662	3.660
50	11.048	16.198	1.326	1.944	2.371	3.477
100	5.367	12.033	0.644	1.444	1.152	2.583

Results of Step 3 – propoxycarbazone-sodium

Maximum PEC_{sw} and PEC_{sed}

Maximum PEC_{sw} and PEC_{sed} of propoxycarbazone-sodium at Step 3 level are shown below.

Table 9.2-19 Step 3 - Maximum PEC_{sw} and PEC_{sed} values for propoxycarbazone-sodium after application to winter cereals

Scenario	Winter cereals: 1 × 42 g a.s./ha			Winter cereals: 1 × 70.0 g a.s./ha		
	Main entry path	$PEC_{sw,\ max}$ (µg/L)	$PEC_{sed,\ max}$ (µg/kg)	Main entry path	$PEC_{sw,\ max}$ (µg/L)	$PEC_{sed,\ max}$ (µg/kg)
D1 (Ditch)	Drift	0.287	0.200	Drift	0.480	0.331
D1 (Stream)	Drift	0.240	0.044	Drift	0.400	0.073
D2 (Ditch)	Drainage	4.288	1.358	Drainage	7.291	2.265
D2 (Stream)	Drainage	2.675	0.786	Drainage	4.551	1.311
D3 (Ditch)	Drift	0.266	0.039	Drift	0.444	0.065
D4 (Pond)	Drift	0.009	0.011	Drift	0.015	0.018
D4 (Stream)	Drift	0.211	0.007	Drift	0.352	0.012
D5 (Pond)	Drift	0.009	0.011	Drift	0.015	0.018
D5 (Stream)	Drift	0.209	0.004	Drift	0.349	0.007
D6 (Ditch)	Drift	0.272	0.038	Drift	0.453	0.062
R1 (Pond)	Runoff	0.012	0.015	Runoff	0.019	0.024
R1 (Stream)	Runoff	0.279	0.034	Runoff	0.470	0.057
R3 (Stream)	Runoff	0.740	0.088	Runoff	1.229	0.144
R4 (Stream)	Runoff	0.497	0.080	Runoff	0.822	0.131

Table 9.2-20 Step 3 - Maximum PEC_{sw} and PEC_{sed} values for propoxycarbazone-sodium after application to spring cereals

Scenario	Spring cereals: 1 × 42 g a.s./ha			Spring cereals: 1 × 70.0 g a.s./ha		
	Main entry path	$PEC_{sw,\ max}$ (µg/L)	$PEC_{sed,\ max}$ (µg/kg)	Main entry path	$PEC_{sw,\ max}$ (µg/L)	$PEC_{sed,\ max}$ (µg/kg)
D1 (Ditch)	Drift	0.281	0.086	Drift	0.468	0.142
D1 (Stream)	Drift	0.219	0.031	Drift	0.366	0.054
D3 (Ditch)	Drift	0.266	0.039	Drift	0.443	0.064
D4 (Pond)	Drift	0.009	0.010	Drift	0.015	0.016
D4 (Stream)	Drift	0.221	0.011	Drift	0.368	0.018
D5 (Pond)	Drift	0.009	0.011	Drift	0.015	0.018
D5 (Stream)	Drift	0.208	0.004	Drift	0.348	0.007
R4 (Stream)	Drift	0.175	0.012	Drift	0.292	0.020

Actual and time-weighted average PEC_{sw}

Actual and time-weighted average concentrations of propoxycarbazone-sodium in surface water at Step 3 are presented below.

Table 9.2-21 Step 3 – Actual and time-weighted average PEC_{sw} values for propoxycarbazone-sodium after application to winter cereals

Time (d)	Scenario	1 × 42 g a.s./ha		1 × 70 g a.s./ha	
		$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)
0	D1 (Ditch)	0.287	-	0.480	-
1		0.272	0.278	0.454	0.465
2		0.263	0.272	0.440	0.455
4		0.254	0.265	0.424	0.443
7		0.243	0.258	0.406	0.431
14		0.046	0.212	0.079	0.356
21		0.035	0.155	0.061	0.260
28		0.028	0.124	0.049	0.209
42		0.017	0.090	0.030	0.152
50		0.013	0.079	0.023	0.133
100		0.003	0.051	0.004	0.087
0	D1 (Stream)	0.240	-	0.400	-
1		0.011	0.065	0.019	0.109
2		0.010	0.038	0.017	0.064
4		0.004	0.028	0.007	0.049
7		<0.001	0.027	<0.001	0.047
14		0.018	0.026	0.032	0.045
21		<0.001	0.025	<0.001	0.044
28		<0.001	0.023	<0.001	0.039
42		<0.001	0.017	<0.001	0.030
50		<0.001	0.016	<0.001	0.028
100		<0.001	0.014	<0.001	0.024
0	D2 (Ditch)	4.288	-	7.291	-
1		3.234	2.901	5.487	4.977
2		2.626	2.731	4.456	4.677
4		1.711	2.407	2.923	4.113
7		1.256	2.012	2.141	3.437
14		0.990	1.583	1.680	2.699
21		1.322	1.440	2.212	2.447
28		0.777	1.336	1.298	2.264
42		0.420	1.107	0.698	1.881
50		0.291	0.997	0.486	1.692
100		0.104	0.599	0.173	1.013
0	D2 (Stream)	2.675	-	4.551	-
1		1.924	1.631	3.271	2.806
2		1.609	1.530	2.729	2.628
4		0.951	1.364	1.625	2.335
7		0.640	1.125	1.090	1.923
14		0.531	0.869	0.900	1.483
21		0.815	0.797	1.364	1.354
28		0.447	0.750	0.746	1.270
42		0.222	0.613	0.368	1.042
50		0.164	0.551	0.273	0.934
100		0.052	0.336	0.086	0.568

Table 9.2-21 continued

Time (d)	Scenario	1 × 42 g a.s./ha		1 × 70 g a.s./ha	
		$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)
0	D3 (Ditch)	0.266	-	0.444	-
1		0.120	0.206	0.200	0.343
2		0.013	0.129	0.022	0.214
4		<0.001	0.066	0.001	0.110
7		<0.001	0.038	<0.001	0.063
14		<0.001	0.019	<0.001	0.031
21		<0.001	0.013	<0.001	0.021
28		<0.001	0.009	<0.001	0.016
42		<0.001	0.006	<0.001	0.011
50		<0.001	0.005	<0.001	0.009
100		<0.001	0.003	<0.001	0.004
0	D4 (Pond)	0.009	-	0.015	-
1		0.009	0.009	0.015	0.015
2		0.009	0.009	0.015	0.015
4		0.009	0.009	0.015	0.015
7		0.008	0.009	0.014	0.015
14		0.008	0.008	0.013	0.014
21		0.007	0.008	0.012	0.014
28		0.007	0.008	0.011	0.013
42		0.006	0.007	0.010	0.012
50		0.005	0.007	0.009	0.012
100		0.003	0.005	0.005	0.009
0	D4 (Stream)	0.211	-	0.352	-
1		<0.001	0.014	<0.001	0.024
2		<0.001	0.007	<0.001	0.012
4		<0.001	0.004	<0.001	0.006
7		<0.001	0.002	<0.001	0.003
14		<0.001	0.001	<0.001	0.002
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
0	D5 (Pond)	0.009	-	0.015	-
1		0.009	0.009	0.015	0.015
2		0.009	0.009	0.015	0.015
4		0.009	0.009	0.014	0.015
7		0.008	0.009	0.014	0.015
14		0.008	0.008	0.013	0.014
21		0.007	0.008	0.012	0.013
28		0.006	0.008	0.011	0.013
42		0.006	0.007	0.009	0.012
50		0.005	0.007	0.009	0.011
100		0.003	0.005	0.005	0.009

Table 9.2-21 continued

Time (d)	Scenario	1 × 42 g a.s./ha		1 × 70 g a.s./ha	
		$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)
0	D5 (Stream)	0.209	-	0.349	-
1		<0.001	0.008	<0.001	0.013
2		<0.001	0.004	<0.001	0.007
4		<0.001	0.002	<0.001	0.003
7		<0.001	0.001	<0.001	0.002
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
0	D6 (Ditch)	0.272	-	0.453	-
1		0.015	0.115	0.024	0.192
2		0.010	0.063	0.016	0.105
4		0.010	0.036	0.017	0.061
7		0.010	0.025	0.017	0.042
14		0.009	0.018	0.015	0.029
21		0.008	0.015	0.014	0.024
28		0.006	0.013	0.009	0.022
42		0.007	0.012	0.012	0.020
50		0.001	0.012	0.002	0.019
100		<0.001	0.009	<0.001	0.015
0	R1 (Pond)	0.012	-	0.019	-
1		0.012	0.012	0.019	0.019
2		0.011	0.012	0.019	0.019
4		0.011	0.011	0.018	0.019
7		0.011	0.011	0.018	0.018
14		0.010	0.011	0.016	0.018
21		0.009	0.010	0.014	0.017
28		0.008	0.010	0.013	0.016
42		0.006	0.009	0.010	0.015
50		0.005	0.009	0.009	0.015
100		0.002	0.007	0.003	0.012
0	R1 (Stream)	0.279	-	0.470	-
1		<0.001	0.115	<0.001	0.194
2		<0.001	0.058	<0.001	0.097
4		<0.001	0.029	<0.001	0.049
7		0.098	0.017	0.161	0.028
14		<0.001	0.015	<0.001	0.026
21		<0.001	0.010	<0.001	0.017
28		<0.001	0.009	<0.001	0.015
42		<0.001	0.006	<0.001	0.010
50		<0.001	0.005	<0.001	0.008
100		<0.001	0.003	<0.001	0.004

Table 9.2-21 continued

Time (d)	Scenario	1 × 42 g a.s./ha		1 × 70 g a.s./ha	
		$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)
0	R3 (Stream)	0.740	-	1.229	-
1		0.002	0.355	0.003	0.589
2		<0.001	0.178	<0.001	0.296
4		<0.001	0.089	<0.001	0.148
7		<0.001	0.051	<0.001	0.085
14		<0.001	0.032	<0.001	0.053
21		<0.001	0.022	<0.001	0.036
28		<0.001	0.016	<0.001	0.027
42		<0.001	0.011	<0.001	0.018
50		<0.001	0.009	<0.001	0.015
100		<0.001	0.005	<0.001	0.008
0	R4 (Stream)	0.497	-	0.822	-
1		0.003	0.359	0.005	0.593
2		<0.001	0.180	<0.001	0.297
4		<0.001	0.100	<0.001	0.165
7		<0.001	0.057	<0.001	0.094
14		<0.001	0.029	<0.001	0.047
21		<0.001	0.021	<0.001	0.034
28		0.001	0.016	0.001	0.026
42		<0.001	0.010	<0.001	0.017
50		<0.001	0.009	<0.001	0.015
100		<0.001	0.004	<0.001	0.007

Table 9.2-22 Step 3 – Actual and time-weighted average PEC_{sw} values for propoxycarbazone-sodium after application to spring cereals

Time (d)	Scenario	1 × 42 g a.s./ha		1 × 70 g a.s./ha	
		$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)
0	D1 (Ditch)	0.281	-	0.468	-
1		0.230	0.255	0.384	0.425
2		0.149	0.223	0.250	0.373
4		0.045	0.155	0.076	0.258
7		0.017	0.100	0.030	0.167
14		0.038	0.063	0.072	0.108
21		0.037	0.055	0.071	0.096
28		0.030	0.050	0.057	0.088
42		0.018	0.041	0.033	0.074
50		0.013	0.037	0.024	0.066
100		0.002	0.024	0.003	0.042
0	D1 (Stream)	0.219	-	0.366	-
1		0.008	0.024	0.014	0.045
2		0.009	0.024	0.015	0.045
4		0.009	0.024	0.015	0.045
7		0.011	0.023	0.019	0.045
14		0.024	0.022	0.045	0.041
21		0.020	0.018	0.039	0.033
28		<0.001	0.016	<0.001	0.029
42		<0.001	0.013	<0.001	0.024
50		<0.001	0.012	<0.001	0.022
100		<0.001	0.009	<0.001	0.016
0	D3 (Ditch)	0.266	-	0.443	-
1		0.118	0.205	0.197	0.341
2		0.012	0.128	0.021	0.213
4		<0.001	0.065	0.001	0.109
7		<0.001	0.037	<0.001	0.062
14		<0.001	0.019	<0.001	0.031
21		<0.001	0.013	<0.001	0.021
28		<0.001	0.009	<0.001	0.016
42		<0.001	0.006	<0.001	0.010
50		<0.001	0.005	<0.001	0.009
100		<0.001	0.003	<0.001	0.004
0	D4 (Pond)	0.009	-	0.015	-
1		0.009	0.009	0.015	0.015
2		0.009	0.009	0.015	0.015
4		0.009	0.009	0.014	0.015
7		0.008	0.009	0.014	0.015
14		0.007	0.008	0.013	0.014
21		0.007	0.008	0.011	0.013
28		0.006	0.008	0.010	0.013
42		0.005	0.007	0.009	0.012
50		0.005	0.007	0.008	0.011
100		0.002	0.005	0.004	0.008

Table 9.2-22 continued

Time (d)	Scenario	1 × 42 g a.s./ha PEC$_{sw,act}$ (µg/L)	1 × 42 g a.s./ha PEC$_{sw,twa}$ (µg/L)	1 × 70 g a.s./ha PEC$_{sw,act}$ (µg/L)	1 × 70 g a.s./ha PEC$_{sw,twa}$ (µg/L)
0	D4 (Stream)	0.221	-	0.368	-
1		<0.001	0.025	<0.001	0.042
2		<0.001	0.013	<0.001	0.021
4		<0.001	0.006	<0.001	0.010
7		<0.001	0.004	<0.001	0.006
14		<0.001	0.002	<0.001	0.003
21		<0.001	0.001	<0.001	0.002
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
0	D5 (Pond)	0.009	-	0.015	-
1		0.009	0.009	0.015	0.015
2		0.009	0.009	0.015	0.015
4		0.009	0.009	0.014	0.015
7		0.008	0.009	0.014	0.015
14		0.008	0.008	0.013	0.014
21		0.007	0.008	0.012	0.013
28		0.007	0.008	0.011	0.013
42		0.006	0.007	0.009	0.012
50		0.005	0.007	0.008	0.012
100		0.003	0.005	0.005	0.009
0	D5 (Stream)	0.208	-	0.348	-
1		<0.001	0.008	<0.001	0.013
2		<0.001	0.004	<0.001	0.006
4		<0.001	0.002	<0.001	0.003
7		<0.001	0.001	<0.001	0.002
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
0	R4 (Stream)	0.175	-	0.292	-
1		<0.001	0.032	<0.001	0.054
2		<0.001	0.016	<0.001	0.027
4		<0.001	0.008	<0.001	0.014
7		<0.001	0.005	<0.001	0.008
14		<0.001	0.002	<0.001	0.004
21		<0.001	0.002	<0.001	0.003
28		<0.001	0.001	<0.001	0.002
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

Results of Step 4 – propoxycarbazone-sodium

Maximum PEC_{sw} and PEC_{sed}

Maximum PEC_{sw} and PEC_{sed} of propoxycarbazone-sodium at Step 4 level are shown below.

Table 9.2-23 Step 4 - Maximum PEC_{sw} and PEC_{sed} values for propoxycarbazone-sodium after application to winter cereals – 1 x 42 g a.s./ha - drft and runoff mitigation

Scenario	10 m D + R		
	Main entry path	$PEC_{sw, max}$ (µg/L)	$PEC_{sed, max}$ (µg/kg)
D1 (Ditch)	Drift	0.057	0.068
D1 (Stream)	Drift	0.056	0.038
D2 (Ditch)	Drainage	4.288	1.332
D2 (Stream)	Drainage	2.675	0.769
D3 (Ditch)	Drift	0.038	0.006
D4 (Pond)	Drift	0.006	0.007
D4 (Stream)	Drift	0.041	0.001
D5 (Pond)	Drift	0.006	0.007
D5 (Stream)	Drift	0.041	0.001
D6 (Ditch)	Drift	0.047	0.018
R1 (Pond)	Runoff	0.006	0.008
R1 (Stream)	Runoff	0.115	0.014
R3 (Stream)	Runoff	0.327	0.039
R4 (Stream)	Runoff	0.227	0.037

D=Drift mitigation, R= runoff mitigation

Table 9.2-24 Step 4 - Maximum PEC_{sw} and PEC_{sed} values for propoxycarbazone-sodium after application to winter cereals – 1 x 70 g a.s./ha - drift and runoff mitigation

Scenario	5 m D			10 m D + R			20 m D + R		
	Main entry path	$PEC_{sw, max}$ (µg/L)	$PEC_{sed, max}$ (µg/kg)	Main entry path	$PEC_{sw, max}$ (µg/L)	$PEC_{sed, max}$ (µg/kg)	Main entry path	$PEC_{sw, max}$ (µg/L)	$PEC_{sed, max}$ (µg/kg)
D1 (Ditch)	Drift	0.154	0.147	Drift	0.097	0.114	Drainage	0.085	0.110
D1 (Stream)	Drift	0.158	0.064	Drift	0.093	0.064	Drift	0.058	0.064
D2 (Ditch)	Drainage	7.291	2.230	Drainage	7.291	2.224	Drainage	7.291	2.220
D2 (Stream)	Drainage	4.551	1.289	Drainage	4.551	1.283	Drainage	4.551	1.280
D3 (Ditch)	Drift	0.120	0.018	Drift	0.064	0.010	Drift	0.033	0.005
D4 (Pond)	Drift	0.013	0.016	Drift	0.009	0.011	Drift	0.006	0.008
D4 (Stream)	Drift	0.129	0.004	Drift	0.068	0.002	Drift	0.036	0.001
D5 (Pond)	Drift	0.013	0.015	Drift	0.009	0.011	Drift	0.006	0.008
D5 (Stream)	Drift	0.127	0.003	Drift	0.068	0.001	Drift	0.035	0.001
D6 (Ditch)	Drift	0.134	0.033	Drift	0.078	0.029	Drift	0.048	0.029
R1 (Pond)	Runoff	0.018	0.022	Runoff	0.010	0.014	Drift	0.006	0.009
R1 (Stream)	Runoff	0.470	0.056	Runoff	0.193	0.024	Runoff	0.098	0.012
R3 (Stream)	Runoff	1.229	0.141	Runoff	0.543	0.063	Runoff	0.281	0.033
R4 (Stream)	Runoff	0.822	0.130	Runoff	0.374	0.060	Runoff	0.196	0.032

D=Drift mitigation, R= runoff mitigation

Table 9.2-25 Step 4 - Maximum PEC_{sw} and PEC_{sed} values for propoxycarbazone-sodium after application to spring cereals – 1 x 70 g a.s./ha - drift mitigation

Scenario	5 m D		
	Main entry path	$PEC_{sw, max}$ (µg/L)	$PEC_{sed, max}$ (µg/kg)
D1 (Ditch)	Drift	0.144	0.099
D1 (Stream)	Drift	0.143	0.054
D3 (Ditch)	Drift	0.120	0.018
D4 (Pond)	Drift	0.013	0.014
D4 (Stream)	Drift	0.134	0.007
D5 (Pond)	Drift	0.013	0.015
D5 (Stream)	Drift	0.127	0.003
R4 (Stream)	Drift	0.107	0.007

D=Drift mitigation

Table 9.2-26 Step 4 – Actual and time-weighted average PEC_{sw} values for propoxycarbazone-sodium after application to winter cereals – 1 x 70 g a.s./ha - drift and runoff mitigation

Time (d)	Scenario	5 m D		10 m D +R		20 m D + R	
		$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)
0	D1 (Ditch)	0.154	-	0.097	-	0.085	-
1		0.147	0.149	0.093	0.094	0.079	0.082
2		0.143	0.147	0.091	0.093	0.076	0.080
4		0.137	0.143	0.087	0.091	0.073	0.078
7		0.130	0.139	0.082	0.088	0.072	0.076
14		0.061	0.121	0.058	0.080	0.070	0.073
21		0.049	0.099	0.047	0.071	0.042	0.071
28		0.039	0.085	0.037	0.064	0.037	0.063
42		0.023	0.068	0.022	0.053	0.020	0.051
50		0.017	0.061	0.016	0.050	0.030	0.050
100		0.003	0.052	0.003	0.046	0.036	0.043
0	D1 (Stream)	0.158	-	0.093	-	0.058	-
1		0.018	0.054	0.018	0.054	0.018	0.054
2		0.017	0.051	0.017	0.051	0.017	0.051
4		0.007	0.049	0.007	0.049	0.007	0.049
7		<0.001	0.047	<0.001	0.047	<0.001	0.047
14		0.032	0.045	0.032	0.045	0.032	0.045
21		<0.001	0.044	<0.001	0.044	<0.001	0.044
28		<0.001	0.039	<0.001	0.039	<0.001	0.039
42		<0.001	0.030	<0.001	0.030	<0.001	0.030
50		<0.001	0.028	<0.001	0.028	<0.001	0.028
100		<0.001	0.024	<0.001	0.024	<0.001	0.024
0	D2 (Ditch)	7.291	-	7.291	-	7.291	-
1		5.487	4.977	5.487	4.977	5.487	4.977
2		4.456	4.677	4.456	4.677	4.456	4.677
4		2.922	4.113	2.922	4.113	2.922	4.113
7		2.141	3.437	2.141	3.437	2.141	3.437
14		1.679	2.698	1.679	2.698	1.679	2.698
21		2.212	2.447	2.212	2.447	2.212	2.447
28		1.298	2.264	1.298	2.264	1.298	2.264
42		0.698	1.880	0.698	1.880	0.698	1.880
50		0.486	1.692	0.486	1.692	0.486	1.692
100		0.173	1.003	0.173	1.003	0.173	1.003
0	D2 (Stream)	4.551	-	4.551	-	4.551	-
1		3.271	2.806	3.271	2.806	3.271	2.806
2		2.729	2.628	2.729	2.628	2.729	2.628
4		1.625	2.335	1.625	2.335	1.625	2.335
7		1.090	1.923	1.090	1.923	1.090	1.923
14		0.900	1.483	0.900	1.483	0.900	1.483
21		1.364	1.354	1.364	1.354	1.364	1.354
28		0.746	1.270	0.746	1.270	0.746	1.270
42		0.368	1.042	0.368	1.042	0.368	1.042
50		0.273	0.934	0.273	0.934	0.273	0.934
100		0.086	0.559	0.086	0.559	0.086	0.559

Table 9.2-26 continued

Time (d)	Scenario	5 m D		10 m D +R		20 m D + R	
		$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)
0	D3 (Ditch)	0.120	-	0.064	-	0.033	-
1		0.054	0.093	0.029	0.049	0.015	0.026
2		0.006	0.058	0.003	0.031	0.002	0.016
4		<0.001	0.030	<0.001	0.016	<0.001	0.008
7		<0.001	0.017	<0.001	0.009	<0.001	0.005
14		<0.001	0.009	<0.001	0.005	<0.001	0.002
21		<0.001	0.006	<0.001	0.003	<0.001	0.002
28		<0.001	0.004	<0.001	0.002	<0.001	0.001
42		<0.001	0.003	<0.001	0.002	<0.001	0.001
50		<0.001	0.002	<0.001	0.001	<0.001	0.001
100		<0.001	0.001	<0.001	<0.001	<0.001	<0.001
0	D4 (Pond)	0.013	-	0.009	-	0.006	-
1		0.013	0.013	0.009	0.009	0.006	0.006
2		0.013	0.013	0.009	0.009	0.006	0.006
4		0.013	0.013	0.009	0.009	0.006	0.006
7		0.012	0.013	0.009	0.009	0.006	0.006
14		0.011	0.012	0.008	0.009	0.005	0.006
21		0.011	0.012	0.007	0.008	0.005	0.006
28		0.010	0.011	0.007	0.008	0.005	0.005
42		0.008	0.011	0.006	0.008	0.004	0.005
50		0.008	0.010	0.005	0.007	0.004	0.005
100		0.004	0.008	0.003	0.006	0.002	0.004
0	D4 (Stream)	0.129	-	0.068	-	0.036	-
1		<0.001	0.009	<0.001	0.005	<0.001	0.002
2		<0.001	0.004	<0.001	0.002	<0.001	0.001
4		<0.001	0.002	<0.001	0.001	<0.001	0.001
7		<0.001	0.001	<0.001	0.001	<0.001	<0.001
14		<0.001	0.001	<0.001	<0.001	<0.001	<0.001
21		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
42		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
50		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
100		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
0	D5 (Pond)	0.013	-	0.009	-	0.006	-
1		0.013	0.013	0.009	0.009	0.006	0.006
2		0.013	0.013	0.009	0.009	0.006	0.006
4		0.013	0.013	0.009	0.009	0.006	0.006
7		0.012	0.013	0.009	0.009	0.006	0.006
14		0.011	0.012	0.008	0.009	0.005	0.006
21		0.010	0.012	0.007	0.008	0.005	0.006
28		0.009	0.011	0.007	0.008	0.004	0.005
42		0.008	0.010	0.006	0.007	0.004	0.005
50		0.007	0.010	0.005	0.007	0.004	0.005
100		0.004	0.008	0.003	0.006	0.002	0.004

Table 9.2-26 continued

Time (d)	Scenario	5 m D		10 m D +R		20 m D + R	
		$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)
0	D5 (Stream)	0.127	-	0.068	-	0.035	-
1		<0.001	0.005	<0.001	0.003	<0.001	0.001
2		<0.001	0.002	<0.001	0.001	<0.001	0.001
4		<0.001	0.001	<0.001	0.001	<0.001	<0.001
7		<0.001	0.001	<0.001	<0.001	<0.001	<0.001
14		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
21		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
42		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
50		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
100		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
0	D6 (Ditch)	0.134	-	0.078	-	0.048	-
1		0.018	0.063	0.017	0.041	0.016	0.028
2		0.016	0.040	0.016	0.028	0.016	0.022
4		0.017	0.028	0.017	0.022	0.017	0.021
7		0.017	0.023	0.017	0.020	0.017	0.020
14		0.015	0.020	0.015	0.019	0.015	0.019
21		0.014	0.019	0.014	0.019	0.014	0.019
28		0.009	0.017	0.009	0.017	0.009	0.017
42		0.012	0.017	0.012	0.016	0.012	0.016
50		0.002	0.017	0.002	0.016	0.002	0.016
100		<0.001	0.014	<0.001	0.013	<0.001	0.013
0	R1 (Pond)	0.018	-	0.010	-	0.006	-
1		0.018	0.018	0.010	0.010	0.006	0.006
2		0.017	0.018	0.010	0.010	0.006	0.006
4		0.017	0.017	0.010	0.010	0.006	0.006
7		0.016	0.017	0.009	0.010	0.006	0.006
14		0.015	0.016	0.008	0.009	0.005	0.006
21		0.013	0.016	0.007	0.009	0.005	0.006
28		0.012	0.015	0.007	0.009	0.006	0.006
42		0.009	0.014	0.005	0.009	0.005	0.006
50		0.008	0.014	0.005	0.008	0.004	0.005
100		0.003	0.011	0.002	0.007	0.002	0.004
0	R1 (Stream)	0.470	-	0.193	-	0.098	-
1		<0.001	0.194	<0.001	0.079	<0.001	0.040
2		<0.001	0.097	<0.001	0.040	<0.001	0.020
4		<0.001	0.049	<0.001	0.020	<0.001	0.010
7		0.161	0.028	0.068	0.011	0.051	0.006
14		<0.001	0.026	<0.001	0.011	<0.001	0.005
21		<0.001	0.017	<0.001	0.007	<0.001	0.004
28		<0.001	0.014	<0.001	0.006	<0.001	0.003
42		<0.001	0.009	<0.001	0.004	<0.001	0.002
50		<0.001	0.008	<0.001	0.003	<0.001	0.002
100		<0.001	0.004	<0.001	0.002	<0.001	0.001

Table 9.2-26 continued

Time (d)	Scenario	5 m D		10 m D +R		20 m D + R	
		$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)	$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)
0	R3 (Stream)	1.229	-	0.543	-	0.281	-
1		0.003	0.589	0.001	0.257	0.001	0.133
2		<0.001	0.296	<0.001	0.129	<0.001	0.067
4		<0.001	0.148	<0.001	0.065	<0.001	0.033
7		<0.001	0.085	<0.001	0.037	<0.001	0.019
14		<0.001	0.046	<0.001	0.021	<0.001	0.011
21		<0.001	0.031	<0.001	0.014	<0.001	0.007
28		<0.001	0.023	<0.001	0.010	<0.001	0.005
42		<0.001	0.016	<0.001	0.007	<0.001	0.004
50		<0.001	0.013	<0.001	0.006	<0.001	0.003
100		<0.001	0.007	<0.001	0.003	<0.001	0.002
0	R4 (Stream)	0.822	-	0.374	-	0.196	-
1		0.005	0.593	0.002	0.271	0.001	0.142
2		<0.001	0.297	<0.001	0.136	<0.001	0.071
4		<0.001	0.165	<0.001	0.075	<0.001	0.039
7		<0.001	0.094	<0.001	0.043	<0.001	0.023
14		<0.001	0.047	<0.001	0.022	<0.001	0.011
21		<0.001	0.033	<0.001	0.015	<0.001	0.008
28		0.001	0.024	0.001	0.011	<0.001	0.006
42		<0.001	0.016	<0.001	0.007	<0.001	0.004
50		<0.001	0.014	<0.001	0.006	<0.001	0.003
100		<0.001	0.007	<0.001	0.003	<0.001	0.002

D=Drift mitigation, R= runoff mitigation

Table 9.2-27 Step 4 – Actual and time-weighted average PEC_{sw} values for propoxycarbazone-sodium after application to spring cereals – 1 x 70 g a.s./ha – drift mitigation

Time (d)	Scenario	5 m D	
		$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)
0	D1 (Ditch)	0.144	-
1		0.121	0.132
2		0.085	0.118
4		0.038	0.087
7		0.029	0.072
14		0.072	0.070
21		0.070	0.065
28		0.056	0.062
42		0.033	0.056
50		0.024	0.052
100		0.003	0.035
0	D1 (Stream)	0.143	-
1		0.014	0.045
2		0.015	0.045
4		0.015	0.045
7		0.019	0.045
14		0.045	0.041
21		0.039	0.033
28		<0.001	0.029
42		<0.001	0.024
50		<0.001	0.021
100		<0.001	0.016
0	D3 (Ditch)	0.120	-
1		0.053	0.093
2		0.006	0.058
4		<0.001	0.030
7		<0.001	0.017
14		<0.001	0.008
21		<0.001	0.006
28		<0.001	0.004
42		<0.001	0.003
50		<0.001	0.002
100		<0.001	0.001
0	D4 (Pond)	0.013	-
1		0.013	0.013
2		0.013	0.013
4		0.012	0.013
7		0.012	0.013
14		0.011	0.012
21		0.010	0.011
28		0.009	0.011
42		0.007	0.010
50		0.007	0.010
100		0.003	0.007

Table 9.2-27 continued

Time (d)	Scenario	5 m D	
		$PEC_{sw,act}$ (µg/L)	$PEC_{sw,twa}$ (µg/L)
0	D4 (Stream)	0.134	-
1		<0.001	0.015
2		<0.001	0.008
4		<0.001	0.004
7		<0.001	0.002
14		<0.001	0.001
21		<0.001	0.001
28		<0.001	0.001
42		<0.001	<0.001
50		<0.001	<0.001
100		<0.001	<0.001
0	D5 (Pond)	0.013	-
1		0.013	0.013
2		0.013	0.013
4		0.013	0.013
7		0.012	0.013
14		0.011	0.012
21		0.010	0.012
28		0.010	0.011
42		0.008	0.010
50		0.007	0.010
100		0.004	0.008
0	D5 (Stream)	0.127	-
1		<0.001	0.005
2		<0.001	0.002
4		<0.001	0.001
7		<0.001	0.001
14		<0.001	<0.001
21		<0.001	<0.001
28		<0.001	<0.001
42		<0.001	<0.001
50		<0.001	<0.001
100		<0.001	<0.001
0	R4 (Stream)	0.107	-
1		<0.001	0.020
2		<0.001	0.010
4		<0.001	0.005
7		<0.001	0.003
14		<0.001	0.001
21		<0.001	0.001
28		<0.001	0.001
42		<0.001	<0.001
50		<0.001	<0.001
100		<0.001	<0.001

D=Drift mitigation

Results of Steps 1-2 – metabolites of propoxycarbazone-sodium

<u>Surface water</u>

Maximum concentrations of the metabolites of propoxycarbazone-sodium in surface water at Step 1-2 are presented in Table 9.2-28. Only maximum values are reported.

Table 9.2-28 Steps 1-2: Maximum PEC_{sw} values of the metabolites of propoxycarbazone-sodium following application to cereals

FOCUS STEP	PEC_{sw} (µg/L)							
	M04	**M05**	**M06**	**M07**	**M08**	**M09**	**M10**	**M11**
Winter cereals, 1 x 42 g a.s./ha								
Step 1	0.242	1.437	0.036	1.651	0.443	0.700	2.800	1.865
Step 2 (N-EU, Oct–Feb)	0.242	0.298	0.036	0.514	0.161	0.256	1.045	0.516
Step 2 (N-EU, Mar–May)	0.242	0.131	0.036	0.228	0.064	0.102	0.447	0.206
Step 2 (S-EU, Oct–Feb)	0.242	0.243	0.036	0.418	0.129	0.205	0.845	0.413
Step 2 (S-EU, Mar–May)	0.242	0.243	0.036	0.418	0.129	0.205	0.845	0.413
Winter cereals, 1 x 70 g a.s./ha								
Step 1	0.403	2.395	0.060	2.751	0.738	1.166	4.667	3.109
Step 2 (N-EU, Oct–Feb)	0.403	0.497	0.060	0.856	0.268	0.426	1.741	0.860
Step 2 (N-EU, Mar–May)	0.403	0.219	0.060	0.380	0.107	0.171	0.745	0.344
Step 2 (S-EU, Oct–Feb)	0.403	0.404	0.060	0.697	0.214	0.341	1.409	0.688
Step 2 (S-EU, Mar–May)	0.403	0.404	0.060	0.697	0.214	0.341	1.409	0.688
Spring cereals, 1 x 42 g a.s./ha								
Step 1	0.242	1.437	0.036	1.651	0.443	0.700	2.800	1.865
Step 2 (N-EU, Mar–May)	0.242	0.131	0.036	0.228	0.064	0.102	0.447	0.206
Step 2 (S-EU, Mar–May)	0.242	0.243	0.036	0.418	0.129	0.205	0.845	0.413
Spring cereals, 1 x 70 g a.s./ha								
Step 1	0.403	2.395	0.060	2.751	0.738	1.166	4.667	3.109
Step 2 (N-EU, Mar–May)	0.403	0.219	0.060	0.380	0.107	0.171	0.745	0.344
Step 2 (S-EU, Mar–May)	0.403	0.404	0.060	0.697	0.214	0.341	1.409	0.688

Sediment

Maximum concentrations of the metabolites of propoxycarbazone-sodium in sediment at Step 1-2 are presented in Table 9.2-29. Only maximum values are reported.

Table 9.2-29 Steps 1-2: Maximum PEC_{sed} values of the metabolites of propoxycarbazone-sodium following application to cereals

FOCUS STEP	PEC_{sed} (µg/kg)							
	M04	M05	M06	M07	M08	M09	M10	M11
Winter cereals, 1 x 42 g a.s. /ha								
Step 1	0.044	0.623	0.002	0.122	7.575	1.353	1.060	0.229
Step 2 (N-EU, Oct–Feb)	0.030	0.128	0.002	0.038	2.749	0.495	0.395	0.063
Step 2 (N-EU, Mar–May)	0.030	0.056	0.002	0.017	1.100	0.198	0.169	0.025
Step 2 (S-EU, Oct–Feb)	0.030	0.104	0.002	0.031	2.199	0.396	0.320	0.051
Step 2 (S-EU, Mar–May)	0.030	0.104	0.002	0.031	2.199	0.396	0.320	0.051
Winter cereals, 1 x 70 g a.s. /ha								
Step 1	0.074	1.038	0.004	0.203	12.626	2.255	1.766	0.382
Step 2 (N-EU, Oct–Feb)	0.050	0.214	0.003	0.063	4.581	0.824	0.659	0.106
Step 2 (N-EU, Mar–May)	0.050	0.094	0.003	0.028	1.833	0.330	0.282	0.042
Step 2 (S-EU, Oct–Feb)	0.050	0.174	0.003	0.052	3.665	0.659	0.533	0.085
Step 2 (S-EU, Mar–May)	0.050	0.174	0.003	0.052	3.665	0.659	0.533	0.085
Spring cereals, 1 x 42 g a.s. /ha								
Step 1	0.044	0.623	0.002	0.122	7.575	1.353	1.060	0.229
Step 2 (N-EU, Mar–May)	0.030	0.056	0.002	0.017	1.100	0.198	0.169	0.025
Step 2 (S-EU, Mar–May)	0.030	0.104	0.002	0.031	2.199	0.396	0.320	0.051
Spring cereals, 1 x 70 g a.s. /ha								
Step 1	0.074	1.038	0.004	0.203	12.626	2.255	1.766	0.382
Step 2 (N-EU, Mar–May)	0.050	0.094	0.003	0.028	1.833	0.330	0.282	0.042
Step 2 (S-EU, Mar–May)	0.050	0.174	0.003	0.052	3.665	0.659	0.533	0.085

III. CONCLUSIONS

Predicted environmental concentrations in surface water and sediment were calculated for propoxycarbazone-sodium using the simulation models FOCUS STEPS 1-2 (version 2.1), FOCUS SWASH (version 3.1 using MACRO 4.4.2, PRZM 3.1.1 and TOXSWA 3.3.1) and SWAN (version 3.0.0). Calculations for the metabolites were conducted at Steps 1-2.

The results of the PEC calculations in surface water and sediment were used for the eco-toxicological risk assessment.

For details, please refer to the corresponding PEC reports (point M-CP 9.2.5/02 of this document) submitted within this dossier.

CP 9.3 Fate and behaviour in air

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

The active substance, propoxycarbazone-sodium, has a very low vapour pressure of < 1 x 10^{-08} Pa at 20°C. Thus, taking into account the low volatilisation of propoxycarbazone-sodium from soil and plant surfaces as well as the estimated half-life of 4.5 hours (calculations according to Atkinson (AOPWin 1.75)) for the photochemical oxidative degradation of gaseous propoxycarbazone-sodium, the calculation of predicted environmental concentrations in air are deemed to be not necessary (refer to Document M-CA, Section 7.3).

Thus, an accumulation in air can be excluded. Also no short or long range transport is expected.

CP 9.4 Estimation of concentrations for other routes of exposure

None of the following routes are relevant for the application of the ATTRIBUT SG70 following the GAP-table:

- deposition of dust containing plant protection products by drift during sowing,
- indirect exposure of surface water via a sewage treatment plant (STP) after application of the formulated product ATTRIBUT SG70 in storage rooms, and
- amenity use.

Therefore, no further information is here presented.

No other routes of exposure are expected after application of ATTRIBUT SG70, and thus no additional estimations of concentrations are required.