European Commission

Combined Draft Renewal Assessment Report prepared according to

Regulation (EC) N° 1107/2009

and

Proposal for Harmonised Classification and Labelling (CLH Report) according to Regulation (EC) N° 1272/2008

Glyphosate

Volume 3 – B.8 (PPP) – MON 52276

Rapporteur Member State: Assessment Group on Glyphosate (AGG) consisting of FR, HU, NL and SE

Version History

When	What
2021/06	Initial RAR

The RMS is the author of the Assessment Report. The Assessment Report is based on the validation by the RMS, and the verification during the EFSA peer-review process, of the information submitted by the Applicant in the dossier, including the Applicant's assessments provided in the summary dossier. As a consequence, data and information including assessments and conclusions, validated and verified by the RMS experts, may be taken from the applicant's (summary) dossier and included as such or adapted/modified by the RMS in the Assessment Report. For reasons of efficiency, the Assessment Report should include the information validated/verified by the RMS, without detailing which elements have been taken or modified from the Applicant's assessment. As the Applicant's summary dossier is published, the experts, interested parties, and the public may compare both documents for getting details on which elements of the Applicant's dossier have been validated/verified and which ones have been modified by the RMS. Nevertheless, the views and conclusions of the RMS should always be clearly and transparently reported; the conclusions from the applicant should be included as an Applicant's statement for every single study reported at study level; and the RMS should justify the final assessment for each endpoint in all cases, indicating in a clear way the Applicant's assessment and the RMS reasons for supporting or not the view of the Applicant.

Table of contents

B.8. ENVIRONMENTAL FATE AND BEHAVIOUR

The representative uses are provided in Volume 1 and in the LoEP. The maximum application rates are 2160 g a.s./ha on field crops, 2880 g a.s./ha on perennial crops and 3600 g a.s./ha on railways.

B.8.1. FATE AND BEHAVIOUR IN SOIL

B.8.1.1. Route and rate of degradation in soil

Studies on the degradation in soil with the formulation were not performed, since it is possible to extrapolate from data obtained with the active substance. Please refer to Volume 3CA – B8 for studies with active substance.

Degradation rates for glyphosate and AMPA were determined according to FOCUS Kinetic guidance and EFSA DegT50 guidance. A summary of reliable degradation rates is presented in Vol. 3 CA B8.1.1.4.

For glyphosate, reliable trigger endpoints were obtained from 10 soils in laboratory and 6 sites in field. Reliable modelling endpoints were obtained for 10 soils in laboratory and for 2 sites in field. In most cases, degradation was described by biphasic kinetics. In laboratory, two sets of modelling endpoints were derived: the 1st one based on parent-only fits, and the 2nd one based on pathway fits (for glyphosate modelling with AMPA). A pH dependence was identified in both cases (endpoints derived from parent only fits and pathway fits), with higher persistence in soils with lower pH. It was also shown that laboratory and field data should be pooled to determine the suitable modelling endpoint for GW and SW exposure calculations.

For AMPA, reliable trigger and modelling endpoints were obtained from 10 soils in laboratory. Degradation follows first-order kinetics. A pH dependence was also identified, with higher persistence in soils with lower pH. Reliable trigger and modelling field DT_{50} could not be derived.

Selection of endpoint for soil exposure calculations (trigger)

According to FOCUS guidance, the trigger endpoints resulting in the worst-case PECsoil values should be selected.

For glyphosate, according to standard practice, the endpoint was selected from field trigger values. Due to biphasic degradation of glyphosate, different endpoints were tested and the ones resulting in the worst-case PECsoil values for glyphosate were selected (see RMS commenting box in Vol. 3 CP B.8.2.1).

For AMPA, the longest laboratory SFO DT_{50} (1040 days) was used.

Selection of endpoints for groundwater exposure calculations (modelling)

- FOCUS calculations

Considering the datasets, simulations could be performed for parent alone (based on DT_{50} from parent-only fits), and then for parent and metabolite (based on DT_{50} from pathway fits).

Approach 1: Modelling of glyphosate alone

Due to pH-dependence, the worst-case modelling DT_{50} could be used in modelling at Tier 1. Based on laboratory endpoints derived from parent-only fits and on field modelling endpoints, this would result in the use of a DT_{50} of 161.1 days.

Approach 2: Modelling of glyphosate and AMPA (pathway fit)

In case of pH-dependence, and when a metabolite is included in the degradation pathway, the shortest and longest endpoints for parent are usually tested for modelling in order to ensure that calculations provided are conservative for both parent and metabolite. Therefore, usually 2 different simulations are performed, and risk assessment is based on worst-case results among the 2 simulations.

For glyphosate, laboratory modelling endpoints derived from pathway fits are mostly biphasic (DFOP), which makes the approach more complex. It is acknowledged that FOCUS guidance provides recommendations for implementing DFOP for parent in FOCUS GW models, that can be applied also when a metabolite is included in the pathway. In absence of pH-dependence, this approach could have been easily followed, by including 2 compartments for glyphosate: fast degrading compartment (using geomean of fast DFOP DT_{50}) and slow degrading compartment (using geomean of slow DFOP DT_{50}), each one forming AMPA.

In case of both pH-dependence and biphasic degradation, it is not straightforward to select the soil for the parent that would result in the highest PECgw values for the metabolite. Hence, probably DFOP parameters from all soils would need to be tested in order to determine which soil (and corresponding DFOP parameters) for the parent would result in the highest PECgw values for AMPA. Therefore, a more pragmatic approach was followed in this case.

The FOCUS Kinetics guidance offers the following possibility in step 6 of the stepwise approach[1]: "Another pragmatic approach may be to model the parent with HS or DFOP (whichever provides the best fit) and the metabolites all with SFO kinetics to derive the endpoints for modelling (the bi-phasic formation of the first metabolite(s) needs to be accounted so as to adequately determine the formation fractions and degradation rates). The modelling can then be performed using two sets of all SFO endpoints: 1/ first-order degradation rate of parent in the first phase of HS or fast compartment of DFOP, formation fraction and SFO degradation rate of metabolites, and 2/ first-order degradation rate of parent in the second phase of HS or slow compartment of DFOP, formation fraction and SFO degradation rate of metabolites. The highest concentrations of the two sets may then be used in the risk assessment. "

This approach was selected as a pragmatic and conservative way forward. Therefore, in this specific case, in order to take into account both biphasic degradation and pH dependency of parent, the following is proposed: perform 2 different simulations, the first one using the minimum fast phase DT_{50} (normalized) of 0.1 days and the 2[nd] one using the maximum slow phase DT_{50} (normalized) of 161.1 days for glyphosate, derived from laboratory pathway fits (the 2 field modelling DT_{50} were considered but has no impact on this selection). AMPA should be included in both simulations, mean ffm will be used. The degradation of AMPA being also pH dependent but without any following metabolites formed, the maximum laboratory normalized DT_{50} of 1040 days is recommended for this compound.

RMS is aware that this proposition may not result in realistic calculations. In addition, using the longest DT_{50} value for AMPA for both simulations introduces even more conservativeness. However in absence of guidelines on how to handle pH dependency on biphasic compounds that have a metabolite, this was considered as the most pragmatic first step. This approach seems appropriate at least to provide a conservative Tier 1 which could cover all possible situations. It must also be taken into account that glyphosate being a wide range herbicide, GAPs usually include a lot of different intended uses. Providing a first step with less complexity was considered as most efficient for future zonal/national assessments. Of course, additional steps might then be performed if there is a need for refining the results, for example including the biphasic behaviour of glyphosate.

<u>Conclusion</u>

Considering the datasets, the selection of endpoints is discussed above for 2 approaches: modelling of parent only and modelling of parent + metabolite.

RMS highlights that in this case, the maximum slow phase DT_{50} of 161.1 days (derived from the pathway fits) for glyphosate is the same as the maximum modelling DT_{50} value derived from the parent-only fits.

[1] FOCUS (2014) - Generic Guidance for Estimating Persistence and Degradation Kinetics from Environmental Fate Studies on Pesticides in EU Registration, version 1.1. Section 8.4.2.1, page 158, note 6 of the stepwise approach

Therefore, the proposed approach for modelling of glyphosate+AMPA covers all cases and there is no need to perform PECgw calculations for parent only with a different DT_{50} value.

Therefore, only approach 2 is finally selected.

Overall, RMS is aware that the endpoints chose for modelling are conservative for both parent and metabolite and that the biphasic behaviour of glyphosate added to the pH dependency of degradation rates of both glyphosate and AMPA leads to a specific situation in terms of choice of endpoints for modelling. The suggested approaches are, in RMS opinion, pragmatic approaches in this case and may be sufficient considering the low mobility of both compounds.

- HardSPEC calculations

In HardSPEC, calculations are performed separately for parent and metabolite. The selection of endpoints is therefore less complex.

Due to pH dependency, the maximum modelling DT_{50} of 161.1 days for glyphosate (from parent-only fits) and of 1040 days for AMPA should be used at first tier.

Selection of endpoints for surface water and sediment exposure calculations (modelling)

- FOCUS calculations

Based on the current available data, FOCUS Step 1-2 calculations are performed for glyphosate, AMPA and HMPA. FOCUS Step 3 calculations may be needed for glyphosate only.

Biphasic kinetics cannot be easily implemented in the current SW models. RMS proposes the following approach:

- Step 1-3 for glyphosate: due to pH dependency of the degradation rates for glyphosate, use the maximum modelling DT_{50} (161.1 days) from endpoints derived from parent-only fits;
- Step 1-2 for AMPA and HMPA: use the minimum slow phase DT_{50} for glyphosate (0.1 days) from endpoints derived from pathway fits in order to maximise the formation of metabolites. use the maximum modelling DT_{50} of 1040 days for AMPA to take into account pH dependence. For HMPA, a default value of 1000 days is used in absence of data.

This approach seems appropriate at least to provide a conservative assessment, which could cover all possible situations. Further discussions may be needed if the risk assessment cannot be finalised based on Tier 1 endpoints.

- HardSPEC calculations

In HardSPEC, calculations are performed separately for parent and metabolite. The selection of endpoints is therefore less complex.

Due to pH dependency, the maximum modelling DT_{50} of 161.1 days for glyphosate (from parent-only fits) and of 1040 days for AMPA should be used.

B.8.1.2. Mobility in soil

Studies on mobility in soil with the formulation were not performed, since it is possible to extrapolate from data obtained with the active substance. Please refer to Volume 3CA – B8 for studies with active substance.

Kfoc and 1/n values are available for glyphosate from 10 soils and for AMPA from 8 soils. No pH dependency has been determined from these adsorption values. A summary of reliable endpoints is presented in Volume 3 CA B8.1.2.3.

For glyphosate, the recommended Kfoc for modelling is 4348 mL/g_{oc} (geomean, n=10) with 1/n of 0.682 (mean value, n=10).

For AMPA, the recommended Kfoc for modelling is 2541 mL/g_{oc} (geomean, n=8) with 1/n of 0.767 (mean value, n=8).

B.8.2. PREDICTED ENVIRONMENTAL CONCENTRATIONS IN SOIL (PEC_S)

B.8.2.1. PECsoil for active substance and metabolite

Data point	CP 9.1.3/001
Report author	[redacted]
Report year	2020
Report title	Predicted environmental concentrations of glyphosate and its metabolite AMPA in soil following application to various crops – a modelling assessment for Europe using ESCAPE
Report No	110054-012
Guidelines followed in study	EU Commission (2000): Guidance document on persistence in soil, EU Commission Document SANCO 9188/VI/97 rev. 8, 12. July 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.
Deviations from current test guideline	None
Previous evaluation	No, not previously submitted
GLP/Officially recognised testing facilities	No, not applicable for this study type
Acceptability/Reliability	No

I. MATERIALS AND METHODS

The purpose of this modelling assessment was to obtain predicted environmental concentrations in soil of the active substance glyphosate and its metabolite aminomethylphosphonic acid (AMPA) following application on various crops in Europe.

Single applications at rates of 540 to 3600 g a.s./ha were considered, with frequency of application being either annually or every third year.

Calculations were carried out according to recommendations of FOCUS (1997) and the EU Commission (2000) using the model ESCAPE 2.0.

1. Model input data

Degradation in soil

Under aerobic conditions, glyphosate is degraded in soil to the major metabolite AMPA, and subsequently to carbon dioxide and non-extractable residues. The maximum occurrence of AMPA of 63 % was found in a field study conducted in the US (Minnesota; [redacted] 1993. KCA 7.1.2.2.1/006) and was used to calculate the 'effective' application rate of AMPA in the ESCAPE calculations.

The aerobic degradation of glyphosate and AMPA in soil was studied in laboratory and field studies. Kinetic evaluations according to FOCUS kinetics guidance (2006, 2014) were performed by [redacted] (2020, KCA 7.1.2.1.1/001, KCA 7.1.2.2.1/003) and [redacted] (2020, KCA 7.1.2.2.1/001). An evaluation based on the "EFSA DegT50 Endpoint Selector" suggested that the normalised DT_{50} values from laboratory and field studies are not significantly different (see M-CA 7.1.2). Therefore all laboratory and field DT_{50} values were considered together as one dataset, respectively for glyphosate and AMPA.

<u>Glyphosate</u>

The maximum non-normalised DT_{50} of all laboratory and field studies of 147 days (Iowa (USA); [redacted] 1993, KCA 7.1.2.2.1/006) was considered for the PECsoil calculations. This value was evaluated using the FOMC kinetic model. Hence, the PECsoil calculations were performed using the FOMC parameters: α = 0.6571 and β = 78.33.

<u>AMPA</u>

The maximum non-normalised SFO DT_{50} of all laboratory and field studies of 634 days ([redacted] (Germany); [redacted] 1992, KCA 7.1.2.2.1/013) was used in the PECsoil calculations.

A summary of the relevant substance-related model input data is given in the table below.

Table 8.2.1-1: Parameters of glyphosate and AMPA used for modelling

Compound	Molar mass (g/mol)	Max. occurrence (%)	DT_{50} (d)
Glyphosate	169.10	-	147 (FOMC (α = 0.6571, β = 78.33), maximum non-normalised value from lab and field studies)
AMPA	111.04	63.0 (maximum value from lab and field studies)[1]	634 (SFO, maximum non-normalised value from lab and field studies)

[1] Maximum from field study: Minnesota (USA), [redacted] (1993, KCA 7.1.2.2.1/006)

2. Use patterns

In the EU glyphosate is intended to be used as a herbicide on various crops. A single application at different rates and application frequencies (every year or every third year) was considered. Detailed information on the simulated use patterns of glyphosate is presented in the table below.

Table 8.2.1-2: Use patterns considered in the simulations

Application rate (g a.s./ha)	No. of appl. (-)	Frequency	Interception (%)	Soil load (g a.s./ha)	Soil depth for $PEC_{soil,plateau}$ (cm)
720	1	Every year Every 3rd year	0	720	5/ 20
1440	1	Every year	0	1440	5/ 20
540	1	Every year Every 3rd year	0	540	5/ 20
2160	1	Every year	0	2160	5/ 20
2880	1	Every year	0	2880	5
3600	1	Every year	0	3600	5
1800	1	Every year	0	1800	5/ 20

3. Simulation tools and modelling strategy

The fate and exposure model ESCAPE 2.0 was used to calculate concentrations in soil for glyphosate and its major soil metabolite AMPA.

The ESCAPE standard scenario with Borstel soil and constant climate conditions at 20 °C was selected. A soil bulk density of 1.5 g/cm3 and a soil layer depth of 5 cm were selected for the calculations of initial, actual and time-weighted average PECsoil.

Initial concentrations in soil were calculated for a single-year application scenario with one application. In order to account for possible accumulation of glyphosate and AMPA, background (plateau) and accumulation concentrations were calculated in addition, assuming long-term application of glyphosate.

For all but uses on railroad tracks and in perennial crops, PECsoil,plateau was calculated assuming a tillage depth of 20 cm, as well as with a standard 5 cm soil mixing depth (worst case: no tillage).

The metabolite AMPA was simulated as pseudo-parent, *i.e.* an 'effective' application rate was calculated considering a molecular mass correction and the maximum occurrence of the metabolite in soil.

The calculation mode was set to "Residues from different applications are considered separately over one year".

II. RESULTS AND DISCUSSION

Initial, actual and time-weighted average PEC_{soil} of glyphosate and AMPA, along with background and accumulated concentrations, are provided in the tables below.

PEC_{soil} for glyphosate

Table 8.2.1-3: PEC_{soil} for glyphosate, 1 × 720 g a.s./ha

PEC_{soil} (mg/kg)		**1 × 720 g a.s./ha**	
		Actual	**TWA**
Initial (5 cm)		0.960	-
Short term	24 h	0.952	0.956
	2 d	0.944	0.952
	4 d	0.929	0.944
Long term	7 d	0.908	0.933
	14 d	0.862	0.909
	21 d	0.821	0.886
	28 d	0.785	0.865
	42 d	0.724	0.828
	50 d	0.694	0.809
	100 d	0.559	0.715
$PEC_{soil,plateau}$ (5 cm)		0.452	-
$PEC_{soil,accu}$ (5 cm)		1.412	-
$PEC_{soil,plateau}$ (20 cm)		0.113	-
$PEC_{soil,accu}$ (20 cm)		1.073	-
$PEC_{soil,plateau}$ (5 cm) (every 3rd year)		0.151	-
$PEC_{soil,accu}$ (5 cm) (every 3rd year)		1.111	-
$PEC_{soil,plateau}$ (20 cm) (every 3rd year)		0.038	-
$PEC_{soil,accu}$ (20 cm) (every 3rd year)		0.998	-

Table 8.2.1-4: PEC_{soil} for glyphosate, 1 × 1440 g a.s./ha

PEC_{soil} (mg/kg)	**1 × 1440 g a.s./ha**	
	Actual	**TWA**
Initial (5 cm)	1.920	-

Table 8.2.1-4: PEC_{soil} for glyphosate, 1 × 1440 g a.s./ha

PEC_{soil} (mg/kg)		1 × 1440 g a.s./ha	
		Actual	TWA
Short term	24 h	1.904	1.912
	2 d	1.889	1.904
	4 d	1.858	1.889
Long term	7 d	1.815	1.866
	14 d	1.723	1.817
	21 d	1.643	1.772
	28 d	1.571	1.731
	42 d	1.448	1.656
	50 d	1.388	1.618
	100 d	1.118	1.430
$PEC_{soil,plateau}$ (5 cm)		0.904	-
$PEC_{soil,accu}$ (5 cm)		2.824	-
$PEC_{soil,plateau}$ (20 cm)		0.226	-
$PEC_{soil,accu}$ (20 cm)		2.146	-

Table 8.2.1-5: PEC_{soil} for glyphosate, 1 × 540 g a.s./ha

PEC_{soil} (mg/kg)		1 × 540 g a.s./ha	
		Actual	TWA
Initial (5 cm)		0.720	-
Short term	24 h	0.714	0.717
	2 d	0.708	0.714
	4 d	0.697	0.708
Long term	7 d	0.681	0.700
	14 d	0.646	0.682
	21 d	0.616	0.665
	28 d	0.589	0.649
	42 d	0.543	0.621
	50 d	0.521	0.607
	100 d	0.419	0.536
$PEC_{soil,plateau}$ (5 cm)		0.339	-
$PEC_{soil,accu}$ (5 cm)		1.059	-
$PEC_{soil,plateau}$ (20 cm)		0.085	-
$PEC_{soil,accu}$ (20 cm)		0.805	-
$PEC_{soil,plateau}$ (5 cm) (every 3rd year)		0.113	-
$PEC_{soil,accu}$ (5 cm) (every 3rd year)		0.833	-
$PEC_{soil,plateau}$ (20 cm) (every 3rd year)		0.028	-
$PEC_{soil,accu}$ (20 cm) (every 3rd year)		0.748	-

Table 8.2.1-6: PEC_{soil} for glyphosate, 1 × 2160 g a.s./ha

PEC_{soil} (mg/kg)		1 × 2160 g a.s./ha	
		Actual	TWA
Initial (5 cm)		2.880	-
Short term	24 h	2.856	2.868
	2 d	2.833	2.856
	4 d	2.787	2.833
Long term	7 d	2.723	2.799
	14 d	2.585	2.726
	21 d	2.464	2.658
	28 d	2.356	2.596
	42 d	2.172	2.484
	50 d	2.082	2.427

Table 8.2.1-6: PEC$_{soil}$ for glyphosate, 1 × 2160 g a.s./ha

PEC$_{soil}$ (mg/kg)		**1 × 2160 g a.s./ha**	
		Actual	**TWA**
	100 d	1.677	2.144
PEC$_{soil,plateau}$ (5 cm)		1.356	-
PEC$_{soil,accu}$ (5 cm)		4.236	-
PEC$_{soil,plateau}$ (20 cm)		0.339	-
PEC$_{soil,accu}$ (20 cm)		3.219	-

Table 8.2.1-7: PEC$_{soil}$ for glyphosate, 1 × 2880 g a.s./ha

PEC$_{soil}$ (mg/kg)		**1 × 2880 g a.s./ha**	
		Actual	**TWA**
Initial (5 cm)		3.840	-
Short term	24 h	3.808	3.824
	2 d	3.777	3.808
	4 d	3.716	3.777
Long term	7 d	3.630	3.733
	14 d	3.447	3.635
	21 d	3.285	3.544
	28 d	3.141	3.461
	42 d	2.896	3.312
	50 d	2.776	3.236
	100 d	2.236	2.859
PEC$_{soil,plateau}$ (5 cm)		1.808	-
PEC$_{soil,accu}$ (5 cm)		5.648	-

Table 8.2.1-8: PEC$_{soil}$ for glyphosate, 1 × 3600 g a.s./ha

PEC$_{soil}$ (mg/kg)		**1 × 3600 g a.s./ha**	
		Actual	**TWA**
Initial (5 cm)		4.800	-
Short term	24 h	4.760	4.780
	2 d	4.721	4.760
	4 d	4.646	4.722
Long term	7 d	4.538	4.666
	14 d	4.308	4.543
	21 d	4.106	4.431
	28 d	3.927	4.327
	42 d	3.620	4.141
	50 d	3.470	4.045
	100 d	2.796	3.574
PEC$_{soil,plateau}$ (5 cm)		2.260	-
PEC$_{soil,accu}$ (5 cm)		7.060	-

Table 8.2.1-9: PEC$_{soil}$ for glyphosate, 1 × 1800 g a.s./ha

PEC$_{soil}$ (mg/kg)		**1 × 1800 g a.s./ha**	
		Actual	**TWA**
Initial (5 cm)		2.400	-
Short term	24 h	2.380	2.390
	2 d	2.361	2.380
	4 d	2.323	2.361
Long term	7 d	2.269	2.333
	14 d	2.154	2.272
	21 d	2.053	2.215
	28 d	1.963	2.163

Table 8.2.1-9: PEC_{soil} for glyphosate, 1 × 1800 g a.s./ha

PEC_{soil} (mg/kg)		**1 × 1800 g a.s./ha**	
		Actual	**TWA**
	42 d	1.810	2.070
	50 d	1.735	2.023
	100 d	1.398	1.787
$PEC_{soil,plateau}$ (5 cm)		1.130	-
$PEC_{soil,accu}$ (5 cm)		3.530	-
$PEC_{soil,plateau}$ (20 cm)		0.283	-
$PEC_{soil,accu}$ (20 cm)		2.683	-

PEC_{soil} for AMPA

Table 8.2.1-10: PEC_{soil} for AMPA, 1 × 720 g a.s./ha

PEC_{soil} (mg/kg)		**1 × 720 g a.s./ha**	
		Actual	**TWA**
Initial (5 cm)		0.397	-
Short term	24 h	0.397	0.397
	2 d	0.396	0.397
	4 d	0.395	0.396
Long term	7 d	0.394	0.396
	14 d	0.391	0.394
	21 d	0.388	0.393
	28 d	0.385	0.391
	42 d	0.379	0.388
	50 d	0.376	0.387
	100 d	0.356	0.376
$PEC_{soil,plateau}$ (5 cm)		0.810	-
$PEC_{soil,accu}$ (5 cm)		1.207	-
$PEC_{soil,plateau}$ (20 cm)		0.203	-
$PEC_{soil,accu}$ (20 cm)		0.600	-
$PEC_{soil,plateau}$ (5 cm) (every 3^{rd} year)		0.270	-
$PEC_{soil,accu}$ (5 cm) (every 3^{rd} year)		0.667	-
$PEC_{soil,plateau}$ (20 cm) (every 3^{rd} year)		0.068	-
$PEC_{soil,accu}$ (20 cm) (every 3^{rd} year)		0.465	-

Table 8.2.1-11: PEC_{soil} for AMPA, 1 × 1440 g a.s./ha

PEC_{soil} (mg/kg)		**1 × 1440 g a.s./ha**	
		Actual	**TWA**
Initial (5 cm)		0.794	-
Short term	24 h	0.793	0.794
	2 d	0.793	0.793
	4 d	0.791	0.793
Long term	7 d	0.788	0.791
	14 d	0.782	0.788
	21 d	0.776	0.785
	28 d	0.770	0.782
	42 d	0.759	0.776
	50 d	0.752	0.773
	100 d	0.712	0.752
$PEC_{soil,plateau}$ (5 cm)		1.620	-
$PEC_{soil,accu}$ (5 cm)		2.414	-
$PEC_{soil,plateau}$ (20 cm)		0.405	-
$PEC_{soil,accu}$ (20 cm)		1.199	-

Table 8.2.1-12: PEC_{soil} for AMPA, 1 × 540 g a.s./ha

PEC_{soil} (mg/kg)		**1 × 540 g a.s./ha**	
		Actual	**TWA**
Initial (5 cm)		0.298	-
Short term	24 h	0.298	0.298
	2 d	0.297	0.298
	4 d	0.297	0.297
Long term	7 d	0.296	0.297
	14 d	0.293	0.296
	21 d	0.291	0.295
	28 d	0.289	0.293
	42 d	0.285	0.291
	50 d	0.282	0.290
	100 d	0.267	0.282
$PEC_{soil,plateau}$ (5 cm)		0.607	-
$PEC_{soil,accu}$ (5 cm)		0.905	-
$PEC_{soil,plateau}$ (20 cm)		0.152	-
$PEC_{soil,accu}$ (20 cm)		0.450	-
$PEC_{soil,plateau}$ (5 cm) (every 3rd year)		0.203	-
$PEC_{soil,accu}$ (5 cm) (every 3rd year)		0.500	-
$PEC_{soil,plateau}$ (20 cm) (every 3rd year)		0.051	-
$PEC_{soil,accu}$ (20 cm) (every 3rd year)		0.349	-

Table 8.2.1-13: PEC_{soil} for AMPA, 1 × 2160 g a.s./ha

PEC_{soil} (mg/kg)		**1 × 2160 g a.s./ha**	
		Actual	**TWA**
Initial (5 cm)		1.191	-
Short term	24 h	1.190	1.191
	2 d	1.189	1.190
	4 d	1.186	1.189
Long term	7 d	1.182	1.187
	14 d	1.173	1.182
	21 d	1.164	1.178
	28 d	1.156	1.173
	42 d	1.138	1.165
	50 d	1.128	1.159
	100 d	1.068	1.129
$PEC_{soil,plateau}$ (5 cm)		2.429	-
$PEC_{soil,accu}$ (5 cm)		3.621	-
$PEC_{soil,plateau}$ (20 cm)		0.607	-
$PEC_{soil,accu}$ (20 cm)		1.799	-

Table 8.2.1-14: PEC_{soil} for AMPA, 1 × 2880 g a.s./ha

PEC_{soil} (mg/kg)		**1 × 2880 g a.s./ha**	
		Actual	**TWA**
Initial (5 cm)		1.589	-
Short term	24 h	1.587	1.588
	2 d	1.585	1.587
	4 d	1.582	1.585
Long term	7 d	1.577	1.583
	14 d	1.564	1.577
	21 d	1.553	1.571
	28 d	1.541	1.565
	42 d	1.517	1.553

Table 8.2.1-14: PEC$_{soil}$ for AMPA, 1 × 2880 g a.s./ha

PEC$_{soil}$ (mg/kg)		1 × 2880 g a.s./ha	
		Actual	TWA
	50 d	1.504	1.546
	100 d	1.424	1.505
PEC$_{soil,plateau}$ (5 cm)		3.239	-
PEC$_{soil,accu}$ (5 cm)		4.828	-

Table 8.2.1-15: PEC$_{soil}$ for AMPA, 1 × 3600 g a.s./ha

PEC$_{soil}$ (mg/kg)		1 × 3600 g a.s./ha	
		Actual	TWA
Initial (5 cm)		1.986	-
Short term	24 h	1.984	1.985
	2 d	1.981	1.984
	4 d	1.977	1.981
Long term	7 d	1.971	1.978
	14 d	1.956	1.971
	21 d	1.941	1.963
	28 d	1.926	1.956
	42 d	1.897	1.941
	50 d	1.880	1.932
	100 d	1.780	1.881
PEC$_{soil,plateau}$ (5 cm)		4.049	-
PEC$_{soil,accu}$ (5 cm)		6.035	-

Table 8.2.1-16: PECsoil for AMPA, 1 × 1800 g a.s./ha

PECsoil (mg/kg)		1 × 1800 g a.s./ha	
		Actual	TWA
Initial (5 cm)		0.993	-
Short term	24 h	0.992	0.992
	2 d	0.991	0.992
	4 d	0.989	0.991
Long term	7 d	0.985	0.989
	14 d	0.978	0.985
	21 d	0.970	0.982
	28 d	0.963	0.978
	42 d	0.948	0.970
	50 d	0.940	0.966
	100 d	0.890	0.941
PECsoil,plateau (5 cm)		2.025	-
PECsoil,accu (5 cm)		3.017	-
PECsoil,plateau (20 cm)		0.506	-
PECsoil,accu (20 cm)		1.499	-

Assessment and conclusion by applicant:

The modelling study was conducted according to current guidance and was therefore considered to be valid.

Assessment and conclusion by RMS:

Following RMS assessment of the kinetic fits, recommended endpoints for PECsoil calculations significantly differ from the ones selected by the applicant. Calculations from the applicant are therefore not considered acceptable. In addition, it is noted that the mode of calculation used in ESCAPE by the applicant ("Residues from different applications are considered separately over one year") is not conservative for FOMC kinetic. Finally, it is highlighted that FOMC, as used by the applicant, is not the preferred option for persistence calculations since usually no plateau can be obtained with FOMC kinetics.

PECaccu were recalculated by the RMS with ESCAPE 2.0 model, considering constant climate conditions.

As a risk envelop approach, the following GAPs were considered to cover the intended uses on railways, perennial crops and field crops.

Table 8.2.1-17: Use patterns considered in the simulations (risk envelope approach)

Application rate (g a.s./ha)	No. of appl. (-)	Frequency	Interception (%)	Soil load (g a.s./ha)	Soil depth for $PEC_{soil,plateau}$ (cm)
3600 (railway)	1	Every year	0	3600	5
2880 (perennial crops)	1	Every year	0	2880	5
2160 (field crops)	1	Every year	0	2160	5 and 20

The plateau concentrations is, besides the common 20 cm when considering tillage, also calculated in 5 cm for field crops, in order to cover all possible situations. Indeed, available information regarding agricultural practices, at least in France, indicate that:

- The use of glyphosate is less important in systems with tillage than in conservation tillage systems;
- In case of no tillage, glyphosate is systematically used.

This is also consistent with the information presented in the Ecotoxicology section relative to biodiversity. Glyphosate is presented as a critical tool to enable conservation tillage systems. Glyphosate treatments (especially intercrop treatments and post-harvest stubble treatments) allow to lower the tillage practices by direct sowing. For PECsoil calculation, no-till is a worst case.

Only PECsoil, max (single application) and PECaccu are provided (other values are not used in the risk assessment for non-target organisms).

For glyphosate, the representative worst case endpoints were selected from the reliable field trigger endpoints available from 6 sites. All endpoints were derived with biphasic kinetics. Therefore, all kinetic parameters were tested in order to check which ones give the worst-case PECaccu values.

Although they result in the shortest DT_{90} value, **DFOP parameters from Ontario site ([redacted] 1993) give the worst-case PECaccu values** and should be considered for PECaccu calculations. RMS notes that DFOP parameters for this site result in the longest DT_{50} (13.7 days, corresponding DT_{90} 54.4 days) and correspond to both the lowest k_1 and k_2 degradation rates. Please note that DFOP kinetics from [redacted] site ([redacted] 1992d) (longest DT_{90} 201 days, corresponding DT_{50} 5.8 days) provided very similar results, only very slightly below those presented with parameters from Ontario site.

RMS notes that the trigger for calculating accumulation PECsoil is not reached for glyphosate, as the max DT_{90} from field studies is 201 days. However, for the sake of providing a thorough assessment, and considering the widespread use of glyphosate, accumulation PECsoil are calculated.

For AMPA, no reliable field DT_{50} are currently determined. All available laboratory trigger endpoints were based on SFO kinetics, therefore the maximum laboratory DT_{50} (trigger) of 1040 days from soil 18 Acres ([redacted] 2020) was used, along with the maximum occurrence from reliable field and laboratory studies (46.9% AR from [redacted] site (field study [redacted] 1992d)). PECsoil and accumulation PECsoil were calculated considering AMPA applied as parent, with parent application rate corrected for molar ratio and maximum occurrence.

Table 8.2.1-18: Parameters of glyphosate and AMPA used for PECsoil calculations

Compound	Molar mass (g/mol)	Max. occurrence (%)	DT_{50}
Glyphosate	169.10	-	DFOP parameters from Ontario site k_1: 0.0551 day^{-1} k_2: 0.0017 day^{-1} g: 0.9420
AMPA	111.04	46. 9 (maximum value from lab and field studies)	1040 d (SFO, maximum non-normalised value from lab)

Results are presented below.

Table 8.2.1-19: PEC_{soil} for glyphosate and AMPA, 1 × 3600 g a.s./ha - Railway

PEC_{soil} (mg/kg)	**1 × 3600 g a.s./ha**	
	Glyphosate	**AMPA**
Initial (5 cm)	4.800	1.478
$PEC_{soil,plateau}$ (5 cm)	0.323	5.367
$PEC_{soil,accu}$ (5 cm)	5.123	6.845

Table 8.2.1-20: PEC_{soil} for glyphosate and AMPA, 1 × 2880 g a.s./ha – Perennial crops

PEC_{soil} (mg/kg)	**1 × 2880 g a.s./ha**	
	Glyphosate	**AMPA**
Initial (5 cm)	3.840	1.182
$PEC_{soil,plateau}$ (5 cm)	0.259	4.293
$PEC_{soil,accu}$ (5 cm)	4.099	5.476

Table 8.2.1-21: PEC_{soil} for glyphosate and AMPA, 1 × 2160 g a.s./ha – Field crops

PEC_{soil} (mg/kg)	**1 × 2160 g a.s./ha**	
	Glyphosate	**AMPA**
Initial (5 cm)	2.880	0.887
$PEC_{soil,plateau}$ (5 cm)	0.194	3.217
$PEC_{soil,plateau}$ (20 cm)	0.049	0.804
$PEC_{soil,accu}$ (5 cm)	3.074	4.104
$PEC_{soil,accu}$ (plateau on 20cm and last appl on 5 cm)	2.929	1.691

B.8.2.2. PECsoil for the formulation

PECsoil provided by the applicant:

PEC_{soil} of the formulation was calculated by the applicant based on the highest single application rate from all uses in the GAP. A soil depth of 5 cm and a soil bulk density of 1.5 g/cm^3 were considered.

Table 8.2.2-1: PEC_{soil} for MON 52276

Formulation	**Application rate (g MON 52276/ha)[1]**	**$PEC_{soil,ini}$ (mg MON 52276/kg)**
MON 52276	5846.5	7.795

Table 8.2.2-1: PEC_{soil} for MON 52276

Formulation	Application rate (g MON 52276/ha)[1]	$PEC_{soil,ini}$ (mg MON 52276/kg)

[1] The formulation components are considered to dissipate rapidly after application, therefore only one application is taken into consideration, based on the highest single application rate. The PEC for the formulation was based on a specific density of 1.1693 g/mL with an application of 5 L formulation/ha and an interception rate of 0 % representing the maximum use in the GAP.

Assessment and conclusion by RMS:

PECsoil for the formulation is acceptable.

B.8.3. PREDICTED ENVIRONMENTAL CONCENTRATIONS IN GROUND WATER (PEC_{GW})

B.8.3.1. Agricultural uses – FOCUS calculations

Data point	CP 9.2.4.1/001
Report author	[redacted]
Report year	2020
Report title	Predicted environmental concentrations of glyphosate and its metabolite AMPA in groundwater following application to various crops – a modelling assessment for Europe using FOCUS PEARL, FOCUS PELMO and FOCUS MACRO
Report No	110054-013
Guidelines followed in study	European Commission (EC) (2014): Assessing Potential for Movement of Active Substances and their Metabolites to Ground Water in the EU. Report of the FOCUS Ground Water Work Group, EC Document Reference Sanco/13144/2010 ver. 3, 613 pp. FOCUS (2000): FOCUS groundwater scenarios in the EU review of active substances. Report of the FOCUS Groundwater Scenarios Workgroup, EC Document Reference Sanco/321/2000 rev.2, 202 pp. FOCUS (2014): Generic guidance for Tier 1 FOCUS ground water assessments, version 2.2. FOCUS groundwater scenarios working group.
Deviations from current test guideline	None
Previous evaluation	No, not previously submitted
GLP/Officially recognised testing facilities	No, not applicable for this study type
Acceptability/Reliability	No

I. MATERIALS AND METHODS

The purpose of this modelling assessment was to obtain predicted environmental concentrations in groundwater (PECgw) of the active substance glyphosate and its soil metabolite AMPA following application to various crops in Europe.

Calculations were carried out according to FOCUS groundwater guidance (FOCUS, 2000, 2014; EC, 2014) using the leaching models FOCUS PEARL 4.4.4, FOCUS PELMO 5.5.3 and FOCUS MACRO 5.5.4 over a total period of 26 years. The first six years were run as a warming-up period and the results were extracted for the following 20 years.

.

1. Model input data

The following input parameters were selected.

For modelling DT_{50}, the “EFSA $DegT_{50}$ Endpoint Selector” suggested that the normalised DT_{50} values from laboratory and field studies are not significantly different, for both glyphosate and AMPA. Therefore, laboratory and field DT_{50} were combined.

For degradation of glyphosate, a pH dependency of the combined laboratory and field DT_{50} was demonstrated. Therefore, two sets of calculations were performed using: i) the geometric mean of acidic soils (pH (H2O) < 7; DT_{50} = 26.8 days) and ii) the geometric mean of alkaline soils (pH (H2O) ≥ 7; DT_{50} = 12.4 days).

Table 8.3.1-1: Input parameters related to active substance glyphosate and its metabolite AMPA for PEC_{gw} calculations

Compound	**Glyphosate**	**AMPA**
Molar mass (g/mol)	169.10	111.04

Table 8.3.1-1: Input parameters related to active substance glyphosate and its metabolite AMPA for PEC_{gw} calculations

Compound	**Glyphosate**	**AMPA**
Water solubility (mg/L)	100 000 (20 °C, pH 7) 200 000 (30°C)	100 000 (20 °C, pH 7)[4]
Saturated vapour pressure (Pa)	PEARL: 1.31×10^{-5} (25 °C) / PELMO: 6.81×10^{-6} (20 °C)[3] / 2.72×10^{-5} (30°C)	1.31×10^{-5} (25 °C)[4]
DT_{50} in soil (d) (lab and field studies)	Acidic: 26.8 (geometric mean from lab&field, pH < 7, n = 15) Alkaline: 12.4 (geometric mean, pH ≥ 7, n = 10), normalisation to 10 kPa/pF 2, 20 °C with Q_{10} of 2.58)	113.3 (geometric mean from lab&field, n = 19)
Transformation rate (1/d)[1]	Acidic: 0.008742 (to AMPA) 0.017122 (to CO_2) Alkaline: 0.018894 (to AMPA) 0.037005 (to CO_2)	0.006118
K_{foc} / K_{fom}[2] (L/kg)	4243 / 2461[5] (geometric mean, n = 10)	3167 / 1837 (geometric mean, n = 4)
Freundlich Exponent 1/n (-)	0.697[5] (arithmetic mean, n = 10)	0.690 (arithmetic mean, n = 4)
Plant uptake factor (-)	0 (worst case value)	0 (worst case value)
Formation fraction (-)	-	0.338 from parent (arithmetic mean of lab and field studies, n = 17)

[1] For PELMO; ($\ln(2)/DT_{50}$) × formation fraction
[2] $K_{fom} = K_{foc}/1.724$
[3] Re-calculated to 20 °C with "EVA3rev2h" for PELMO input
[4] No available data, parent value assumed
[5] Adsorption parameters were based on preliminary data as final report was not available at time of calculations.

2. Use patterns

Glyphosate is intended to be used as an herbicide on various crops. The FOCUS crops carrots, potatoes, onions, tomatoes, cabbage, sugar beets, apples, vines, citrus, and grass/alfalfa were simulated.

Two possible application timings: pre-emergence/ spring ("early") and post-harvest/ autumn ("late") were considered. As a worst case, it was assumed that glyphosate is applied to bare soil by setting the interception rate to 0 %; all of the applied substance reaches the soil surface and becomes available for leaching.

Calculations were performed for annual application. A risk envelope approach was taken in the modelling, whereby the maximum annual load was considered as a single application for all GAP uses. In addition, band or spot application was not considered as a refinement for reducing the areal load in the modelling. The detailed use patterns considered in the simulations are presented in the table below:

Table 8.3.1-2: Use patterns considered in the simulations

FOCUS crop	Application rate (g a.s./ha)	No. of appl. (-)	Min. appl. interval (d)	Application timing (-)	Interception (%)	Soil load (g a.s./ha)
Carrots[1] / vegetables, root[2] Potatoes Onions[1] / vegetables, bulb[2] Tomatoes[1] / vegetables, fruiting[2] Cabbage[1] / vegetables, leafy[2] Sugar beets Apples[1] / pome/stone fruit[2] Vines Citrus	720	1	-	Early, late	0	720
	1440	1	-	Early, late	0	1440
Carrots[1] / vegetables, root[2] Potatoes Onions[1] / vegetables, bulb[2] Tomatoes[1] / vegetables, fruiting[2] Cabbage[1] / vegetables, leafy[2] Sugar beets	540	1	-	Early, late	0	540
	2160	1	-	Early, late	0	2160
Apples[1] / pome/stone fruit[2] Vines Citrus	2880	1	-	Early, late	0	2880
Grass/alfalfa	1800	1	-	Early, late	0	1800

[1] Representative crop in FOCUS PEARL and FOCUS PELMO
[2] Representative crop in FOCUS MACRO

Application timing depends on the specific growth stage being treated.

For annual field crops (carrots, potatoes, onions, tomatoes, cabbage, and sugar beet), two sets of simulations were conducted considering relative application dates according to FOCUS:

i) 20 days before emergence (“early”)

ii) 7 days after harvest (“late”).

For perennial crops (apples, vines, citrus, and grass/alfalfa), two sets of simulations were conducted considering absolute application dates:

i) 01-Apr (“early”)

ii) 01-Oct (“late”).

The detailed application dates used in the modelling are summarised in the table below.

Table 8.3.1-3: Application dates used for groundwater risk assessment

Crop	Scenario	Early application dates[1]	Late application dates[1]
Carrots[2] / vegetables, root[3]	Châteaudun (1st)	18-Feb (49)	07-Jun (158)
	Châteaudun (2nd)	20-Jun (171)	27-Sep (270)
	Hamburg (1st)	18-Feb (49)	07-Jun (158)
	Hamburg (2nd)	20-Jun (171)	27-Sep (270)
	Jokioinen	12-May (132)	12-Oct (285)
	Kremsmünster (1st)	18-Feb (49)	07-Jun (158)
	Kremsmünster (2nd)	20-Jun (171)	27-Sep (270)
	Porto (1st)	08-Feb (39)	07-Jun (158)
	Porto (2nd)	02-Jul (183)	22-Oct (295)
	Thiva (1st)	23-Feb (54)	29-May (149)
	Thiva (2nd)	26-May (146)	17-Sep (260)
Potatoes	Châteaudun	10-Apr (100)	08-Sep (251)
	Hamburg	20-Apr (110)	22-Sep (265)
	Jokioinen	16-May (136)	02-Oct (275)
	Kremsmünster	20-Apr (110)	22-Sep (265)
	Okehampton	10-Apr (100)	08-Sep (251)
	Piacenza	31-Mar (90)	17-Sep (260)
	Porto	23-Feb (54)	22-Jun (173)
	Sevilla	11-Jan (11)	07-Jun (158)
	Thiva	09-Feb (40)	06-Aug (218)
Onions[2] / vegetables, bulb[3]	Châteaudun	05-Apr (95)	08-Sep (251)
	Hamburg	05-Apr (95)	08-Sep (251)
	Jokioinen	30-Apr (120)	22-Aug (234)
	Kremsmünster	05-Apr (95)	08-Sep (251)
	Porto	08-Feb (39)	07-Jun (158)
	Thiva	21-Mar (80)	07-Jul (188)
Tomatoes[2] / vegetables, fruiting[3]	Châteaudun	20-Apr (110)	01-Sep (244)
	Piacenza	20-Apr (110)	01-Sep (244)
	Porto	23-Feb (54)	07-Sep (250)
	Sevilla	26-Mar (85)	08-Jul (189)
	Thiva	21-Mar (80)	17-Sep (260)
Cabbage[2] / vegetables, leafy[3]	Châteaudun (1st)	31-Mar (90)	22-Jul (203)
	Châteaudun (2nd)	11-Jul (192)	22-Oct (295)

Table 8.3.1-3: Application dates used for groundwater risk assessment

Crop	Scenario	Early application dates[1]	Late application dates[1]
	Hamburg (1st)	31-Mar (90)	22-Jul (203)
	Hamburg (2nd)	11-Jul (192)	22-Oct (295)
	Jokioinen	30-Apr (120)	27-Sep (270)
	Kremsmünster (1st)	31-Mar (90)	22-Jul (203)
	Kremsmünster (2nd)	11-Jul (192)	22-Oct (295)
	Porto (1st)	08-Feb (39)	08-Jul (189)
	Porto (2nd)	11-Jul (192)	22-Nov (326)
	Sevilla (1st)	09-Feb (40)	08-Jun (159)
	Sevilla (2nd)	26-May (146)	22-Sep (265)
	Thiva	26-Jul (207)	07-Dec (341)
Sugar beet	Châteaudun	27-Mar (86)	22-Oct (295)
	Hamburg	26-Mar (85)	15-Oct (288)
	Jokioinen	05-May (125)	22-Oct (295)
	Kremsmünster	26-Mar (85)	17-Oct (290)
	Okehampton	05-Apr (95)	01-Nov (305)
	Piacenza	28-Feb (59)	22-Sep (265)
	Porto	23-Feb (54)	08-Aug (220)
	Sevilla	21-Oct (294)	08-Jul (189)
	Thiva	11-Apr (101)	07-Oct (280)
Apples[2] / pome/stone fruit[3]	Châteaudun	01-Apr (91)	01 Oct (274)
	Hamburg	01-Apr (91)	01 Oct (274)
	Jokioinen	01-Apr (91)	01 Oct (274)
	Kremsmünster	01-Apr (91)	01 Oct (274)
	Okehampton	01-Apr (91)	01 Oct (274)
	Piacenza	01-Apr (91)	01 Oct (274)
	Porto	01-Apr (91)	01 Oct (274)
	Sevilla	01-Apr (91)	01 Oct (274)
	Thiva	01-Apr (91)	01 Oct (274)
Vines	Châteaudun	01-Apr (91)	01 Oct (274)
	Hamburg	01-Apr (91)	01 Oct (274)
	Kremsmünster	01-Apr (91)	01 Oct (274)
	Piacenza	01-Apr (91)	01 Oct (274)
	Porto	01-Apr (91)	01 Oct (274)
	Sevilla	01-Apr (91)	01 Oct (274)

Table 8.3.1-3: Application dates used for groundwater risk assessment

Crop	Scenario	Early application dates[1]	Late application dates[1]
	Thiva	01-Apr (91)	01 Oct (274)
Citrus	Piacenza	01-Apr (91)	01 Oct (274)
	Porto	01-Apr (91)	01 Oct (274)
	Sevilla	01-Apr (91)	01 Oct (274)
	Thiva	01-Apr (91)	01 Oct (274)
Grass/alfalfa	Châteaudun	01-Apr (91)	01 Oct (274)
	Hamburg	01-Apr (91)	01 Oct (274)
	Jokioinen	01-Apr (91)	01 Oct (274)
	Kremsmünster	01-Apr (91)	01 Oct (274)
	Okehampton	01-Apr (91)	01 Oct (274)
	Piacenza	01-Apr (91)	01 Oct (274)
	Porto	01-Apr (91)	01 Oct (274)
	Sevilla	01-Apr (91)	01 Oct (274)
	Thiva	01-Apr (91)	01 Oct (274)

[1] Values in brackets specify 'Julian Day' as used in FOCUS MACRO simulations
[2] Representative crop in FOCUS PEARL and FOCUS PELMO
[3] Representative crop in FOCUS MACRO

II. RESULTS AND DISCUSSION

The PECgw values are given in the tables below.

Table 8.3.1-4: PEC_{gw} of glyphosate and AMPA (FOCUS PEARL)

Crop	Scenario	Glyphosate (µg/L)		AMPA (µg/L)	
		Acidic case: DT_{50} = 26.8 days	**Alkaline case: DT_{50} = 12.4 days**	**Acidic case: parent DT_{50} = 26.8 days**	**Alkaline case: parent DT_{50} = 12.4 days**
All relevant FOCUS crops (1 × 720 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 1440 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 540 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 2160 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 2880 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops	All relevant FOCUS	<0.001	<0.001	<0.001	<0.001

Table 8.3.1-4: PEC$_{gw}$ of glyphosate and AMPA (FOCUS PEARL)

Crop	Scenario	Glyphosate (µg/L)		AMPA (µg/L)	
		Acidic case: DT$_{50}$ = 26.8 days	**Alkaline case: DT$_{50}$ = 12.4 days**	**Acidic case: parent DT$_{50}$ = 26.8 days**	**Alkaline case: parent DT$_{50}$ = 12.4 days**
(1 × 1800 g a.s./ha)	scenarios				

Table 8.3.1-5: PEC$_{gw}$ of glyphosate and AMPA (FOCUS PELMO)

Crop	**Scenario**	**Glyphosate (µg/L)**		**AMPA (µg/L)**	
		Acidic case: DT$_{50}$ = 26.8 days	**Alkaline case: DT$_{50}$ = 12.4 days**	**Acidic case: parent DT$_{50}$ = 26.8 days**	**Alkaline case: parent DT$_{50}$ = 12.4 days**
All relevant FOCUS crops (1 × 720 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 1440 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 540 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 2160 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 2880 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 1800 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001

Table 8.3.1-6: PECgw of glyphosate and AMPA (FOCUS MACRO)

Crop	Scenario	Glyphosate (µg/L)		AMPA (µg/L)	
		Acidic case: DT$_{50}$ = 26.8 days	Alkaline case: DT$_{50}$ = 12.4 days	Acidic case: parent DT$_{50}$ = 26.8 days	Alkaline case: parent DT$_{50}$ = 12.4 days
All relevant FOCUS crops (1 × 720 g/ha)1	Châteaudun	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 1440 g/ha)1	Châteaudun	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 540 g/ha)	Châteaudun	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 2160 g/ha)	Châteaudun	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 2880 g/ha)1	Châteaudun	<0.001	<0.001	<0.001	<0.001

Table 8.3.1-6: PECgw of glyphosate and AMPA (FOCUS MACRO)

Crop	Scenario	Glyphosate (µg/L)		AMPA (µg/L)	
		Acidic case: DT_{50} = 26.8 days	Alkaline case: DT_{50} = 12.4 days	Acidic case: parent DT_{50} = 26.8 days	Alkaline case: parent DT_{50} = 12.4 days
All relevant FOCUS crops (1 × 1800 g/ha)	Châteaudun	<0.001	<0.001	<0.001	<0.001

1 Citrus was not simulated in FOCUS MACRO since the scenario Châteaudun is not defined for this crop

In all simulations, the PEC_{gw} of glyphosate and its metabolite AMPA in leachate at 1 m soil depth did not exceed the groundwater threshold value of 0.1 µg/L. Therefore, it can be concluded that the use of glyphosate is unlikely to pose an unacceptable risk to groundwater if the active substance is used in compliance with the label recommendations.

Assessment and conclusion by applicant:

The modelling study was conducted according to current guidance and was therefore considered to be valid.

Assessment and conclusion by RMS:

PECgw calculations were provided by the applicant considering the recommended FOCUS models, relevant scenarios and relevant application schemes (timing, dose, interception values) considering the intended GAPs. PECgw were calculated considering pre-emergence and post-harvest applications for annual crops and applications on April 1st and October 1st for perennial crops. No calculations for multiple applications were provided by the applicant. Considering the low mobility of both glyphosate and AMPA in soils, the application schemes used by the applicant are considered as sufficient to cover the risk of contamination of groundwater from the intended uses of the representative formulation.

Regarding the selection of input parameters for glyphosate and AMPA, the evaluation of the studies presented in Vol. 3 CA by RMS results in the selection of different endpoints. As a consequence, PECgw calculations provided by the applicant are not considered acceptable.

In order to provide a 1st informative estimation of PECgw for the peer review, PECgw were recalculated by RMS for two application patterns: an example for perennial crops (Apple, 1x2880 g/ha, application on October 1st) and an example for field crops (Potatoes, 1x2160 g/ha, application 7 days after harvest). Calculations were performed for annual application with FOCUS PEARL 4.4.4 and FOCUS PELMO 5.5.3.

Please note that these application schemes were selected based on use 2a and 4a, to provide an example for each crop category (field / perennial), at the highest intended application rate, for a critical application period and because these FOCUS crops cover all FOCUS scenarios. The intention is that the MS, EFSA and the applicant have an idea on the outcome of the risk assessment for the commenting period. However exhaustive calculations for the application schemes initially considered by the applicant should be provided by the applicant to cover the intended uses.

The following endpoints were considered by RMS: The choice of degradation endpoint is discussed in detail under point CP B 8.1.1 above.

Table 8.3.1-7: Input parameters used for FOCUS PECgw modelling

Compound	Glyphosate	AMPA
Molar mass (g/mol)	169.10	111.04
Water solubility (mg/L)	100 000 (20 °C, pH 7) 200 000 (30°C)[5]	100 000 (20 °C, pH 7)[4]
Saturated vapour pressure (Pa)	PEARL: 1.31×10^{-5} (25 °C) / PELMO: 6.81×10^{-6} (20 °C)[3] / 2.72×10^{-5} (30°C)[5]	1.31×10^{-5} (25 °C)[4]
DT_{50} in soil (d)	***First set of simulations***: 0.1d (minimum fast phase normalized DT_{50}, from laboratory - pathway fits – and field, n=12) ***Second set of simulations***: 161.1 days (maximum slow phase normalized DT_{50}, from laboratory - pathway fits – and field, n=12)	1040 (max laboratory normalized DT_{50}, n=10)
Transformation rate (1/d)[1]	***First set of simulations***: 2.01013 (to AMPA) 4.92134 (to CO_2) ***Second set of simulations***: 0.00125(to AMPA) 0.00305 (to CO_2)	0.000666
K_{foc} / K_{fom}[2] (L/kg)	4348 / 2522 (geometric mean, n = 10)	2541 / 1474 (geometric mean, n = 8)

Freundlich Exponent 1/n (-)	0.682 (arithmetic mean, n = 10)	0.767 (arithmetic mean, n = 8)
Plant uptake factor (-)	0 (worst case value)	0 (worst case value)
Formation fraction (-)	-	0.290 from parent (arithmetic mean, laboratory, n = 7)

[1] For PELMO; $(\ln(2)/DT_{50}) \times$ formation fraction

[2] $K_{fom} = K_{foc}/1.724$

[3] Calculated to 20 °C with "EVA3rev2h" for PELMO input, using experimental value at 25°C

[4] No available data, parent value assumed

[5] For PELMO, values at 30°C estimated as "2 x solubility value at 20°C" and "4 x vapour pressure value at 20°C", as recommended in PELMO user manual, version 5.00, may 2018

All other parameters were left to FOCUS default parameters.

Results are presented below.

Table 8.3.1-8: PEC_{gw} of glyphosate and AMPA (FOCUS PEARL and FOCUS PELMO)

Crop	Scenario	Glyphosate (µg/L)		AMPA (µg/L)	
		parent DT_{50} = 0.1 days	parent DT_{50} = 161.1 days	parent DT_{50} = 0.1 days	parent DT_{50} = 161.1 days
Apple 1st October (1 × 2880 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
Potatoes 7 d after harvest (1 x 2160 g a.s./ha	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001

For the 2 simulated uses, PECgw for glyphosate and AMPA are < 0.1 µg/L for all scenarios in both models. No unacceptable risk of groundwater contamination is expected for these simulated uses.

A data gap is set for the applicant to provide updated PECgw calculations for all intended uses considering the application schemes initially proposed, the endpoints agreed during the peer review and all relevant models.

B.8.3.2. Use on railways – HardSPEC calculations

Data point	CP 9.2.4.1/002
Report author	[redacted]
Report year	2020
Report title	Predicted environmental concentrations of glyphosate and its metabolites AMPA and HMPA in groundwater and surface water following application to railways – a modelling assessment using HardSPEC
Report No	110054-015
Guidelines followed in study	Hollis, J.M. *et al.*: HardSPEC: A First-tier Model for Estimating Surface- and Ground-Water Exposure resulting from Herbicides applied to Hard Surfaces: Updated Technical Guidance on Model Principles and Application for version 1.4.3.2. Report to the Chemicals Regulation Division of the HSE April, 2017, 121 pp + 3 Appendices.
Deviations from current test guideline	None
Previous evaluation	No, not previously submitted
GLP/Officially recognised testing facilities	No, not applicable for this study type

Acceptability/Reliability	No

I. MATERIALS AND METHODS

The purpose of this modelling assessment was to obtain predicted environmental concentrations in groundwater of the herbicidal active substance glyphosate and its metabolite AMPA following weed treatment of railways.

Calculations were carried out using the model HardSPEC 1.4.3.2.

1. Model input data

The following data were considered for calculation in HardSPEC.

For modelling DT_{50}, the "EFSA $DegT_{50}$ Endpoint Selector" suggested that the normalised DT_{50} values from laboratory and field studies are not significantly different, for both glyphosate and AMPA. Therefore, laboratory and field DT_{50} were combined.

For degradation of glyphosate, a pH dependency of the combined laboratory and field DT_{50} was demonstrated. The geometric mean of acidic soils (pH (H2O) < 7; DT_{50} = 26.8 days) was used as worst-case.

Table 8.3.2-1: Input parameters related to active substance glyphosate and its metabolite for HardSPEC calculations

Compound	Glyphosate	AMPA
Molar mass (g/mol)	169.10	111.04
Soil K_{oc} (mL/g)	4243[2] (geometric mean, n = 10)	3167[2] (geometric mean, n = 4)
Water solubility (g/mol):	100,000 (20 °C)	100,000 (20 °C)[1]
DT_{50} in soil (d)	26.8 (geometric mean of acidic soils, combined lab and field, normalisation to 10 kPa/pF 2, 20 °C with Q_{10} of 2.58, n = 15)	113.3 (geometric mean, combined lab and field, normalisation to 10 kPa/pF 2, 20 °C with Q_{10} of 2.58, n = 19)

[1] No available data, parent value assumed
[2] Adsorption parameters were based on preliminary data as final report was not available at time of calculations.

2. Modelling strategy

Glyphosate is intended to be used as an herbicide on railways. The detailed use patterns considered in the HardSPEC calculations are presented below.

Table 8.3.2-2: Use patterns considered in the simulations

Target	Application rate (g a.s./ha)	No. of appl. (-)	Min. appl. interval (d)	Interception (%)
Railways	1800	1	-	10[1]
Railways	3600	1	-	10[1]

[1] Default interception in HardSPEC assuming heavy weed infestation

For AMPA, a pseudo application was assumed. The application rate of glyphosate was corrected for molar ratio (111.04/169.1) and maximum occurrence in soil/ water. Since the overall maximum occurrence was for soil (0.63), this value was used to derive a worst case 'effective' application rate for

AMPA.

Table 8.3.2-3: Consideration of application by substance

Compound	Application rate (g a.s./ha)	Molecular mass correction (-)	Maximum occurrence (-)	Effective application rate (g/ha)
Glyphosate	1800	-	-	1800
	3600	-	-	3600
AMPA	1800	0.6567	0.63[1]	744.6
	3600	0.6567	0.63[1]	1489.3

[1] Maximum from a US field study: Minnesota, USA ([redacted] 1993, KCA 7.1.2.2.1/006)

II. RESULTS AND DISCUSSION

Results are shown below.

Table 8.3.2-4: PEC_{gw} of glyphosate following application to railways, 1 × 1800 g a.s./ha (HardSPEC 1.4.3.2)

Average annual concentration at the base of the railway formation (µg/L)			<0.001
	Exposure at the abstraction well-head		
	Chalk	Limestone	Sandstone
Max. concentration in well (µg/L)	<0.001	<0.001	<0.001
Period when plume in well >0.1 µg/L (d)	0	0	0

Table 8.3.2-5: PEC_{gw} of glyphosate following application to railways, 1 × 3600 g a.s./ha (HardSPEC 1.4.3.2)

Average annual concentration at the base of the railway formation (µg/L)			<0.001
	Exposure at the abstraction well-head		
	Chalk	Limestone	Sandstone
Max. concentration in well (µg/L)	<0.001	<0.001	<0.001
Period when plume in well >0.1 µg/L (d)	0	0	0

Table 8.3.2-6: PEC_{gw} of AMPA following application to railways, 1 × 1800 g a.s./ha (HardSPEC 1.4.3.2)

Average annual concentration at the base of the railway formation (µg/L)			<0.001
	Exposure at the abstraction well-head		
	Chalk	Limestone	Sandstone
Max. concentration in well (µg/L)	<0.001	<0.001	<0.001
Period when plume in well >0.1 µg/L (d)	0	0	0

Table 8.3.2-7: PEC$_{gw}$ of AMPA following application to railways, 1 × 3600 g a.s./ha (HardSPEC 1.4.3.2)

Average annual concentration at the base of the railway formation (µg/L)			0.01
	Exposure at the abstraction well-head		
	Chalk	**Limestone**	**Sandstone**
Max. concentration in well (µg/L)	<0.001	<0.001	<0.001
Period when plume in well >0.1 µg/L (d)	0	0	0

<u>Assessment and conclusion by applicant</u>:

The modelling study was conducted according to current guidance and was therefore considered to be valid.

Assessment and conclusion by RMS:

HardSPEC model was specifically developed for UK. In absence of other European model for application on railway, calculations with HardSPEC are reported for information for MS who use this model.

Regarding the selection of input parameters for glyphosate and AMPA, the evaluation of the studies presented in Vol. 3 CA by RMS results in the selection of different endpoints. As a consequence, PECgw calculations provided by the applicant are not considered acceptable.

PECgw were recalculated by RMS for the worst-case application rate on railway: 1x3600 g/ha. In HardSPEC, PECgw for parent and metabolite are calculated separately. For metabolite, a pseudo-application is considered; as a conservative approach the application rate was corrected for molar ratio only, resulting in 2364 g AMPA/ha.

The following input parameters were used. The choice of soil degradation endpoint is discussed under point CP B8.1.1 above. For degradation rates, due to pH-dependency for both glyphosate and AMPA, it is proposed that the maximum modelling DT_{50} of 161.1 days for glyphosate (from laboratory parent-only fits and field) and of 1040 days for AMPA (laboratory) are used.

Table 8.3.2-8: Input parameters for PECgw calculations with HardSPEC – 1 x 3600 g/ha on railways

Compound	Glyphosate	AMPA
Molar mass (g/mol)	169.10	111.04
Soil K_{oc} (mL/g)	4348 (geometric mean, n = 10)	2541 (geometric mean, n = 4)
Water solubility (g/L):	100 000 (20 °C)	100 000 (20 °C)[1]
DT_{50} in soil (d)	161.1 days (max normalized DT_{50}, laboratory - parent only fits - and field, n=12)	1040 (max laboratory normalized DT_{50}, n=10)

[1] No available data, parent value assumed

The following results were obtained.

Table 8.3.2-9: PECgw results for glyphosate – 1 x 3600 g/ha on railways

Average annual concentration at the base of the railway formation (µg/L)			0.01
	Exposure at the abstraction well-head		
	Chalk	**Limestone**	**Sandstone**
Max. concentration in well (µg/L)	<0.001	<0.001	<0.001
Period when plume in well >0.1 µg/L (d)	0	0	0

Table 8.3.2-10: PECgw results for AMPA – 1 x 3600 g/ha on railways

Average annual concentration at the base of the railway formation (µg/L)			0.03
	Exposure at the abstraction well-head		
	Chalk	**Limestone**	**Sandstone**
Max. concentration in well (µg/L)	0.028	0.006	0.007
Period when plume in well >0.1 µg/L (d)	0	0	0

For railway, PECgw for glyphosate and AMPA are < 0.1 µg/L for all scenarios at the maximum intended application rate of 3600 g/ha. No unacceptable risk of groundwater contamination is expected for railway uses.

B.8.4. FATE AND BEHAVIOUR IN WATER AND SEDIMENT

B.8.4.1. Aerobic mineralisation in surface water

Studies on aerobic mineralisation in surface water with the formulation were not performed, since it is possible to extrapolate from data obtained with the active substance. Please refer to Volume 3CA – B8 for studies with active substance.

B.8.4.2. Water/sediment study

Studies on degradation in water/sediment systems with the formulation were not performed, since it is possible to extrapolate from data obtained with the active substance. Please refer to Volume 3CA – B8 for studies with active substance.

Degradation rates for glyphosate and AMPA were determined according to FOCUS Kinetic guidance. A summary of reliable degradation rates is presented in Vol. 3 CA B8.2.2.5.

Reliable modelling endpoints in total system were obtained from 4 and 7 water/sediment systems for glyphosate and AMPA, respectively. The geomean modelling DT_{50} of 143.3 days and 98.7 days respectively for glyphosate and AMPA is recommended for PECsw calculations.

Metabolite HMPA was also observed at 10% in water and a risk assessment is performed below.

Formation of 1-oxo-AMPA was also observed. It should be considered in more details whether this metabolite 1-oxo-AMPA exceeds the trigger for further assessment. A data gap is identified for the applicant to further address this metabolite, quantitatively or qualitatively (see Vol 3 CA B 8.2.2). Unless it is shown that the trigger is not exceeded or the ecotoxicological risk can be addressed qualitatively, PECsed calculations should be provided for 1-oxo-AMPA, based on default conservative substance properties in the absence of data.

B.8.4.3. Irradiated water/sediment study

No data, not required.

B.8.5. PREDICTED ENVIRONMENTAL CONCENTRATIONS IN SURFACE WATER AND SEDIMENT (PEC_{SW}, PEC_{SD})

B.8.5.1. Agricultural uses – FOCUS calculations

Data point	CP 9.2.5/001
Report author	[redacted]
Report year	2020
Report title	Predicted environmental concentrations of glyphosate and its metabolites AMPA and HMPA in surface water and sediment following application to various crops – a modelling assessment for Europe using the FOCUS surface water scenarios at Steps 1 - 3
Report No	110054-014
Guidelines followed in study	FOCUS (2001): FOCUS Surface Water Scenarios in the EU Evaluation Process under 91/414/EEC. Report of the FOCUS Working Group on Surface Water Scenarios. EC Document Reference SANCO/4802/2001 rev. 2. FOCUS (2015): Generic guidance for FOCUS surface water Scenarios, version 1.4.
Deviations from current test guideline	None
Previous evaluation	No, not previously submitted
GLP/Officially recognised testing facilities	No, not applicable for this study type
Acceptability/Reliability	No

I. MATERIALS AND METHODS

The purpose of this modelling assessment was to obtain predicted environmental concentrations in surface water (PECsw) and sediment (PECsed) of the active substance glyphosate and its metabolites AMPA and HMPA, following application to various crops in Europe.

Calculations were carried out according to FOCUS surface water guidance (FOCUS, 2001, 2015) at FOCUS Steps 1 and 2 using STEPS 1-2 in FOCUS 3.2 and at Step 3 (parent only) using FOCUS SWASH 5.3, which includes the Substance Plug-In database (SPIN 2.2), and operational models FOCUS MACRO 5.5.4, FOCUS PRZM 4.3.1 and FOCUS TOXSWA 5.5.3.

1. Model input data

Endpoints for glyphosate, AMPA and HMPA are issued from the studies presented under Vol 3 CA B8.

For modelling DT_{50}, the "EFSA $DegT_{50}$ Endpoint Selector" suggested that the normalised DT_{50} values from laboratory and field studies are not significantly different, for both glyphosate and AMPA. Therefore, laboratory and field DT_{50} were combined.

For degradation of glyphosate, a pH dependency of the combined laboratory and field DT_{50} was demonstrated. The geometric mean of acidic soils (pH (H2O) < 7; DT50 = 26.8 days) was used as worst-case.

For HMPA, only one reliable DT_{50} for the total system was derived based on a decline fit; hence a default DT_{50} of 1000 days was used for both the water and sediment phases at Steps 1 and 2. No batch adsorption experiments were conducted with HMPA. Since HMPA is only relevant in water, a default Kfoc of 10 L/kg was considered appropriate for use in the simulations.

Table 8.5.1-1: Input parameters related to active substance glyphosate and metabolites for $PEC_{sw/sed}$ calculations

Compound	Glyphosate	AMPA	HMPA
Molar mass (g/mol)	169.10	111.04	112.02
Water solubility (mg/L)	100,000 (20 °C, pH 7)	100,000 (20 °C, pH 7)[2]	769,000 (20 °C, pH 7)
Saturated vapour pressure (Pa)	1.31×10^{-5} (25 °C)	n r.	n.r.
Diffusion coefficient in water (m²/d)	4.3×10^{-5} (default value)	n r.	n.r.
Diffusion coefficient in air (m²/d)	0.43 (default value)	n r.	n.r.
K_{foc} / K_{fom}[1] (L/kg)	4243 / 2461[7] (geometric mean, n = 10)	3167 / 1837 (geometric mean, n = 4)	10 (default value)
Freundlich Exponent 1/n (-)	0.697[7] (arithmetic mean, n = 10)	n r.	n.r.
Plant uptake factor (-)	0 (worst case value)	n r.	n.r.
Wash-off factor from Crop (1/m)	50 (FOCUS default value)	n r.	n.r.
$DT_{50,soil}$ (d) (lab and field studies)	26.8 (geometric mean of acidic soils (pH < 7), normalisation to 10 kPa/pF 2, 20 °C with Q_{10} of 2.58, n = 15)	113.3 (geometric mean, n = 19)	1000 (FOCUS default)

Table 8.5.1-1: Input parameters related to active substance glyphosate and metabolites for $PEC_{sw/sed}$ calculations

Compound	Glyphosate	AMPA	HMPA
$DT_{50,water}$ (d)	143.3 (total system, geometric mean, n = 4) (Steps 1-2) / 1000 (FOCUS default) (Step 3)	102.5 (total system, geometric mean, n = 7)	1000 (FOCUS default)
$DT_{50,sed}$ (d)	143.3 (total system, geometric mean, n = 4)	102.5 (total system, geometric mean, n = 7)	1000 (FOCUS default)
$DT_{50,whole\ system}$ (d)	143.3 (total system, geometric mean, n = 4)	102.5 (total system, geometric mean, n = 7)	1000 (FOCUS default)
Maximum occurrence observed (% molar basis with respect to the parent)	-	Soil: 63.0[4] Water/sediment system: 45.0[5]	Soil: - Water/sediment system: 10.0[6]

[1] $K_{fom} = K_{foc}/1.724$
[2] No available data, parent value assumed
[3] n r. = not relevant (for Steps 1-2)
[4] Maximum from a US field study: Minnesota, USA ([redacted] 1993, KCA 7.1.2.2.1/006)
[5] Maximum total system value from an OECD 309 study ([redacted] 2020, KCA 7.2.2.2/001)
[6] Maximum from a water/sediment study ([redacted], 1993, KCA 7.2.2.3/005)
[7] Adsorption parameters were based on preliminary data as final report was not available at time of calculations.

2. Use patterns

Glyphosate is intended to be used as an herbicide on various crops. The FOCUS crops 'vegetables, root', 'potatoes', 'vegetables, bulb', 'vegetables, fruiting', 'vegetables, leafy', 'sugar beets', 'pome/stone fruit', 'olives', 'vines' and 'grass/alfalfa' were simulated.

Two possible application timings were considered: pre-emergence/ spring ("early") and post-harvest/ autumn ("late"). The detailed use patterns considered in the simulations are presented in the table below.

Table 8.5.1-2: Use patterns considered in the simulations

FOCUS crop	Application rate (g a.s./ha)	No. of appl. (-)	Min. appl. interval (d)	Application method	Application timing (-)
Vegetables, root	720	1 / 3	- / 28	Ground spray	Early / late
Potatoes					
Vegetables, bulb					
Vegetables, fruiting					
Vegetables, leafy					
Sugar beets					
Pome/stone fruit				Ground spray[1]	
Olives					
Vines					
Vegetables, root	1440	1	-	Ground spray	Early / late
Potatoes					
Vegetables, bulb					
Vegetables, fruiting					
Vegetables, leafy					
Sugar beets					
Pome/stone fruit				Ground spray[1]	

Table 8.5.1-2: Use patterns considered in the simulations

FOCUS crop	Application rate (g a.s./ha)	No. of appl. (-)	Min. appl. interval (d)	Application method	Application timing (-)
Olives					
Vines					
Pome/stone fruit	1440	2	28	Ground spray[1]	Early / late
Olives					
Vines					
Vegetables, root	540	1	-	Ground spray	Early / late
Potatoes					
Vegetables, bulb					
Vegetables, fruiting					
Vegetables, leafy					
Sugar beets					
Vegetables, root	1080	1 / 2	- / 28	Ground spray	Early / late
Potatoes					
Vegetables, bulb					
Vegetables, fruiting					
Vegetables, leafy					
Sugar beets					
Grass/alfalfa	1800	1	-	Ground spray	Early / late

[1] Since the standard method of applicaton for this crop is 'air blast' in the $FOCUS_{sw}$ models, the drift rate was manually adjusted to reflect ground spray application to weeds around tree base

3. Modelling strategy

In STEPS 1-2 calculations, both regions (South and North Europe) and all application periods (March – May, June – September and Oct – Feb) were simulated to cover the use patterns given above. In STEPS 1-2, the crops pome/stone fruit, olives, and vines were calculated with FOCUS crop 'grass/alfalfa' as a surrogate crop, because the drift rate for field crops is more representative for a herbicide sprayed on weeds at ground level and not to the crop canopy. As a worst case, 'no interception' was selected in the model.

Crop interception at Step 3 is calculated internally by the model on the basis of the maximum interception capacity and the actual leaf area index. For annual field crops, simulations were conducted with the standard application type 'ground spray' and the Chemical Application Method (CAM) was set to '2' (foliar linear; with 4 cm standard application depth). Since the application window was defined pre-emergence or post-harvest, crop interception can be discounted. For perennial crops (pome/stone fruit, olives, vines and grass/alfalfa), CAM 1 (application direct to soil) was selected to eliminate interception (worst case) in FOCUS PRZM for the runoff scenarios. For the drainage scenarios (FOCUS MACRO), the interception parameter ('ZFINT') was manually set to '0' in the input ('*.par') files.

At Step 3 drift is calculated internally by the model. For the crops pome/stone fruit, olives and vines, the default application method is 'air blast'. Since application of a herbicide is to weeds at ground level, the drift deposition rates for these crops had to be adapted manually in the TOXSWA input files ('*.txw'). Therefore, the selection of 'early' or 'late' variation of FOCUS crop for pome/stone fruit and vines had no consequence on the drift loadings ('pome/stone fruit, early' and 'vines, early' with modified drift loadings were simulated). The drift mass loadings were calculated using the 'Drift Calculator' as implemented in SWASH 5.3. Adjusted drift loadings were based on a representative FOCUS field crop ('grass/alfalfa'), but with default buffer distances (between crop and water's edge) at

Step 3 relevant for tree crops (3.5 m, 4 m and 6 m for ditch, stream and pond FOCUS scenarios, respectively).

Table 8.5.1-3: Drift loadings for glyphosate application to weeds in pome/stone fruit, olives and vines (based on the crop 'grass/alfalfa' using the SWASH Drift Calculator)

Application rate (g a.s./ha)	No. of appl. (-)	Mass loading per drift event (mg/m^2)		
		Ditch	Pond	Stream[1]
720	1	0.5875	0.1260	0.5500
	3	0.4216	0.0881	0.3929
1440	1	1.1750	0.2519	1.0999
	2	0.9973	0.2041	0.9259

[1] Including a factor of 1.2 to account for pesticide input from the upstream catchment (FOCUS 2001, 2015)

At Step 3, application timing depends on the specific growth stage being treated.

For annual field crops ('vegetables, root', 'potatoes', 'vegetables, bulb', 'vegetables, fruiting', 'vegetables, leafy', and 'sugar beets'), two sets of simulations were conducted considering relative application dates according to FOCUS:

i) application window ends 20 days before emergence ("early application")

ii) application window starts 7 days after harvest ("late application").

For perennial crops ('pome/stone fruit', 'olives' 'vines' and 'grass/alfalfa'), two sets of simulations were conducted considering absolute application dates:

i) application window starts 15-Mar ("early application")

ii) application starts 15-Sep ("late application").

A summary of the application dates used in the modelling at Step 3 is presented below.

Table 8.5.1-4: Application dates used in modelling at Step 3

Crop (use)	FOCUS scenario	Application window (early)[1]	Application window (late)[1]
Vegetables, root (1 × application)	D3	06-Mar (65) - 05-Apr (95)	22-Aug (234) - 21-Sep (264)
	D6	06-Jan (6) - 05-Feb (36)	20-May (140) - 19-Jun (170)
	R1	01-Mar (60) - 31-Mar (90)	17-Aug (229) - 16-Sep (259)
	R2 (1st)	09-Jan (9) - 08-Feb (39)	07-Jun (158) - 07-Jul (188)
	R2 (2nd)	02-Jun (153) - 02-Jul (183)	22-Oct (295) - 21-Nov (325)
	R3	07-Jan (7) - 06-Feb (37)	20-May (140) - 19-Jun (170)
	R4	07-Jan (7) - 06-Feb (37)	20-May (140) - 19-Jun (170)
Vegetables, root (2 × application)	D3	06-Feb (37) - 05-Apr (95)	22-Aug (234) - 19-Oct (292)
	D6	09-Dec (343) - 05-Feb (36)	20-May (140) - 17-Jul (198)
	R1	01-Feb (32) - 31-Mar (90)	17-Aug (229) - 14-Oct (287)
	R2 (1st)	12-Dec (346) - 08-Feb (39)	07-Jun (158) - 04-Aug (216)
	R2 (2nd)	05-May (125) - 02-Jul (183)	22-Oct (295) - 19-Dec (353)
	R3	10-Dec (344) - 06-Feb (37)	20-May (140) - 17-Jul (198)
	R4	10-Dec (344) - 06-Feb (37)	20-May (140) - 17-Jul (198)
Vegetables, root (3 × application)	D3	09-Jan (9) - 05-Apr (95)	22-Aug (234) - 16-Nov (320)
	D6	11-Nov (315) - 05-Feb (36)	20-May (140) - 14-Aug (226)
	R1	04-Jan (4) - 31-Mar (90)	17-Aug (229) - 11-Nov (315)

Table 8.5.1-4: Application dates used in modelling at Step 3

Crop (use)	FOCUS scenario	Application window (early)[1]	Application window (late)[1]
	R2 (1st)	14-Nov (318) - 08-Feb (39)	07-Jun (158) - 01-Sep (244)
	R2 (2nd)	07-Apr (97) - 02-Jul (183)	22-Oct (295) - 16-Jan (16)
	R3	12-Nov (316) - 06-Feb (37)	20-May (140) - 14-Aug (226)
	R4	12-Nov (316) - 06-Feb (37)	20-May (140) - 14-Aug (226)
Potatoes (1 × application)	D3	21-Mar (80) - 20-Apr (110)	22-Sep (265) - 22-Oct (295)
	D4	02-Apr (92) - 02-May (122)	30-Sep (273) - 30-Oct (303)
	D6 (1st)	19-Feb (50) - 21-Mar (80)	22-Jul (203) - 21-Aug (233)
	D6 (2nd)	16-Jun (167) - 16-Jul (197)	02-Dec (336) - 01-Jan (1)
	R1	16-Mar (75) - 15-Apr (105)	15-Sep (258) - 15-Oct (288)
	R2	24-Jan (24) - 23-Feb (54)	22-Jun (173) - 22-Jul (203)
	R3	19-Feb (50) - 21-Mar (80)	08-Sep (251) - 08-Oct (281)
Potatoes (2 × application)	D3	21-Feb (52) - 20-Apr (110)	22-Sep (265) - 19-Nov (323)
	D4	05-Mar (64) - 02-May (122)	30-Sep (273) - 27-Nov (331)
	D6 (1st)	22-Jan (22) - 21-Mar (80)	22-Jul (203) - 18-Sep (261)
	D6 (2nd)	19-May (139) - 16-Jul (197)	02-Dec (336) - 29-Jan (29)
	R1	16-Feb (47) - 15-Apr (105)	15-Sep (258) - 12-Nov (316)
	R2	27-Dec (361) - 23-Feb (54)	22-Jun (173) - 19-Aug (231)
	R3	22-Jan (22) - 21-Mar (80)	08-Sep (251) - 05-Nov (309)
Potatoes (3 × application)	D3	24-Jan (24) - 20-Apr (110)	22-Sep (265) - 17-Dec (351)
	D4	05-Feb (36) - 02-May (122)	30-Sep (273) - 25-Dec (359)
	D6 (1st)	25-Dec (359) - 21-Mar (80)	22-Jul (203) - 16-Oct (289)
	D6 (2nd)	21-Apr (111) - 16-Jul (197)	02-Dec (336) - 26-Feb (57)
	R1	19-Jan (19) - 15-Apr (105)	15-Sep (258) - 10-Dec (344)
	R2	29-Nov (333) - 23-Feb (54)	22-Jun (173) - 16-Sep (259)
	R3	25-Dec (359) - 21-Mar (80)	08-Sep (251) - 03-Dec (337)
Vegetables, bulb (1 × application)	D3	06-Mar (65) - 05-Apr (95)	08-Sep (251) - 08-Oct (281)
	D4	04-Mar (63) - 03-Apr (93)	20-Sep (263) - 20-Oct (293)
	D6 (1st)	21-Mar (80) - 20-Apr (110)	07-Aug (219) - 06-Sep (249)
	D6 (2nd)	31-Aug (243) - 30-Sep (273)	17-Apr (107) - 17-May (137)
	R1	01-Mar (60) - 31-Mar (90)	01-Sep (244) - 01-Oct (274)
	R2	09-Jan (9) - 08-Feb (39)	07-Jun (158) - 07-Jul (188)
	R3	10-Jan (10) - 09-Feb (40)	07-Jun (158) - 07-Jul (188)
	R4	10-Jan (10) - 09-Feb (40)	07-Jun (158) - 07-Jul (188)
Vegetables, bulb (2 × application)	D3	06-Feb (37) - 05-Apr (95)	08-Sep (251) - 05-Nov (309)
	D4	04-Feb (35) - 03-Apr (93)	20-Sep (263) - 17-Nov (321)
	D6 (1st)	21-Feb (52) - 20-Apr (110)	07-Aug (219) - 04-Oct (277)
	D6 (2nd)	03-Aug (215) - 30-Sep (273)	17-Apr (107) - 14-Jun (165)
	R1	01-Feb (32) - 31-Mar (90)	01-Sep (244) - 29-Oct (302)
	R2	12-Dec (346) - 08-Feb (39)	07-Jun (158) - 04-Aug (216)
	R3	13-Dec (347) - 09-Feb (40)	07-Jun (158) - 04-Aug (216)
	R4	13-Dec (347) - 09-Feb (40)	07-Jun (158) - 04-Aug (216)
Vegetables, bulb (3 × application)	D3	09-Jan (9) - 05-Apr (95)	08-Sep (251) - 03-Dec (337)
	D4	07-Jan (7) - 03-Apr (93)	20-Sep (263) - 15-Dec (349)

Table 8.5.1-4: Application dates used in modelling at Step 3

Crop (use)	FOCUS scenario	Application window (early)[1]	Application window (late)[1]
	D6 (1st)	24-Jan (24) - 20-Apr (110)	07-Aug (219) - 01-Nov (305)
	D6 (2nd)	06-Jul (187) - 30-Sep (273)	17-Apr (107) - 12-Jul (193)
	R1	04-Jan (4) - 31-Mar (90)	01-Sep (244) - 26-Nov (330)
	R2	14-Nov (318) - 08-Feb (39)	07-Jun (158) - 01-Sep (244)
	R3	15-Nov (319) - 09-Feb (40)	07-Jun (158) - 01-Sep (244)
	R4	15-Nov (319) - 09-Feb (40)	07-Jun (158) - 01-Sep (244)
Vegetables, fruiting (1 × application)	D6	19-Feb (50) - 21-Mar (80)	17-Aug (229) - 16-Sep (259)
	R2	24-Jan (24) - 23-Feb (54)	07-Sep (250) - 07-Oct (280)
	R3	21-Mar (80) - 20-Apr (110)	01-Sep (244) - 01-Oct (274)
	R4	01-Mar (60) - 31-Mar (90)	22-Jul (203) - 21-Aug (233)
Vegetables, fruiting (2 × application)	D6	22-Jan (22) - 21-Mar (80)	17-Aug (229) - 14-Oct (287)
	R2	27-Dec (361) - 23-Feb (54)	07-Sep (250) - 04-Nov (308)
	R3	21-Feb (52) - 20-Apr (110)	01-Sep (244) - 29-Oct (302)
	R4	01-Feb (32) - 31-Mar (90)	22-Jul (203) - 18-Sep (261)
Vegetables, fruiting (3 × application)	D6	25-Dec (359) - 21-Mar (80)	17-Aug (229) - 11-Nov (315)
	R2	29-Nov (333) - 23-Feb (54)	07-Sep (250) - 02-Dec (336)
	R3	24-Jan (24) - 20-Apr (110)	01-Sep (244) - 26-Nov (330)
	R4	04-Jan (4) - 31-Mar (90)	22-Jul (203) - 16-Oct (289)
Vegetables, leafy (1 × application)	D3 (1st)	06-Mar (65) - 05-Apr (95)	27-Jul (208) - 26-Aug (238)
	D3 (2nd)	16-Jun (167) - 16-Jul (197)	27-Oct (300) - 26-Nov (330)
	D4	21-Mar (80) - 20-Apr (110)	03-Oct (276) - 02-Nov (306)
	D6	26-Jun (177) - 26-Jul (207)	07-Dec (341) - 06-Jan (6)
	R1 (1st)	01-Mar (60) - 31-Mar (90)	22-Jul (203) - 21-Aug (233)
	R1 (2nd)	11-Jun (162) - 11-Jul (192)	22-Oct (295) - 21-Nov (325)
	R2 (1st)	09-Jan (9) - 08-Feb (39)	08-Jul (189) - 07-Aug (219)
	R2 (2nd)	11-Jun (162) - 11-Jul (192)	22-Nov (326) - 22-Dec (356)
	R3 (1st)	10-Jan (10) - 09-Feb (40)	08-Jun (159) - 08-Jul (189)
	R3 (2nd)	26-Apr (116) - 26-May (146)	22-Sep (265) - 22-Oct (295)
	R4 (1st)	10-Jan (10) - 09-Feb (40)	08-Jun (159) - 08-Jul (189)
	R4 (2nd)	26-Apr (116) - 26-May (146)	22-Sep (265) - 22-Oct (295)
Vegetables, leafy (2 × application)	D3 (1st)	06-Feb (37) - 05-Apr (95)	27-Jul (208) - 23-Sep (266)
	D3 (2nd)	19-May (139) - 16-Jul (197)	27-Oct (300) - 24-Dec (358)
	D4	21-Feb (52) - 20-Apr (110)	03-Oct (276) - 30-Nov (334)
	D6	29-May (149) - 26-Jul (207)	07-Dec (341) - 03-Feb (34)
	R1 (1st)	01-Feb (32) - 31-Mar (90)	22-Jul (203) - 18-Sep (261)
	R1 (2nd)	14-May (134) - 11-Jul (192)	22-Oct (295) - 19-Dec (353)
	R2 (1st)	12-Dec (346) - 08-Feb (39)	08-Jul (189) - 04-Sep (247)
	R2 (2nd)	14-May (134) - 11-Jul (192)	22-Nov (326) - 19-Jan (19)
	R3 (1st)	13-Dec (347) - 09-Feb (40)	08-Jun (159) - 05-Aug (217)
	R3 (2nd)	29-Mar (88) - 26-May (146)	22-Sep (265) - 19-Nov (323)
	R4 (1st)	13-Dec (347) - 09-Feb (40)	08-Jun (159) - 05-Aug (217)
	R4 (2nd)	29-Mar (88) - 26-May (146)	22-Sep (265) - 19-Nov (323)
Vegetables, leafy	D3 (1st)	09-Jan (9) - 05-Apr (95)	27-Jul (208) - 21-Oct (294)

Table 8.5.1-4: Application dates used in modelling at Step 3

Crop (use)	FOCUS scenario	Application window (early)[1]	Application window (late)[1]
(3 × application)	D3 (2nd)	21-Apr (111) - 16-Jul (197)	27-Oct (300) - 21-Jan (21)
	D4	24-Jan (24) - 20-Apr (110)	03-Oct (276) - 28-Dec (362)
	D6	01-May (121) - 26-Jul (207)	07-Dec (341) - 03-Mar (62)
	R1 (1st)	04-Jan (4) - 31-Mar (90)	22-Jul (203) - 16-Oct (289)
	R1 (2nd)	16-Apr (106) - 11-Jul (192)	22-Oct (295) - 16-Jan (16)
	R2 (1st)	14-Nov (318) - 08-Feb (39)	08-Jul (189) - 02-Oct (275)
	R2 (2nd)	16-Apr (106) - 11-Jul (192)	22-Nov (326) - 16-Feb (47)
	R3 (1st)	15-Nov (319) - 09-Feb (40)	08-Jun (159) - 02-Sep (245)
	R3 (2nd)	01-Mar (60) - 26-May (146)	22-Sep (265) - 17-Dec (351)
	R4 (1st)	15-Nov (319) - 09-Feb (40)	08-Jun (159) - 02-Sep (245)
	R4 (2nd)	01-Mar (60) - 26-May (146)	22-Sep (265) - 17-Dec (351)
Sugar beets (1 × application)	D3	06-Mar (65) - 05-Apr (95)	25-Oct (298) - 24-Nov (328)
	D4	15-Mar (74) - 14-Apr (104)	01-Nov (305) - 01-Dec (335)
	R1	25-Feb (56) - 27-Mar (86)	17-Oct (290) - 16-Nov (320)
	R3	29-Jan (29) - 28-Feb (59)	10-Sep (253) - 10-Oct (283)
Sugar beets (2 × application)	D3	06-Feb (37) - 05-Apr (95)	25-Oct (298) - 22-Dec (356)
	D4	15-Feb (46) - 14-Apr (104)	01-Nov (305) - 29-Dec (363)
	R1	28-Jan (28) - 27-Mar (86)	17-Oct (290) - 14-Dec (348)
	R3	01-Jan (1) - 28-Feb (59)	10-Sep (253) - 07-Nov (311)
Sugar beets (3 × application)	D3	09-Jan (9) - 05-Apr (95)	25-Oct (298) - 19-Jan (19)
	D4	18-Jan (18) - 14-Apr (104)	01-Nov (305) - 26-Jan (26)
	R1	31-Dec (365) - 27-Mar (86)	17-Oct (290) - 11-Jan (11)
	R3	04-Dec (338) - 28-Feb (59)	10-Sep (253) - 05-Dec (339)
Pome/stone fruit (1 × application)	D3	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D4	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D5	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R1	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R2	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R3	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R4	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
Pome/stone fruit (2 × application)	D3	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	D4	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	D5	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R1	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R2	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R3	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R4	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
Pome/stone fruit (3 × application)	D3	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	D4	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	D5	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R1	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R2	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R3	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)

Table 8.5.1-4: Application dates used in modelling at Step 3

Crop (use)	FOCUS scenario	Application window (early)[1]	Application window (late)[1]
	R4	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
Olives (1 × application)	D6	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R4	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
Olives (2 × application)	D6	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R4	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
Olives (3 × application)	D6	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R4	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
Vines (1 × application)	D6	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R1	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R2	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R3	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R4	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
Vines (2 × application)	D6	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R1	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R2	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R3	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R4	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
Vines (3 × application)	D6	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R1	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R2	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R3	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R4	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
Grass/alfalfa (1 × application)	D1	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D2	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D3	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D4	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D5	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R2	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R3	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)

[1] Values in brackets specify 'Julian Day'

II. RESULTS AND DISCUSSION

Maximum concentrations by use and scenario are given for glyphosate, AMPA and HMPA in the tables below. Since runoff/drainage and drift loadings of active substance and metabolites are equivalent at Steps 1 and 2 for all crops selected for modelling, results for metabolites are presented in a single table for each simulated use pattern.

PEC_{sw} and PEC_{sed} for glyphosate

PEC calculations for 1 x 720 and 3 x 720 g/haq/ha

Table 8.5.1-5 : FOCUS Step 1, 2 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables root, potatoes, vegetables bulb, vegetables fruiting, vegetables leafy, sugarbeet, pome/stone fruits, olives, vines (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246

Table 8.5.1-6: FOCUS Step 1, 2 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables root, potatoes, vegetables bulb, vegetables fruiting, vegetables leafy, sugarbeet, pome/stone fruits, olives, vines (3 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000

Table 8.5.1-7: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	4.479	Drift	2.919
D6	Ditch	4.444	Drift	1.726
R1	Pond	0.150	Drift	4.955
R1	Stream	2.960	Drift	36.340
R2	Stream	3.875	Drift	513.500
R2	Stream 2nd	3.976	Drift	105.500
R3	Stream	4.182	Drift	14.380
R4	Stream	2.924	Drift	17.380

Table 8.5.1-8: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.263	Drift	4.606
D6	Ditch	3.292	Drift	10.430
R1	Pond	0.490	Runoff	22.350
R1	Stream	2.422	Runoff	214.600
R2	Stream	2.840	Drift	1353.600
R2	Stream 2nd	2.884	Drift	314.000
R3	Stream	3.041	Drift	296.300
R4	Stream	3.495	Runoff	85.490

Table 8.5.1-9: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	4.495	Drift	4.151
D6	Ditch	4.507	Drift	6.978
R1	Pond	0.152	Drift	6.540
R1	Stream	2.962	Drift	68.110
R2	Stream	3.976	Drift	30.640
R2	Stream 2nd	3.931	Drift	396.100
R3	Stream	4.183	Drift	2.729
R4	Stream	2.911	Drift	11.790

Table 8.5.1-10: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.272	Drift	4.775
D6	Ditch	3.354	Drift	21.890
R1	Pond	0.705	Runoff	30.830
R1	Stream	2.145	Drift	271.200
R2	Stream	2.880	Drift	196.100
R2	Stream 2nd	2.847	Drift	1370.300
R3	Stream	3.030	Drift	23.890
R4	Stream	2.144	Drift	173.000

Table 8.5.1-11: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.704	Drift	2.559
D4	Pond	0.146	Drift	2.239
D4	Stream	2.965	Drift	0.108
D6	Ditch	3.664	Drift	1.237
D6	Ditch 2nd	3.685	Drift	1.693
R1	Pond	0.146	Drift	4.351
R1	Stream	2.567	Drift	30.110
R2	Stream	3.316	Drift	613.100
R3	Stream	3.626	Drift	19.820

Table 8.5.1-12: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	2.686	Drift	3.823
D4	Pond	0.159	Drift	4.458
D4	Stream	2.248	Drift	0.236
D6	Ditch	2.692	Drift	3.831
D6	Ditch 2nd	2.673	Drift	2.543
R1	Pond	0.482	Runoff	20.410
R1	Stream	1.847	Drift	208.200
R2	Stream	2.427	Drift	1280.700
R3	Stream	2.704	Drift	47.340

Table 8.5.1-13: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.702	Drift	2.419
D4	Pond	0.146	Drift	2.375
D4	Stream	3.151	Drift	0.197
D6	Ditch	3.729	Drift	7.716
D6	Ditch 2nd	3.741	Drift	13.680
R1	Pond	0.160	Runoff	10.110
R1	Stream	2.568	Drift	107.400
R2	Stream	3.448	Drift	49.660
R3	Stream	3.621	Drift	200.500

Table 8.5.1-14: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	2.684	Drift	3.460
D4	Pond	0.162	Drift	4.376
D4	Stream	2.321	Drift	0.412
D6	Ditch	2.704	Drift	5.626
D6	Ditch 2nd	2.713	Drift	10.010
R1	Pond	1.017	Runoff	41.600
R1	Stream	2.140	Runoff	365.700
R2	Stream	2.489	Drift	370.800
R3	Stream	2.614	Drift	684.700

Table 8.5.1-15: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	4.479	Drift	2.921
D4	Pond	0.150	Drift	2.300
D4	Stream	3.272	Drift	0.091
D6	Ditch	4.473	Drift	2.565
D6	Ditch 2nd	4.526	Drift	15.930
R1	Pond	0.150	Drift	4.424
R1	Stream	2.960	Drift	30.440
R2	Stream	3.874	Drift	513.400
R3	Stream	4.182	Drift	9.843
R4	Stream	2.923	Drift	17.420

Table 8.5.1-16: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.263	Drift	4.608
D4	Pond	0.153	Drift	4.681
D4	Stream	2.512	Drift	0.215
D6	Ditch	3.256	Drift	3.088
D6	Ditch 2nd	3.371	Drift	24.750
R1	Pond	0.492	Runoff	22.520
R1	Stream	2.426	Runoff	215.100
R2	Stream	2.839	Drift	1352.800
R3	Stream	3.041	Drift	317.000

Table 8.5.1-16: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R4	Stream	3.503	Runoff	86.140

Table 8.5.1-17: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	4.477	Drift	2.767
D4	Pond	0.150	Drift	2.431
D4	Stream	3.541	Drift	0.169
D6	Ditch	4.526	Drift	15.750
D6	Ditch 2nd	4.390	Drift	0.931
R1	Pond	0.156	Runoff	9.841
R1	Stream	2.962	Drift	106.800
R2	Stream	3.976	Drift	30.650
R3	Stream	4.176	Drift	1.563
R4	Stream	2.961	Drift	5.874

Table 8.5.1-18: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.259	Drift	4.173
D4	Pond	0.173	Drift	4.581
D4	Stream	2.661	Drift	0.401
D6	Ditch	3.340	Drift	20.250
D6	Ditch 2nd	3.311	Drift	15.520
R1	Pond	1.006	Runoff	40.690
R1	Stream	2.145	Drift	366.300
R2	Stream	2.880	Drift	171.800
R3	Stream	3.029	Drift	143.900
R4	Stream	2.144	Drift	102.500

Table 8.5.1-19: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	4.433	Drift	1.497
R2	Stream	3.825	Drift	613.800
R3	Stream	4.163	Drift	86.160
R4	Stream	2.950	Drift	50.180

Table 8.5.1-20: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	3.270	Drift	4.605
R2	Stream	2.808	Drift	1282.400
R3	Stream	3.030	Drift	70.930
R4	Stream	3.780	Runoff	366.500

Table 8.5.1-21: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	4.517	Drift	11.910
R2	Stream	3.976	Drift	414.500
R3	Stream	4.183	Drift	201.100
R4	Stream	2.961	Drift	30.620

Table 8.5.1-22: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	3.341	Drift	20.410
R2	Stream	2.880	Drift	1622.300
R3	Stream	3.029	Drift	686.200
R4	Stream	2.145	Drift	236.900

Table 8.5.1-23: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	4.479	Drift	2.891
D3	Ditch 2nd	4.491	Drift	3.719
D4	Pond	0.150	Drift	2.309
D4	Stream	3.419	Drift	0.124
D6	Ditch	4.526	Drift	15.860
R1	Pond	0.150	Drift	4.984
R1	Pond 2nd	0.321	Runoff	16.570
R1	Stream	2.960	Drift	53.560
R1	Stream 2nd	2.937	Drift	357.400
R2	Stream	3.875	Drift	513.600
R2	Stream 2nd	3.976	Drift	118.000
R3	Stream	4.182	Drift	27.560
R3	Stream 2nd	4.183	Drift	84.400
R4	Stream	2.925	Drift	23.970
R4	Stream 2nd	2.908	Drift	264.300

Table 8.5.1-24: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.263	Drift	4.564
D3	Ditch 2nd	3.270	Drift	5.999
D4	Pond	0.142	Drift	4.626
D4	Stream	2.556	Drift	0.268
D6	Ditch	3.344	Drift	20.770
R1	Pond	0.489	Runoff	22.310
R1	Pond 2nd	0.381	Drift	27.110
R1	Stream	2.419	Runoff	214.300
R1	Stream 2nd	2.157	Drift	486.800
R2	Stream	2.840	Drift	1353.700
R2	Stream 2nd	2.884	Drift	313.900
R3	Stream	3.041	Drift	316.700
R3	Stream 2nd	3.042	Drift	292.000
R4	Stream	3.371	Runoff	84.360

Table 8.5.1-24: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R4	Stream 2nd	3.120	Runoff	581.900

Table 8.5.1-25: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	4.494	Drift	4.072
D3	Ditch 2nd	4.456	Drift	1.915
D4	Pond	0.150	Drift	2.440
D4	Stream	3.612	Drift	0.212
D6	Ditch	4.526	Drift	16.430
R1	Pond	0.152	Drift	5.981
R1	Pond 2nd	0.280	Runoff	15.130
R1	Stream	2.914	Drift	67.390
R1	Stream 2nd	2.959	Drift	176.200
R2	Stream	3.976	Drift	99.180
R2	Stream 2nd	3.916	Drift	548.900
R3	Stream	4.183	Drift	208.400
R3	Stream 2nd	4.172	Drift	201.000
R4	Stream	2.961	Drift	143.800
R4	Stream 2nd	2.961	Drift	168.500

Table 8.5.1-26: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.271	Drift	4.962
D3	Ditch 2nd	3.254	Drift	3.815
D4	Pond	0.172	Drift	4.504
D4	Stream	2.685	Drift	0.481
D6	Ditch	3.295	Drift	12.060
R1	Pond	0.492	Runoff	27.790
R1	Pond 2nd	1.243	Runoff	48.270
R1	Stream	2.147	Drift	267.100
R1	Stream 2nd	2.255	Runoff	462.000
R2	Stream	2.880	Drift	483.000
R2	Stream 2nd	2.836	Drift	1300.300
R3	Stream	3.044	Drift	542.600
R3	Stream 2nd	3.022	Drift	686.100
R4	Stream	2.151	Drift	383.000
R4	Stream 2nd	3.555	Runoff	739.300

Table 8.5.1-27: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.704	Drift	2.538
D4	Pond	0.145	Drift	2.233
D4	Stream	2.837	Drift	0.079
R1	Pond	0.146	Drift	4.158
R1	Stream	2.487	Drift	25.610
R3	Stream	3.626	Drift	19.100

Table 8.5.1-28: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	2.688	Drift	4.056
D4	Pond	0.148	Drift	4.542
D4	Stream	2.171	Drift	0.187
R1	Pond	0.431	Runoff	18.480
R1	Stream	2.452	Runoff	161.000
R3	Stream	2.619	Drift	67.010

Table 8.5.1-29: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.702	Drift	2.415
D4	Pond	0.146	Drift	2.306
D4	Stream	3.246	Drift	0.314
R1	Pond	0.235	Runoff	13.340
R1	Stream	2.568	Drift	156.200
R3	Stream	3.617	Drift	200.500

Table 8.5.1-30: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	2.685	Drift	4.033
D4	Pond	0.145	Drift	4.299
D4	Stream	2.380	Drift	0.516
R1	Pond	1.230	Runoff	46.500
R1	Stream	2.236	Runoff	459.800
R3	Stream	2.611	Drift	684.800

Table 8.5.1-31: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	1.889	Drift	1.384
D4	Pond	0.120	Drift	1.858
D4	Stream	1.449	Drift	0.040
D5	Pond	0.120	Drift	1.926
D5	Stream	1.599	Drift	0.049
R1	Pond	0.120	Drift	1.893
R1	Stream	1.311	Drift	0.569
R2	Stream	1.727	Drift	2.663
R3	Stream	1.837	Drift	1.290
R4	Stream	1.302	Drift	2.976

Table 8.5.1-32: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	1.357	Drift	2.845
D4	Pond	0.120	Drift	3.630
D4	Stream	1.171	Drift	0.156
D5	Pond	0.137	Drift	3.772

Table 8.5.1-32: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D5	Stream	1.321	Drift	0.496
R1	Pond	0.127	Drift	3.635
R1	Stream	0.934	Drift	1.872
R2	Stream	1.253	Drift	6.319
R3	Stream	1.321	Drift	1.609
R4	Stream	1.280	Runoff	6.753

Table 8.5.1-33: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	1.899	Drift	2.537
D4	Pond	0.120	Drift	2.037
D4	Stream	1.679	Drift	0.203
D5	Pond	0.120	Drift	2.081
D5	Stream	1.854	Drift	0.541
R1	Pond	0.120	Drift	2.024
R1	Stream	1.312	Drift	1.358
R2	Stream	1.762	Drift	13.100
R3	Stream	1.853	Drift	23.140
R4	Stream	1.311	Drift	7.161

Table 8.5.1-34: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	1.360	Drift	3.362
D4	Pond	0.138	Drift	3.778
D4	Stream	1.196	Drift	0.337
D5	Pond	0.140	Drift	4.165
D5	Stream	1.322	Drift	1.010
R1	Pond	0.134	Drift	4.958
R1	Stream	1.388	Runoff	4.428
R2	Stream	1.255	Drift	46.210
R3	Stream	1.321	Drift	29.010
R4	Stream	2.397	Runoff	23.020

Table 8.5.1-35: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	1.905	Drift	5.792
R4	Stream	1.303	Drift	3.647

Table 8.5.1-36: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	1.392	Drift	11.100
R4	Stream	1.710	Runoff	9.308

Table 8.5.1-37: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	1.907	Drift	6.973
R4	Stream	1.311	Drift	9.064

Table 8.5.1-38: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	1.395	Drift	12.080
R4	Stream	2.733	Runoff	27.420

Table 8.5.1-39: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	1.898	Drift	2.523
R1	Pond	0.120	Drift	1.897
R1	Stream	1.310	Drift	0.796
R2	Stream	1.726	Drift	2.970
R3	Stream	1.834	Drift	1.216
R4	Stream	1.299	Drift	3.314

Table 8.5.1-40: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	1.386	Drift	9.822
R1	Pond	0.128	Drift	3.726
R1	Stream	0.934	Drift	2.843
R2	Stream	1.251	Drift	7.826
R3	Stream	1.321	Drift	1.536
R4	Stream	1.658	Runoff	8.677

Table 8.5.1-41: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	1.907	Drift	6.973
R1	Pond	0.120	Drift	2.017
R1	Stream	1.312	Drift	1.343
R2	Stream	1.762	Drift	13.070
R3	Stream	1.853	Drift	22.850
R4	Stream	1.311	Drift	8.137

Table 8.5.1-42: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	1.395	Drift	12.080
R1	Pond	0.134	Drift	4.933
R1	Stream	1.353	Runoff	4.386
R2	Stream	1.255	Drift	46.280
R3	Stream	1.321	Drift	28.620

Table 8.5.1-42: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R4	Stream	2.775	Runoff	25.340

PEC calculations for 1 x 1440 g/ha and 2 x 1440 g/ha

Table 8.5.1-43: FOCUS Step 1, 2 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables root, potatoes, vegetables bulb, vegetables fruiting, vegetables leafy, sugarbeet, pome/stone fruits, olives, vines (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000

Table 8.5.1-44: FOCUS Step 1, 2 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruits, olives, vines (2 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	170.688	-	6260.000
Step 2				
Northern Europe	Mar-May	23.871	-	951.571
Northern Europe	Jun-Sep	23.871	-	951.571
Northern Europe	Oct-Feb	52.829	-	2170.000
Southern Europe	Mar-May	43.176	-	1770.000
Southern Europe	Jun-Sep	33.523	-	1360.000
Southern Europe	Oct-Feb	43.176	-	1770.000

Table 8.5.1-45: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	8.987	Drift	5.836
D6	Ditch	8.916	Drift	3.457
R1	Pond	0.303	Drift	10.430
R1	Stream	5.942	Drift	67.730
R2	Stream	7.775	Drift	973.300
R2	Stream 2nd	7.979	Drift	208.600
R3	Stream	8.392	Drift	25.250
R4	Stream	5.870	Drift	29.270

Table 8.5.1-46: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	9.019	Drift	8.284
D6	Ditch	9.043	Drift	13.850
R1	Pond	0.307	Drift	13.290
R1	Stream	5.945	Drift	114.900

Table 8.5.1-46: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R2	Stream	7.979	Drift	60.760
R2	Stream 2nd	7.888	Drift	736.800
R3	Stream	8.393	Drift	5.228
R4	Stream	5.843	Drift	20.770

Table 8.5.1-47: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	7.433	Drift	5.117
D4	Pond	0.294	Drift	4.346
D4	Stream	5.951	Drift	0.216
D6	Ditch	7.353	Drift	2.480
D6	Ditch 2nd	7.396	Drift	3.391
R1	Pond	0.294	Drift	9.086
R1	Stream	5.153	Drift	56.510
R2	Stream	6.656	Drift	1185.300
R3	Stream	7.277	Drift	36.370

Table 8.5.1-48: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	7.428	Drift	4.840
D4	Pond	0.294	Drift	4.603
D4	Stream	6.324	Drift	0.396
D6	Ditch	7.484	Drift	15.270
D6	Ditch 2nd	7.507	Drift	26.820
R1	Pond	0.419	Runoff	20.880
R1	Stream	5.156	Drift	181.900
R2	Stream	6.920	Drift	96.060
R3	Stream	7.266	Drift	346.200

Table 8.5.1-49: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	8.987	Drift	5.840
D4	Pond	0.303	Drift	4.457
D4	Stream	6.567	Drift	0.183
D6	Ditch	8.975	Drift	5.133
D6	Ditch 2nd	9.082	Drift	31.250
R1	Pond	0.303	Drift	9.224
R1	Stream	5.942	Drift	57.140
R2	Stream	7.775	Drift	972.900
R3	Stream	8.391	Drift	17.410
R4	Stream	5.867	Drift	29.180

Table 8.5.1-50: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	8.982	Drift	5.534

Table 8.5.1-50: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D4	Pond	0.303	Drift	4.709
D4	Stream	7.106	Drift	0.339
D6	Ditch	9.082	Drift	30.900
D6	Ditch 2nd	8.810	Drift	1.868
R1	Pond	0.408	Runoff	20.320
R1	Stream	5.945	Drift	181.000
R2	Stream	7.979	Drift	60.760
R3	Stream	8.379	Drift	2.986
R4	Stream	5.944	Drift	10.300

Table 8.5.1-51: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	8.896	Drift	2.999
R2	Stream	7.676	Drift	1186.900
R3	Stream	8.354	Drift	163.600
R4	Stream	5.921	Drift	85.970

Table 8.5.1-52: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	9.064	Drift	23.440
R2	Stream	7.979	Drift	774.700
R3	Stream	8.393	Drift	347.100
R4	Stream	5.944	Drift	52.510

Table 8.5.1-53: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	8.986	Drift	5.781
D3	Ditch 2nd	9.010	Drift	7.427
D4	Pond	0.303	Drift	4.481
D4	Stream	6.862	Drift	0.249
D6	Ditch	9.082	Drift	31.110
R1	Pond	0.303	Drift	10.070
R1	Pond 2nd	0.801	Runoff	33.560
R1	Stream	5.942	Drift	91.630
R1	Stream 2nd	5.895	Drift	672.800
R2	Stream	7.776	Drift	973.500
R2	Stream 2nd	7.979	Drift	234.300
R3	Stream	8.392	Drift	47.570
R3	Stream 2nd	8.393	Drift	155.300
R4	Stream	5.870	Drift	36.710
R4	Stream 2nd	5.838	Drift	472.800

Table 8.5.1-54: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	9.017	Drift	8.127

Table 8.5.1-54: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D3	Ditch 2nd	8.941	Drift	3.835
D4	Pond	0.303	Drift	4.727
D4	Stream	7.249	Drift	0.425
D6	Ditch	9.082	Drift	32.200
R1	Pond	0.308	Drift	12.140
R1	Pond 2nd	0.729	Runoff	31.810
R1	Stream	5.849	Drift	117.100
R1	Stream 2nd	5.939	Drift	311.800
R2	Stream	7.979	Drift	191.400
R2	Stream 2nd	7.857	Drift	1026.000
R3	Stream	8.393	Drift	400.100
R3	Stream 2nd	8.372	Drift	346.800
R4	Stream	5.944	Drift	256.900
R4	Stream 2nd	5.944	Drift	281.600

Table 8.5.1-55: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	7.432	Drift	5.076
D4	Pond	0.294	Drift	4.327
D4	Stream	5.695	Drift	0.159
R1	Pond	0.296	Drift	8.662
R1	Stream	4.993	Drift	48.080
R3	Stream	7.277	Drift	35.180

Table 8.5.1-56: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	7.429	Drift	4.831
D4	Pond	0.294	Drift	4.461
D4	Stream	6.516	Drift	0.630
R1	Pond	0.617	Runoff	27.950
R1	Stream	5.155	Drift	273.900
R3	Stream	7.259	Drift	346.000

Table 8.5.1-57: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.795	Drift	2.772
D4	Pond	0.241	Drift	3.607
D4	Stream	2.911	Drift	0.081
D5	Pond	0.241	Drift	3.746
D5	Stream	3.211	Drift	0.099
R1	Pond	0.241	Drift	3.673
R1	Stream	2.633	Drift	1.100
R2	Stream	3.469	Drift	5.149
R3	Stream	3.688	Drift	2.694
R4	Stream	2.615	Drift	5.369

Table 8.5.1-58: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, early application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.222	Drift	4.453
D4	Pond	0.266	Drift	5.680
D4	Stream	2.557	Drift	0.156
D5	Pond	0.269	Drift	5.852
D5	Stream	2.960	Drift	0.299
R1	Pond	0.252	Drift	5.707
R1	Stream	2.214	Drift	2.609
R2	Stream	2.922	Drift	7.911
R3	Stream	3.117	Drift	3.294
R4	Stream	3.225	Runoff	12.540

Table 8.5.1-59: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.814	Drift	5.064
D4	Pond	0.242	Drift	3.951
D4	Stream	3.372	Drift	0.408
D5	Pond	0.242	Drift	4.040
D5	Stream	3.724	Drift	1.086
R1	Pond	0.242	Drift	3.983
R1	Stream	2.635	Drift	2.348
R2	Stream	3.538	Drift	23.880
R3	Stream	3.721	Drift	41.680
R4	Stream	2.635	Drift	12.200

Table 8.5.1-60: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, late application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.234	Drift	6.511
D4	Pond	0.278	Drift	6.084
D4	Stream	2.835	Drift	0.522
D5	Pond	0.283	Drift	6.473
D5	Stream	3.132	Drift	1.686
R1	Pond	0.267	Drift	7.076
R1	Stream	2.216	Drift	4.937
R2	Stream	2.975	Drift	54.810
R3	Stream	3.130	Drift	41.540
R4	Stream	2.279	Runoff	23.160

Table 8.5.1-61: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	3.825	Drift	11.430
R4	Stream	2.619	Drift	6.651

Table 8.5.1-62: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, early application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				

Table 8.5.1-62: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, early application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D6	Ditch	3.276	Drift	18.240
R4	Stream	4.511	Runoff	17.730

Table 8.5.1-63: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	3.830	Drift	13.750
R4	Stream	2.635	Drift	15.620

Table 8.5.1-64: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, late application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	3.295	Drift	20.590
R4	Stream	2.954	Runoff	30.420

Table 8.5.1-65: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	3.813	Drift	5.038
R1	Pond	0.241	Drift	3.680
R1	Stream	2.632	Drift	1.505
R2	Stream	3.465	Drift	5.726
R3	Stream	3.683	Drift	2.538
R4	Stream	2.609	Drift	5.952

Table 8.5.1-66: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, early application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	3.257	Drift	14.520
R1	Pond	0.252	Drift	5.791
R1	Stream	2.214	Drift	3.598
R2	Stream	2.921	Drift	9.351
R3	Stream	3.112	Drift	3.099
R4	Stream	4.363	Runoff	16.390

Table 8.5.1-67: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	3.830	Drift	13.750
R1	Pond	0.242	Drift	3.967
R1	Stream	2.635	Drift	2.318
R2	Stream	3.538	Drift	23.830
R3	Stream	3.721	Drift	41.180
R4	Stream	2.635	Drift	14.000

Table 8.5.1-68: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, late application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	3.295	Drift	20.590
R1	Pond	0.267	Drift	7.041
R1	Stream	2.216	Drift	4.889
R2	Stream	2.975	Drift	54.840
R3	Stream	3.130	Drift	41.040
R4	Stream	2.994	Runoff	27.890

PEC calculations for 1 x 540 g/ha

Table 8.5.1-69: FOCUS Step 1, 2 PECsw and PECsed for glyphosate following application to vegetables root, potatoes, vegetables bulb, vegetables fruiting, vegetables leafy, sugarbeet, (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684

Table 8.5.1-70: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.354	Drift	2.189
D6	Ditch	3.328	Drift	1.293
R1	Pond	0.112	Drift	3.649
R1	Stream	2.216	Drift	27.950
R2	Stream	2.901	Drift	392.400
R2	Stream 2nd	2.978	Drift	79.450
R3	Stream	3.132	Drift	11.300
R4	Stream	2.189	Drift	13.950

Table 8.5.1-71: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.366	Drift	3.114
D6	Ditch	3.375	Drift	5.245
R1	Pond	0.113	Drift	4.885
R1	Stream	2.218	Drift	54.310
R2	Stream	2.978	Drift	23.050
R2	Stream 2nd	2.944	Drift	304.700
R3	Stream	3.132	Drift	2.077
R4	Stream	2.179	Drift	9.244

Table 8.5.1-72: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	2.773	Drift	1.918
D4	Pond	0.109	Drift	1.697
D4	Stream	2.220	Drift	0.081
D6	Ditch	2.743	Drift	0.927
D6	Ditch 2nd	2.759	Drift	1.268
R1	Pond	0.109	Drift	3.216
R1	Stream	1.921	Drift	23.100
R2	Stream	2.483	Drift	465.200
R3	Stream	2.715	Drift	15.340

Table 8.5.1-73: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	2.772	Drift	1.813
D4	Pond	0.109	Drift	1.802
D4	Stream	2.359	Drift	0.148
D6	Ditch	2.792	Drift	5.806
D6	Ditch 2nd	2.801	Drift	10.330
R1	Pond	0.110	Drift	7.503
R1	Stream	1.922	Drift	85.520
R2	Stream	2.582	Drift	37.680
R3	Stream	2.711	Drift	158.600

Table 8.5.1-74: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.354	Drift	2.190
D4	Pond	0.112	Drift	1.745
D4	Stream	2.450	Drift	0.068
D6	Ditch	3.350	Drift	1.923
D6	Ditch 2nd	3.390	Drift	12.030
R1	Pond	0.112	Drift	3.270
R1	Stream	2.216	Drift	23.340
R2	Stream	2.901	Drift	392.300
R3	Stream	3.132	Drift	7.717
R4	Stream	2.188	Drift	13.990

Table 8.5.1-75: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.352	Drift	2.074
D4	Pond	0.112	Drift	1.844
D4	Stream	2.651	Drift	0.127
D6	Ditch	3.390	Drift	11.890
D6	Ditch 2nd	3.288	Drift	0.697
R1	Pond	0.113	Drift	7.301
R1	Stream	2.218	Drift	84.970
R2	Stream	2.978	Drift	23.060
R3	Stream	3.127	Drift	1.192

Table 8.5.1-75: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R4	Stream	2.217	Drift	4.615

Table 8.5.1-76: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	3.320	Drift	1.121
R2	Stream	2.864	Drift	465.800
R3	Stream	3.118	Drift	65.820
R4	Stream	2.208	Drift	39.820

Table 8.5.1-77: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	3.383	Drift	8.982
R2	Stream	2.978	Drift	318.400
R3	Stream	3.132	Drift	159.100
R4	Stream	2.217	Drift	24.270

Table 8.5.1-78: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.354	Drift	2.168
D3	Ditch 2nd	3.363	Drift	2.789
D4	Pond	0.112	Drift	1.750
D4	Stream	2.560	Drift	0.093
D6	Ditch	3.390	Drift	11.970
R1	Pond	0.112	Drift	3.732
R1	Pond 2nd	0.221	Runoff	12.370
R1	Stream	2.216	Drift	42.520
R1	Stream 2nd	2.199	Drift	273.800
R2	Stream	2.901	Drift	392.400
R2	Stream 2nd	2.978	Drift	88.770
R3	Stream	3.132	Drift	21.790
R3	Stream 2nd	3.132	Drift	65.150
R4	Stream	2.190	Drift	19.990
R4	Stream 2nd	2.177	Drift	206.300

Table 8.5.1-79: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.366	Drift	3.055
D3	Ditch 2nd	3.337	Drift	1.435
D4	Pond	0.112	Drift	1.851
D4	Stream	2.705	Drift	0.159
D6	Ditch	3.390	Drift	12.400
R1	Pond	0.113	Drift	4.468
R1	Pond 2nd	0.188	Runoff	11.150
R1	Stream	2.182	Drift	53.170
R1	Stream 2nd	2.215	Drift	138.000

Table 8.5.1-79: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R2	Stream	2.978	Drift	75.300
R2	Stream 2nd	2.932	Drift	421.600
R3	Stream	3.132	Drift	158.600
R3	Stream 2nd	3.124	Drift	159.000
R4	Stream	2.217	Drift	112.300
R4	Stream 2nd	2.217	Drift	135.000

Table 8.5.1-80: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	2.773	Drift	1.903
D4	Pond	0.109	Drift	1.693
D4	Stream	2.124	Drift	0.059
R1	Pond	0.109	Drift	3.073
R1	Stream	1.862	Drift	19.670
R3	Stream	2.715	Drift	14.760

Table 8.5.1-81: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	2.772	Drift	1.810
D4	Pond	0.109	Drift	1.751
D4	Stream	2.431	Drift	0.235
R1	Pond	0.157	Runoff	9.834
R1	Stream	1.922	Drift	122.800
R3	Stream	2.708	Drift	158.600

PEC calculations for 1 x 1080 g/ha and 2 x 1080 g/ha

Table 8.5.1-82: FOCUS Step 1, 2 PECsw and PECsed for glyphosate following application to vegetables root, potatoes, vegetables bulb, vegetables fruiting, vegetables leafy, sugarbeet (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369

Table 8.5.1-83: FOCUS Step 1, 2 PECsw and PECsed for glyphosate following application to vegetables root, potatoes, vegetables bulb, vegetables fruiting, vegetables leafy, sugarbeet, (2 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000

Table 8.5.1-84: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	6.732	Drift	4.379
D6	Ditch	6.679	Drift	2.591
R1	Pond	0.227	Drift	7.649
R1	Stream	4.450	Drift	52.400
R2	Stream	5.824	Drift	747.600
R2	Stream 2nd	5.977	Drift	157.300
R3	Stream	6.286	Drift	20.050
R4	Stream	4.396	Drift	23.610

Table 8.5.1-85: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	5.880	Drift	6.019
D6	Ditch	5.938	Drift	19.860
R1	Pond	0.452	Runoff	19.360
R1	Stream	3.790	Drift	192.500
R2	Stream	5.035	Drift	1316.700
R2	Stream 2nd	5.166	Drift	488.600
R3	Stream	5.435	Drift	77.270
R4	Stream	3.811	Drift	97.080

Table 8.5.1-86: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	6.756	Drift	6.220
D6	Ditch	6.774	Drift	10.430
R1	Pond	0.229	Drift	9.890
R1	Stream	4.453	Drift	92.860
R2	Stream	5.977	Drift	45.750
R2	Stream 2nd	5.909	Drift	570.600
R3	Stream	6.287	Drift	3.997
R4	Stream	4.376	Drift	16.470

Table 8.5.1-87: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	5.900	Drift	7.557
D6	Ditch	5.970	Drift	26.450
R1	Pond	0.542	Runoff	25.090
R1	Stream	3.848	Drift	203.100
R2	Stream	5.165	Drift	159.500
R2	Stream 2nd	5.106	Drift	1275.000
R3	Stream	5.433	Drift	15.760

Table 8.5.1-87: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R4	Stream	3.847	Drift	79.130

Table 8.5.1-88: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	5.567	Drift	3.839
D4	Pond	0.219	Drift	3.303
D4	Stream	4.457	Drift	0.162
D6	Ditch	5.507	Drift	1.858
D6	Ditch 2nd	5.539	Drift	2.542
R1	Pond	0.219	Drift	6.685
R1	Stream	3.859	Drift	43.580
R2	Stream	4.985	Drift	902.600
R3	Stream	5.451	Drift	28.320

Table 8.5.1-89: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	4.828	Drift	5.402
D4	Pond	0.243	Drift	5.204
D4	Stream	3.833	Drift	0.233
D6	Ditch	4.775	Drift	2.275
D6	Ditch 2nd	4.803	Drift	3.756
R1	Pond	0.499	Runoff	16.440
R1	Stream	3.306	Drift	149.500
R2	Stream	4.345	Drift	1156.400
R3	Stream	4.690	Drift	42.490

Table 8.5.1-90: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	5.564	Drift	3.630
D4	Pond	0.220	Drift	3.500
D4	Stream	4.736	Drift	0.297
D6	Ditch	5.605	Drift	11.510
D6	Ditch 2nd	5.622	Drift	20.290
R1	Pond	0.282	Runoff	15.430
R1	Stream	3.861	Drift	146.700
R2	Stream	5.183	Drift	73.120
R3	Stream	5.442	Drift	276.900

Table 8.5.1-91: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	4.824	Drift	4.701
D4	Pond	0.252	Drift	5.458
D4	Stream	4.075	Drift	0.440
D6	Ditch	4.860	Drift	10.010
D6	Ditch 2nd	4.875	Drift	17.680

Table 8.5.1-91: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R1	Pond	0.902	Runoff	38.010
R1	Stream	3.322	Drift	320.200
R2	Stream	4.459	Drift	221.200
R3	Stream	4.682	Drift	585.200

Table 8.5.1-92: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	6.732	Drift	4.381
D4	Pond	0.227	Drift	3.389
D4	Stream	4.919	Drift	0.137
D6	Ditch	6.723	Drift	3.850
D6	Ditch 2nd	6.803	Drift	23.640
R1	Pond	0.227	Drift	6.790
R1	Stream	4.450	Drift	44.060
R2	Stream	5.823	Drift	747.400
R3	Stream	6.286	Drift	13.780
R4	Stream	4.394	Drift	23.590

Table 8.5.1-93: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	5.880	Drift	6.022
D4	Pond	0.240	Drift	5.454
D4	Stream	4.505	Drift	0.250
D6	Ditch	5.872	Drift	4.884
D6	Ditch 2nd	6.031	Drift	34.130
R1	Pond	0.453	Runoff	19.540
R1	Stream	3.791	Drift	193.000
R2	Stream	5.035	Drift	1316.200
R3	Stream	5.434	Drift	70.680
R4	Stream	3.810	Drift	38.280

Table 8.5.1-94: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	6.728	Drift	4.151
D4	Pond	0.227	Drift	3.582
D4	Stream	5.323	Drift	0.254
D6	Ditch	6.803	Drift	23.370
D6	Ditch 2nd	6.599	Drift	1.399
R1	Pond	0.274	Runoff	15.020
R1	Stream	4.453	Drift	146.000
R2	Stream	5.977	Drift	45.760
R3	Stream	6.276	Drift	2.285
R4	Stream	4.452	Drift	8.187

Table 8.5.1-95: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	5.876	Drift	5.768
D4	Pond	0.260	Drift	5.620
D4	Stream	4.600	Drift	0.411
D6	Ditch	6.032	Drift	34.230
D6	Ditch 2nd	5.918	Drift	10.410
R1	Pond	0.888	Runoff	37.120
R1	Stream	3.848	Drift	320.200
R2	Stream	5.165	Drift	141.100
R3	Stream	5.433	Drift	43.940
R4	Stream	3.847	Drift	46.370

Table 8.5.1-96: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	6.664	Drift	2.248
R2	Stream	5.749	Drift	903.900
R3	Stream	6.258	Drift	125.600
R4	Stream	4.434	Drift	68.980

Table 8.5.1-97: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	5.820	Drift	2.765
R2	Stream	5.033	Drift	1157.700
R3	Stream	5.433	Drift	61.780
R4	Stream	4.346	Runoff	418.300

Table 8.5.1-98: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	6.789	Drift	17.710
R2	Stream	5.977	Drift	598.800
R3	Stream	6.287	Drift	277.700
R4	Stream	4.452	Drift	42.130

Table 8.5.1-99: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D6	Ditch	6.039	Drift	35.550
R2	Stream	5.165	Drift	1478.500
R3	Stream	5.433	Drift	586.500
R4	Stream	3.847	Drift	135.800

Table 8.5.1-100: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	6.731	Drift	4.337

Table 8.5.1-100: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D3	Ditch 2nd	6.750	Drift	5.575
D4	Pond	0.227	Drift	3.406
D4	Stream	5.140	Drift	0.187
D6	Ditch	6.803	Drift	23.530
R1	Pond	0.227	Drift	7.511
R1	Pond 2nd	0.548	Runoff	25.030
R1	Stream	4.451	Drift	73.560
R1	Stream 2nd	4.415	Drift	518.400
R2	Stream	5.824	Drift	747.800
R2	Stream 2nd	5.977	Drift	176.300
R3	Stream	6.286	Drift	38.070
R3	Stream 2nd	6.287	Drift	120.900
R4	Stream	4.397	Drift	30.810
R4	Stream 2nd	4.372	Drift	372.500

Table 8.5.1-101: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	5.880	Drift	5.962
D3	Ditch 2nd	5.896	Drift	8.348
D4	Pond	0.224	Drift	5.399
D4	Stream	4.505	Drift	0.315
D6	Ditch	6.015	Drift	32.370
R1	Pond	0.451	Runoff	19.310
R1	Pond 2nd	0.690	Runoff	37.930
R1	Stream	3.788	Drift	192.200
R1	Stream 2nd	3.860	Drift	655.200
R2	Stream	5.035	Drift	1317.100
R2	Stream 2nd	5.169	Drift	291.500
R3	Stream	5.435	Drift	96.400
R3	Stream 2nd	5.442	Drift	280.900
R4	Stream	3.812	Drift	44.330
R4	Stream 2nd	3.897	Runoff	670.800

Table 8.5.1-102: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	6.755	Drift	6.102
D3	Ditch 2nd	6.697	Drift	2.875
D4	Pond	0.227	Drift	3.595
D4	Stream	5.430	Drift	0.318
D6	Ditch	6.803	Drift	24.370
R1	Pond	0.230	Drift	9.038
R1	Pond 2nd	0.490	Runoff	23.340
R1	Stream	4.381	Drift	93.410
R1	Stream 2nd	4.448	Drift	246.800
R2	Stream	5.977	Drift	145.800
R2	Stream 2nd	5.886	Drift	792.900
R3	Stream	6.287	Drift	305.600
R3	Stream 2nd	6.271	Drift	277.500
R4	Stream	4.452	Drift	202.500

Table 8.5.1-102: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R4	Stream 2nd	4.452	Drift	228.400

Table 8.5.1-103: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	5.899	Drift	6.211
D3	Ditch 2nd	5.856	Drift	4.688
D4	Pond	0.260	Drift	5.596
D4	Stream	4.692	Drift	0.515
D6	Ditch	5.941	Drift	21.380
R1	Pond	0.435	Runoff	24.620
R1	Pond 2nd	1.201	Runoff	47.090
R1	Stream	3.848	Drift	233.300
R1	Stream 2nd	3.848	Drift	416.400
R2	Stream	5.165	Drift	254.600
R2	Stream 2nd	5.086	Drift	1501.400
R3	Stream	5.457	Drift	599.200
R3	Stream 2nd	5.420	Drift	586.400
R4	Stream	3.853	Drift	374.800
R4	Stream 2nd	3.849	Drift	597.300

Table 8.5.1-104: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	5.567	Drift	3.808
D4	Pond	0.219	Drift	3.290
D4	Stream	4.265	Drift	0.119
R1	Pond	0.221	Drift	6.381
R1	Stream	3.739	Drift	37.070
R3	Stream	5.451	Drift	27.350

Table 8.5.1-105: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	4.827	Drift	5.255
D4	Pond	0.232	Drift	5.289
D4	Stream	3.889	Drift	0.217
R1	Pond	0.457	Runoff	20.140
R1	Stream	3.279	Drift	181.400
R3	Stream	4.690	Drift	48.920

Table 8.5.1-106: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	5.564	Drift	3.624
D4	Pond	0.220	Drift	3.395
D4	Stream	4.880	Drift	0.472
R1	Pond	0.413	Runoff	20.540
R1	Stream	3.861	Drift	217.700

Table 8.5.1-106: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R3	Stream	5.437	Drift	276.800

Table 8.5.1-107: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	4.824	Drift	5.220
D4	Pond	0.256	Drift	4.975
D4	Stream	4.264	Drift	0.918
R1	Pond	1.165	Runoff	45.150
R1	Stream	3.322	Drift	408.600
R3	Stream	4.678	Drift	585.100

<u>PEC calculations for 1 x 1800 g/ha</u>

Table 8.5.1-108: FOCUS Step 1, 2 PECsw and PECsed for glyphosate following application to grass/alfalfa (1 × 1800 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	106.680	-	3910.000
Step 2				
Northern Europe	Mar-May	19.739	-	789.300
Northern Europe	Jun-Sep	19.739	-	789.300
Northern Europe	Oct-Feb	44.120	-	1820.000
Southern Europe	Mar-May	35.993	-	1480.000
Southern Europe	Jun-Sep	27.866	-	1130.000
Southern Europe	Oct-Feb	35.993	-	1480.000

Table 8.5.1-109: FOCUS Step 3 PEC_{sw} and PEC_{sed} for glyphosate following application to grass/alfalfa, early application (1 × 1800 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D1	Ditch	11.310	Drift	16.230
D1	Stream	8.847	Drift	0.403
D2	Ditch	11.410	Drift	44.090
D2	Stream	10.150	Drift	39.060
D3	Ditch	11.260	Drift	8.772
D4	Pond	0.380	Drift	5.649
D4	Stream	8.606	Drift	0.317
D5	Pond	0.380	Drift	5.860
D5	Stream	9.289	Drift	0.344
R2	Stream	9.805	Drift	1.550
R3	Stream	10.440	Drift	3.330

Table 8.5.1-110: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to grass/alfalfa, late application (1 × 1800 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D1	Ditch	11.400	Drift	63.590
D1	Stream	9.964	Drift	6.604
D2	Ditch	11.410	Drift	61.080
D2	Stream	10.150	Drift	47.820
D3	Ditch	11.300	Drift	12.530

Table 8.5.1-110: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to grass/alfalfa, late application (1 × 1800 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D4	Pond	0.380	Drift	6.245
D4	Stream	9.736	Drift	2.160
D5	Pond	0.380	Drift	6.190
D5	Stream	10.510	Drift	3.062
R2	Stream	9.938	Drift	5.558
R3	Stream	10.480	Drift	11.630

PEC_{sw} and PEC_{sed} for AMPA

Table 8.5.1-111: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops, orchards and vines (1 × 720 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	34.546	-	1040.000
Step 2				
Northern Europe	Mar-May	6.666	-	205.542
Northern Europe	Jun-Sep	6.666	-	205.542
Northern Europe	Oct-Feb	15.904	-	498.129
Southern Europe	Mar-May	12.825	-	400.600
Southern Europe	Jun-Sep	9.745	-	303.071
Southern Europe	Oct-Feb	12.825	-	400.600

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-112: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops, orchards and vines (3 × 720 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	103.639	-	3110.000
Step 2				
Northern Europe	Mar-May	14.607	-	452.678
Northern Europe	Jun-Sep	14.607	-	452.678
Northern Europe	Oct-Feb	35.129	-	1100.000
Southern Europe	Mar-May	28.289	-	885.972
Southern Europe	Jun-Sep	21.448	-	669.325
Southern Europe	Oct-Feb	28.289	-	885.972

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-113: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops, orchards and vines (1 × 1440 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	69.092	-	2070.000
Step 2				
Northern Europe	Mar-May	13.331	-	411.084
Northern Europe	Jun-Sep	13.331	-	411.084
Northern Europe	Oct-Feb	31.809	-	996.258
Southern Europe	Mar-May	25.650	-	801.200
Southern Europe	Jun-Sep	19.490	-	606.142
Southern Europe	Oct-Feb	25.650	-	801.200

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-114: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to orchards and vines (2 × 1440 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	138.185	-	4150.000
Step 2				
Northern Europe	Mar-May	22.570	-	697.251
Northern Europe	Jun-Sep	22.570	-	697.251
Northern Europe	Oct-Feb	53.986	-	1690.000
Southern Europe	Mar-May	43.514	-	1360.000
Southern Europe	Jun-Sep	33.042	-	1030.000
Southern Europe	Oct-Feb	43.514	-	1360.000

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-115: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops (1 × 540 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	25.910	-	777.705
Step 2				
Northern Europe	Mar-May	4.999	-	154.156
Northern Europe	Jun-Sep	4.999	-	154.156
Northern Europe	Oct-Feb	11.928	-	373.597
Southern Europe	Mar-May	9.619	-	300.450
Southern Europe	Jun-Sep	7.309	-	227.303
Southern Europe	Oct-Feb	9.619	-	300.450

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-116: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops (1 × 1080 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	51.819	-	1560.000
Step 2				
Northern Europe	Mar-May	9.999	-	308.313
Northern Europe	Jun-Sep	9.999	-	308.313
Northern Europe	Oct-Feb	23.856	-	747.194
Southern Europe	Mar-May	19.237	-	600.900
Southern Europe	Jun-Sep	14.618	-	454.606
Southern Europe	Oct-Feb	19.237	-	600.900

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-117: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops (2 × 1080 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	103.639	-	3110.000
Step 2				
Northern Europe	Mar-May	16.927	-	522.938
Northern Europe	Jun-Sep	16.927	-	522.938
Northern Europe	Oct-Feb	40.490	-	1270.000
Southern Europe	Mar-May	32.636	-	1020.000
Southern Europe	Jun-Sep	24.782	-	771.679
Southern Europe	Oct-Feb	32.636	-	1020.000

Table 8.5.1-117: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops (2 × 1080 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-118: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to grass/alfalfa (1 × 1800 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	86.366	-	2590.000
Step 2				
Northern Europe	Mar-May	16.664	-	513.855
Northern Europe	Jun-Sep	16.664	-	513.855
Northern Europe	Oct-Feb	39.761	-	1250.000
Southern Europe	Mar-May	32.062	-	1000.000
Southern Europe	Jun-Sep	24.363	-	757.677
Southern Europe	Oct-Feb	32.062	-	1000.000

PEC_{sw} and PEC_{sed} for HMPA

Table 8.5.1-119: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops, orchards and vines (1 × 720 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	16.128	-	1.611
Step 2				
Northern Europe	Mar-May	3.263	-	0.326
Northern Europe	Jun-Sep	3.263	-	0.326
Northern Europe	Oct-Feb	7.507	-	0.750
Southern Europe	Mar-May	6.093	-	0.609
Southern Europe	Jun-Sep	4.678	-	0.467
Southern Europe	Oct-Feb	6.093	-	0.609

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-120: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops, orchards and vines (3 × 720 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	48.385	-	4.833
Step 2				
Northern Europe	Mar-May	5.802	-	0.579
Northern Europe	Jun-Sep	5.802	-	0.579
Northern Europe	Oct-Feb	13.101	-	1.309
Southern Europe	Mar-May	10.668	-	1.066
Southern Europe	Jun-Sep	8.235	-	0.823
Southern Europe	Oct-Feb	10.668	-	1.066

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-121: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops, orchards and vines (1 × 1440 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.256	-	3.222
Step 2				

Table 8.5.1-121: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops, orchards and vines (1 × 1440 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Northern Europe	Mar-May	6.526	-	0.652
Northern Europe	Jun-Sep	6.526	-	0.652
Northern Europe	Oct-Feb	15.015	-	1.500
Southern Europe	Mar-May	12.185	-	1.217
Southern Europe	Jun-Sep	9.356	-	0.935
Southern Europe	Oct-Feb	12.185	-	1.217

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-122: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to orchards and vines (2 × 1440 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.513	-	6.445
Step 2				
Northern Europe	Mar-May	9.920	-	0.991
Northern Europe	Jun-Sep	9.920	-	0.991
Northern Europe	Oct-Feb	22.523	-	2.250
Southern Europe	Mar-May	18.322	-	1.830
Southern Europe	Jun-Sep	14.121	-	1.410
Southern Europe	Oct-Feb	18.322	-	1.830

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-123: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops (1 × 540 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	12.096	-	1.208
Step 2				
Northern Europe	Mar-May	2.447	-	0.244
Northern Europe	Jun-Sep	2.447	-	0.244
Northern Europe	Oct-Feb	5.631	-	0.563
Southern Europe	Mar-May	4.569	-	0.457
Southern Europe	Jun-Sep	3.508	-	0.351
Southern Europe	Oct-Feb	4.569	-	0.457

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-124: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops (1 × 1080 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	24.192	-	2.417
Step 2				
Northern Europe	Mar-May	4.895	-	0.489
Northern Europe	Jun-Sep	4.895	-	0.489
Northern Europe	Oct-Feb	11.261	-	1.125
Southern Europe	Mar-May	9.139	-	0.913
Southern Europe	Jun-Sep	7.017	-	0.701
Southern Europe	Oct-Feb	9.139	-	0.913

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-125: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops (2 × 1080 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	48.385	-	4.833
Step 2				
Northern Europe	Mar-May	7.440	-	0.743
Northern Europe	Jun-Sep	7.440	-	0.743
Northern Europe	Oct-Feb	16.892	-	1.688
Southern Europe	Mar-May	13.741	-	1.373
Southern Europe	Jun-Sep	10.591	-	1.058
Southern Europe	Oct-Feb	13.741	-	1.373

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 8.5.1-126: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to grass/alfalfa (1 × 1800 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	40.321	-	4.028
Step 2				
Northern Europe	Mar-May	8.158	-	0.815
Northern Europe	Jun-Sep	8.158	-	0.815
Northern Europe	Oct-Feb	18.768	-	1.875
Southern Europe	Mar-May	15.232	-	1.522
Southern Europe	Jun-Sep	11.695	-	1.168
Southern Europe	Oct-Feb	15.232	-	1.522

Assessment and conclusion by applicant:

The modelling study was conducted according to current guidance and was therefore considered to be valid.

Assessment and conclusion by RMS:

PECsw calculations were provided by the applicant considering the recommended FOCUS models, relevant scenarios and relevant application parameters (timing, dose, interception values) considering the intended GAPs. PECsw were calculated in this study considering all scenarios and application timing at STEP 1-2. At Step 3, pre-emergence and post-harvest applications for most of FOCUS annual crops and applications on March 15th and September 15th for perennial crops were simulated. This is considered appropriate.

For the adjustment of drift loadings for pome/stone fruits, olives and vines at Step 3, RMS notes that in table 8.5.1-3 the distance used for the ditch loadings is 3 meters, although the text states refers to 3.5 m which is the correct default distance. Since the value at 3.5 m cannot be selected in the Drift calculator, this is accepted as a conservative approach.

Regarding the selection of input parameters for glyphosate and AMPA, the evaluation of the studies presented in Vol. 3 CA by RMS results in the selection of different endpoints. As a consequence, PECsw/sed calculations provided by the applicant are not considered acceptable.

In order to provide a 1st informative estimation of PECsw for the peer review, STEP 1-2 PECsw were recalculated by RMS for the worst-case application pattern, selected based on current applicant's results: pome/stone fruits / olives / vines, 2x1440 g/ha (28 d interval), Northern Europe, October-February (worst-case for drainage/run-off entry), no crop interception. As glyphosate is an herbicide, the FOCUS crop Potato was used as surrogate in order to have suitable drift values. Calculations were performed using FOCUS Step 1-2 v. 3.2.

The following endpoints were considered by RMS. The choice of soil degradation endpoint is discussed under point CP B8.1.1 above.

Table 8.5.1-127: Input parameters used for FOCUS Step 1-2 PECsw modelling

Compound	**Glyphosate**	**AMPA**
Molar mass (g/mol)	169.10	111.04
Water solubility (mg/L) (20 °C)	100 000	100 000 [1]
DT_{50} in soil (d)	***For glyphosate calculations:*** 161.1 days (maximum modelling normalized DT_{50}, from laboratory – parent-only fits - and field, n=12) ***For metabolites calculations:*** 0.1 days (minimum fast phase normalized DT_{50}, from laboratory - pathway fits – and field, n=12)	1040 (max laboratory normalized DT_{50}, n=10)
K_{foc} (L/kg)	4348 (geometric mean, n = 10)	2541 (geometric mean, n = 8)
DT_{50} water/sediment/system (d)	143.3 (geometric mean, total system, n = 4)	98.7 (geometric mean, total system, n = 7)
Max occurrence in total system (%)	-	27.1
Max occurrence in soil (%)	-	46.9

[1] No available data, parent value assumed

For HMPA, the input parameters used by the applicant were considered for RMS calculations.

Results are presented below.

Table 8.5.1-128: STEP 1-2 PECsw/PECsed for glyphosate - potatoes, 2x1440 g/ha

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)*	Max PEC_{sed} (µg/kg)*
Step 1			
-	-	167.72	6280
Step 2			
Northern Europe	Oct-Feb	69.95 (37.44)	2970

* For Step 2, values in brackets refer to single application / no values in brackets when not calculated by the model

Table 8.5.1-129: STEP 1-2 PECsw/PECsed for AMPA - potatoes, 2x1440 g/ha

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)*	Max PEC_{sed} (µg/kg)*
Step 1	-	111.02	2710
Step 2			
Northern Europe	Oct-Feb	52.47 (27.08)	1320 (681.83)

* For Step 2, values in brackets refer to single application

Table 8.5.1-130: STEP 1-2 PECsw/PECsed for HMPA - potatoes, 2x1440 g/ha

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)*	Max PEC_{sed} (µg/kg)*
Step 1	-	58.06	57.82
	Step 2		
Northern Europe	Oct-Feb	52.47 (27.08)	1320 (681.83)

* For Step 2, values in brackets refer to single application

A data gap is set for the applicant to update PECsw/PECsed calculations for all intended uses considering the application schemes initially proposed, the endpoints agreed during the peer review and all relevant models. Step 3 calculations should be provided also, in order to ensure that they do not result in higher PEC values (from the current calculations from the applicant, RMS noted that Step 3 PECsed was sometimes higher than Step 2).

B.8.5.2. Use on railways – HardSPEC calculations

Data point	CP 9.2.5/002
Report author	[redacted]
Report year	2020
Report title	Predicted environmental concentrations of glyphosate and its metabolites AMPA and HMPA in groundwater and surface water following application to railways – a modelling assessment using HardSPEC
Report No	110054-015
Guidelines followed in study	Hollis, J.M. *et al.*: HardSPEC: A First-tier Model for Estimating Surface- and Ground-Water Exposure resulting from Herbicides applied to Hard Surfaces: Updated Technical Guidance on Model Principles and Application for version 1.4.3.2. Report to the Chemicals Regulation Division of the HSE April, 2017, 121 pp + 3 Appendices.
Deviations from current test guideline	None
Previous evaluation	No, not previously submitted
GLP/Officially recognised testing facilities	No, not applicable for this study type
Acceptability/Reliability	No

I. MATERIALS AND METHODS

The purpose of this modelling assessment was to obtain predicted environmental concentrations in surface water and sediment of the herbicidal active substance glyphosate and its metabolites AMPA and hydroxymethylphosphonic acid (HMPA) following weed treatment of railways.

Calculations were carried out using the model HardSPEC 1.4.3.2.

1. Model input data

The following data were considered for calculation in HardSPEC.

For modelling DT_{50}, the "EFSA $DegT_{50}$ Endpoint Selector" suggested that the normalised DT_{50} values from laboratory and field studies are not significantly different, for both glyphosate and AMPA. Therefore, laboratory and field DT_{50} were combined.

For degradation of glyphosate, a pH dependency of the combined laboratory and field DT_{50} was demonstrated. The geometric mean of acidic soils (pH (H2O) < 7; DT_{50} = 26.8 days) was used as worst-case.

Table 8.5.2-1: Input parameters related to active substance glyphosate and its metabolite for HardSPEC calculations

Compound	Glyphosate	AMPA
Molar mass (g/mol)	169.10	111.04
Soil K_{oc} (mL/g)	4243[2] (geometric mean, n = 10)	3167[2] (geometric mean, n = 4)
Water solubility (g/mol):	100,000 (20 °C)	100,000 (20 °C)[1]
DT_{50} in soil (d)	26.8 (geometric mean of acidic soils, combined lab and field, normalisation to 10 kPa/pF 2, 20 °C with Q_{10} of 2.58, n = 15)	113.3 (geometric mean, combined lab and field, normalisation to 10 kPa/pF 2, 20 °C with Q_{10} of 2.58, n = 19)
DT_{50} in sediment (d)	143.3 (geometric mean, total system, n = 4)	102.5 (geometric mean, total system, n = 7)
DT_{50} in water (d)	1000 (conservative default)	1000 (conservative default)

[1] No available data, parent value assumed
[2] Adsorption parameters were based on preliminary data as final report was not available at time of calculations.

2. Modelling strategy

Glyphosate is intended to be used as an herbicide on railways. The detailed use patterns considered in the HardSPEC calculations are presented below.

Table 8.5.2-2: Use patterns considered in the simulations

Target	Application rate (g a.s./ha)	No. of appl. (-)	Min. appl. interval (d)	Interception (%)
Railways	1800	1	-	10[1]
Railways	3600	1	-	10[1]

[1] Default interception in HardSPEC assuming heavy weed infestation

For AMPA, a pseudo application was assumed. The application rate of glyphosate was corrected for molar ratio (111.04/169.1) and maximum occurrence in soil (63%) / water (41%). Since the overall maximum occurrence was for soil (0.63), this value was used to derive a worst case 'effective' application rate.

Table 8.5.2-3: Consideration of application by substance

Compound	Application rate (g a.s./ha)	Molecular mass correction (-)	Maximum occurrence (-)	Effective application rate (g/ha)
Glyphosate	1800	-	-	1800
	3600	-	-	3600
AMPA	1800	0.6567	0.63[1]	744.6
	3600	0.6567	0.63[1]	1489.3

[1] Maximum from a US field study: Minnesota, USA ([redacted] 1993, KCA 7.1.2.2.1/006)

For HMPA, since it is only observed in water, maximum PECsw was calculated based on the maximum PECsw of the parent substance, corrected for maximum occurrence of HMPA in water (10% AR) and molar ratio (112.02/169.1).

II. RESULTS AND DISCUSSION

Results are presented in the tables below.

Table 8.5.2-4: $PEC_{sw/sed}$ of glyphosate following application to railways, 1 × 1800 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)
	Water phase (µg/L)	Sediment phase (µg/kg)	
Railway ditch leaching	4.729	16.992	4.729
Railway ditch runoff	4.729	17.000	4.729

Table 8.5.2-5: $PEC_{sw/sed}$ of glyphosate following application to railways, 1 × 3600 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)
	Water phase (µg/L)	Sediment phase (µg/kg)	
Railway ditch leaching	9.458	33.984	9.458
Railway ditch runoff	9.458	34.000	9.458

Table 8.5.2-6: $PEC_{sw/sed}$ of AMPA following application to railways, 1 × 1800 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)
	Water phase (µg/L)	Sediment phase (µg/kg)	
Railway ditch leaching	1.956	6.352	1.956
Railway ditch runoff	1.956	6.494	1.956

Table 8.5.2-7: $PEC_{sw/sed}$ of AMPA following application to railways, 1 × 3600 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)
	Water phase (µg/L)	Sediment phase (µg/kg)	
Railway ditch leaching	3.913	12.705	3.913
Railway ditch runoff	3.913	12.989	3.913

Table 8.5.2-8: $PEC_{sw/sed}$ of HMPA following application to railways, 1 × 1800 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)[1]
	Water phase (µg/L)[1]	Sediment phase (µg/kg)	
Railway ditch leaching	0.313	-[2]	0.313
Railway ditch runoff	0.313	-[2]	0.313

[1] Calculated based on parent maximum PEC_{sw}, taking into account molar mass and max. occurrence in water

[2] Metabolite not relevant in sediment

Table 8.5.2-9: $PEC_{sw/sed}$ of HMPA following application to railways, 1 × 3600 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)[1]
	Water phase (µg/L)[1]	Sediment phase (µg/kg)	
Railway ditch leaching	0.627	-[2]	0.627
Railway ditch runoff	0.627	-[2]	0.627

[1] Calculated based on parent maximum PEC_{sw}, taking into account molar mass and max. occurrence in water

[2] Metabolite not relevant in sediment

Assessment and conclusion by applicant:

The modelling study was conducted according to current guidance and was therefore considered to be valid.

Assessment and conclusion by RMS:

HardSPEC model was specifically developed for UK. In absence of other European model for application on railway, calculations with HardSPEC are reported for information for MS who use this model.

Regarding the selection of input parameters for glyphosate and AMPA, the evaluation of the studies presented in Vol. 3 CA by RMS results in the selection of different endpoints. In addition, RMS noted that the input dose for AMPA should not be corrected with the maximum occurrence of metabolite in soil, as it is also formed in water sediment studies. As a conservative approach, the application dose for AMPA should be corrected for molar ratio only.

As a consequence, PECsw calculations provided by the applicant are not considered acceptable.

PECsw were recalculated by RMS for the worst-case application rate on railway: 1x3600 g/ha. In HardSPEC, PECsw for parent and metabolite are calculated separately. For AMPA, a pseudo-application is considered. Since it is formed both in soil and water/sediment, as a conservative approach the application rate was corrected for molar ratio only, resulting in 2364 g AMPA/ha.

The following input parameters were used. The choice of soil degradation endpoint is discussed under point CP B8.1.1 above. For degradation rates, due to pH-dependency for both glyphosate and AMPA, it is proposed that the maximum modelling DT_{50} of 161.1 days for glyphosate (from laboratory parent-only fits and field) and of 1040 days for AMPA (laboratory) are used.

PECsw were also calculated for HMPA which is formed in water only. PECsw was calculated from maximum PECsw for glyphosate, corrected for molar ratio and maximum occurrence in water (10% AR).

Table 8.5.2-10: Input parameters related to active substance glyphosate and its metabolites for HardSPEC calculations

Compound	Glyphosate	AMPA	HMPA[2]
Molar mass (g/mol)	169.10	111.04	112.02
Soil K_{oc} (mL/g)	4348 (geometric mean, n = 10)	2541 (geometric mean, n = 4)	
Water solubility (g/L):	100,000 (20 °C)	100,000 (20 °C)[1]	
DT_{50} in soil (d)	161.1 days (max normalized DT_{50}, laboratory - parent only fits - and field, n=12)	1040 (max laboratory normalized DT_{50}, n=10)	
DT_{50} in sediment (d)	143.3 (geometric mean, total system, n = 4)	98.7 (geometric mean, total system, n = 7)	
DT_{50} in water (d)	143.3 (geometric mean, total system, n = 4)	98.7 (geometric mean, total system, n = 7)	

[1] No available data, parent value assumed

[2] Calculated based on parent maximum PEC_{sw}, taking into account molar ratio and maximum occurrence in water (10%)

Results are presented below.

Table 8.5.2-11: $PEC_{sw/sed}$ of glyphosate following application to railways, 1 × 3600 g a.s./ha

	Acute (24 hrs) concentration		Application day PECsw
	Water phase (ug L^{-1})	Sediment phase (ug kg^{-1})	from spray drift (µg L^{-1})
Railway ditch leaching	9.458	34.240	9.458
Railway ditch runoff	9.458	34.781	9.458

Table 8.5.2-12: $PEC_{sw/sed}$ of AMPA following application to railways, 1 × 3600 g a.s./ha

	Acute (24 hrs) concentration		Application day PECsw
	Water phase (ug L^{-1})	Sediment phase (ug kg^{-1})	from spray drift (µg L^{-1})
Railway ditch leaching	6.210	18.390	6.210

Railway ditch runoff	6.210	19.469	6.210

Table 8.5.2-13: PEC$_{sw/sed}$ of HMPA following application to railways, 1 × 3600 g a.s./ha

	Acute (24 hrs) concentration		Application day PECsw
	Water phase (ug L^{-1})	Sediment phase (ug kg^{-1})	from spray drift (µg L^{-1})
Railway ditch leaching	0.627	-	0.627
Railway ditch runoff	0.627	-	0.627

B.8.5.3. PEC puddle

<u>PECsw provided by the applicant:</u>

The predicted environmental concentration of glyphosate in puddle water (PEC$_{puddle}$) is required for the assessment for pollinators (honey bees) considering the consumption of contaminated water (guttation water, surface water and puddles). PEC$_{puddle}$ was estimated by calculating the concentration of glyphosate in runoff water, based on the results of the calculations for runoff scenarios at Step 3 of the FOCUS assessment presented above. For this purpose, the output files (*.p2t) of the FOCUS-PRZM model from FOCUS PEC$_{sw}$ calculations were used ([redacted] 2020, CP 9.2.5/001). The hourly concentration of glyphosate in runoff water (unit: mg/L) was calculated by dividing the variable "runoff flux" (unit: mg a.s./m^2/h) by the variable "runoff volume" (unit: mm/h). The concentration was then multiplied by the factor of 1000, resulting in hourly concentrations in units of µg/L.

For each simulated FOCUS runoff scenario, PEC$_{puddle}$ was obtained by selecting the maximum hourly concentration of glyphosate in runoff water over the entire simulation time.

The maximum PEC$_{puddle}$ across all modelled uses at Step 3 is 32.34 µg/L (from R4 scenario of pome/stone fruit, early applications, 2 × 1440 g a.s./ha, with application interval of 28 days).

<u>**Assessment and conclusion by RMS**</u>**:**

Step 3 PECsw values were not validated by RMS, therefore above calculations are not accepted.

RMS provides below for information PEC Step 1-2 values, calculated for the same use as in B.8.5.1 (2x1440 g/ha, 28 d interval) considering no drift entry.

No drift PECsw Step 1 is 141.23 µg/L.

No drift PECsw Step 2 is 65.47 µg/L.

B.8.5.4. PECsw for the formulation

<u>PECsw provided by the applicant:</u>

PEC$_{sw}$ of the formulation was calculated using the Drift Calculator 1.1 implemented in FOCUS SWASH 5.3. The FOCUS crop 'grass/alfalfa' was selected to represent the GAP use with the maximum single application rate of 5846.5 g/ha (use no. 8/9). Since the application method is ground spray to weeds for all uses from the GAP, and the FOCUS default buffers are the minimum for grass/alfalfa, this selection results in a set of maximum PEC values for the formulation.

Table 8.5.4-1: PEC$_{sw}$ of MON 52276 following single application to grass/alfalfa

Formulation	Number of applications	Maximum application rate (g MON 52276/ha)[1]	FOCUS water body	FOCUS default buffer (m)	Drift rate[2] (%)	PEC$_{sw}$ (µg MON 52276/L)
MON 52276	1	5846.5	Ditch	1.0	1.9274	37.562

			Pond	3.5	0.2191	1.281
			Stream	1.5	1.4304	27.875

[1] The formulation components are considered to dissipate rapidly after application, therefore only one application is taken into consideration, based on the highest single application rate. The PEC for the formulation was based on a specific density of 1.1693 g/mL with an application of 5 L formulation/ha representing the maximum use in the GAP.
[2] Areic mean drift rates according to Rautmann *et al.* (2001) as implemented in FOCUS drift calculator.

Assessment and conclusion by RMS:

PECsw for the formulation are acceptable.

B.8.6. Fate and behaviour in air

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

Studies on fate and behaviour in air with the formulation were not performed, since it is possible to extrapolate from data obtained with the active substance. Please refer to Volume 3CA – B8 for studies with active substance.

B.8.6.2. Predicted environmental concentrations from airborne transport

Due to the low volatilisation potential and the fast degradation of glyphosate in air, glyphosate is not expected to be subject of atmospheric long-range transport. Therefore, calculations of concentrations from airborne transport are not required and were not performed.

B.8.7. Predicted environmental concentrations from other routes of exposure

No other routes of exposure are relevant for the representative uses.

B.8.8. References relied on

None.