European Commission

Addendum

VOLUME 3 – Annex B (A12115I)

Abamectin

B.8 Fate and behaviour

Rapporteur Member State: The Netherlands

April 2015

Draft Assessment Report and Proposed decision of the Netherlands prepared in the context of the possible extension of the approval conditions of abamectin under Regulation (EC) 1107/2009

Version history page

Date	Version history
April 2015	Initial version

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This addendum concerns the extension of the approval for the use of abamectin as a nematicide in glasshouses only. All endpoints for the a.s. and metabolites are as agreed for the original inclusion of abamectin on Annex I.
The applicant narrowed the specific use down to an indoor drip irrigation on soil in walk-in tunnels. Various (fruiting) vegetable crops are requested.
The application is intended to take place between BBCH 12 and 89. As it concerns drip irrigation, interception by the crop is not relevant.

The critical use pattern is 6x100 g a.s./ha per season (tomatoes) and an additional crop cycle may be grown to which 4x100 g a.s./ha is applied.

B.8.3 PEC soil

PECsoil calculations are required in the GD on ranking and clustering of protected crops [1](March 2014) for walk-in tunnels as if it were open field.
The applicant provided the following PECsoil calculations.

Crop	Number of applications	Maximum use rate [g a.s./ha]	Minimum application interval (days)	Earliest growth stage at application	Crop interception [%]	Effective soil exposure rate per application [g a.s./ha]	PECS [mg a.s./kg]
A12115I*	1	5950*	-	-	0	5950	7.9
Green Beans	2	100	10	BBBCH12	0	100	0.136
	4					100	0.136
Fruiting Vegetables	2				0	100	0.136
	6					100	0.136
Cucurbits**	2				0	100	0.136
	4					100	0.136

* - The formulation components are considered to dissipate rapidly after application, therefore only one application is taken into consideration. The rate of formulation was based on a nominal specific density of 1.19 g/mL (g/cm^3) with a maximum application of 5.0 L/ha (5.0 L/ha *1000 * 1.19 g/mL).
** also covering for the pepper/aubergine crop

It was verified by RMS on the basis of the agreed EU endpoints whether the above calculation covers the exposure assessment. The maximum field DT50 of the substance is 1.8 days (first order kinetics).

The indicated number of applications does not entirely match the Table of Intended uses (6 applications + 4 applications in a second crop cycle). For most uses a maximum of 4 applications are requested and for tomatoes the maximum number is 6. The results for reported for 2 applications are therefore not relevant. The results (for 4 applications to beans, cucurbits, pepper, aubergine and 6 applications to tomatoes, respectively) are acceptable. As it was indicated that for a second crop cycle

[1] EFSA Guidance Document on clustering and ranking of emissions of active substances of plant protection products and transformation products of these active substances from protected crops (greenhouses and crops grown under cover) to relevant environmental compartments. EFSA Journal 2014;12(3):3615, 43 pp., doi:10.2903/j.efsa.2014.3615

a total of 4 additional applications could be made, RMS also checked whether this would lead to an additional accumulation in soil (assuming an equal interval between the crop cycles as the interval between applications within the crop cycle as a very conservative case) by assessing the PECsoil for 10 applications (with a ten day interval). This was not the case. The result of **0.136 mg/kg** abamectin in soil can be used for the ecotoxicological risk assessment.
It is noted that no soil exposure assessment for the metabolites was submitted. This is not considered necessary since their risk to soil organisms is covered by the parent assessment. The calculation carried out for the formulation based on a single application is not needed for the assessment.

B.8.6 PEC groundwater and PEC surface water

B.8.6.1 PEC groundwater

The notifier initially submitted the PECgw reports that were already evaluated during the initial peer review and the review of confirmatory data. These are intended to cover the now proposed use. However as the crop scenario turf was used there, and the model version is outdated, this is not completely acceptable.
These studies are not completely repeated here but the reference is included.

Reference/notifier	:	Mason & Li	GLP statement	:	not applicable
Type of study	:	Estimation of PEC_{gw}	Guideline	:	See DAR
Year of execution	:	2010	Acceptability	:	See DAR
Test substance	:	Abamectin and its soil metabolites			

Reference/notifier	:	Mason	GLP statement	:	not applicable
Type of study	:	Estimation of PEC_{gw}	Guideline	:	See DAR
Year of execution	:	2010	Acceptability	:	See DAR
Test substance	:	Abamectin and its soil metabolites			

Reference/notifier	:	Wallace	GLP statement	:	not applicable
Type of study	:	Estimation of PEC_{gw}	Guideline	:	See DAR (addendum confirmatory data)
Year of execution	:	2012	Acceptability	:	See DAR (addendum confirmatory data)
Test substance	:	Abamectin and its soil metabolites			

A new study addressing the groundwater exposure assessment for the currently proposed use was submitted by the applicant.

Reference/notifier	:	Carnall J.	GLP statement	:	not applicable

Type of study	:	Estimation of PEC_{gw}	Guideline	:	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 (2009). Assessing potential for movement of active substances and their metabolites to groundwater in the EU. Report of the FOCUS Groundwater Work Group, EC Document Reference Sanco/13144/2010 version 1, 604 pp. FOCUS (2012). Generic guidance for Tier 1 FOCUS groundwater assessments, version 2. FOCUS groundwater scenarios working group.
Year of execution	:	2014	Acceptability	:	Acceptable with some remarks
Test substance	:	Abamectin and its soil metabolites			

This report describes a FOCUS groundwater modelling study that examined the potential for abamectin and its metabolites, NOA448111, NOA448112, NOA457464 and NOA457465, to reach groundwater following application to beans and tomatoes. The FOCUS simulation models FOCUS-PEARL (v 4.4.4) and FOCUS-PELMO (v 5.5.3) were used in the modelling study.

Abamectin is intended for indoor application to beans and tomatoes at BBCH 12-89, *via* drip irrigation to the soil surface. Up to six applications of abamectin, each at an application rate of 100 g a.s./ha, can be made to a single crop, and two crop cycles are possible in a given year. As a worst-case representation of this use pattern, a single application of abamectin was simulated at the maximum annual application rate of 1200 g a.s./ha. Additional simulations were also performed using an exaggerated annual application rate of 1 × 5000 g a.s./ha.

Both early-season and late-season applications were simulated, at approximately BBCH 12 and BBCH 89, respectively. Detailed information on the use patterns of abamectin included in the modelling is presented in Table B.9.6.1-1.

Table B.9.6.1-1: Application patterns of abamectin to beans and tomatoes used in the modelling

Application method	Application rate [g a.s./ha]	No. of applications	Application interval [d]	Growth stage [approx. BBCH]	Crop interception at application [%]	Resulting soil deposit per application [g a.s./ha]
Drip irrigation to soil surface [a]	1200	1	-	12	0	1200
				89	0	1200
	5000	1	-	12	0	5000
				89	0	5000

[a] FOCUS-PEARL 4.4.4 and FOCUS-PELMO 5.5.3 are unable to simulate application *via* drip irrigation, therefore PEARL simulations were performed using the 'incorporation' application method with an incorporation depth of 10 cm, and PELMO simulations were performed using an application depth of 10 cm.

The beans (field), beans (vegetable) and tomatoes FOCUS standard crops were used in the modelling. For tomatoes, applications were considered for the FOCUS scenarios Châteaudun, Piacenza, Porto, Sevilla and Thiva. For beans (field), applications were considered for the FOCUS scenarios Hamburg, Kremsmünster and Okehampton, while for beans (vegetables), applications were considered for Porto and Thiva.

Applications were simulated at both extremes of the indoor growing season for beans and tomatoes. For early-season applications, at approximately BBCH 12, the application date was set to 1st February for all scenarios and crops, while for late-season applications, at approximately BBCH 89, the application date was set to 15th October. The current versions of the FOCUS groundwater models are unable to simulate application *via* drip irrigation, therefore 'incorporation' was selected as the application method in the FOCUS-PEARL interface, and the incorporation depth was set to 10 cm. An application depth of 10 cm was also defined in the FOCUS-PELMO interface.

Simulations were carried out over 26 years, as proposed by FOCUS for pesticides that are applied annually. The first 6 years are intended to be a 'warm up' period, thus the following 20 years were taken into account for the assessment of the leaching behaviour.

The input parameters for abamectin and metabolites NOA448111, NOA448112, NOA457464 and NOA457465 used in the modelling are given in Table B.9.6.1-2.
All substance parameters used in this modelling study are as established in the EFSA Conclusion (EFSA, 2008), or as referenced. The modelled metabolic pathway for abamectin degradation in soil is given in Figure B.9.6.1-1.

Table B.9.6.1-2: Summary of input parameters for abamectin, NOA448111, NOA448112, NOA457464 and NOA457465 for the leaching simulation models FOCUS-PEARL (v 4.4.4) and FOCUS-PELMO (v 5.5.3)

Physical chemistry properties			
	Molecular weight [g/mol]	**Water solubility at 25°C [mg/L]**	**Vapour pressure at 20°C [Pa]**
Abamectin	873.1	1.21	0
Remarks	EFSA (2008)	EFSA (2008)	Loss due to volatilisation was not considered (i.e. set to 0) → worst case[a]
NOA448111	887.1	51 (at 20°C)	0
Remarks	-	-	Loss due to volatilisation was not considered (i.e. set to 0) → worst case[a]
NOA448112	889.1	13.8 (at 20°C)	0
Remarks	-	-	Loss due to volatilisation was not considered (i.e. set to 0) → worst case[a]
NOA457464	905.1	1.21	0
Remarks	-	Assumed same as parent	Loss due to volatilisation was not considered (i.e. set to 0) → worst case[a]
NOA457465	902.1	1.21	0
Remarks	-	Assumed same as parent	Loss due to volatilisation was not considered (i.e. set to 0) → worst case[a]

[a] Implemented in PELMO 5.5.3 by entering the Henry's law constant directly as 0 J/mol at 20°C and 30°C

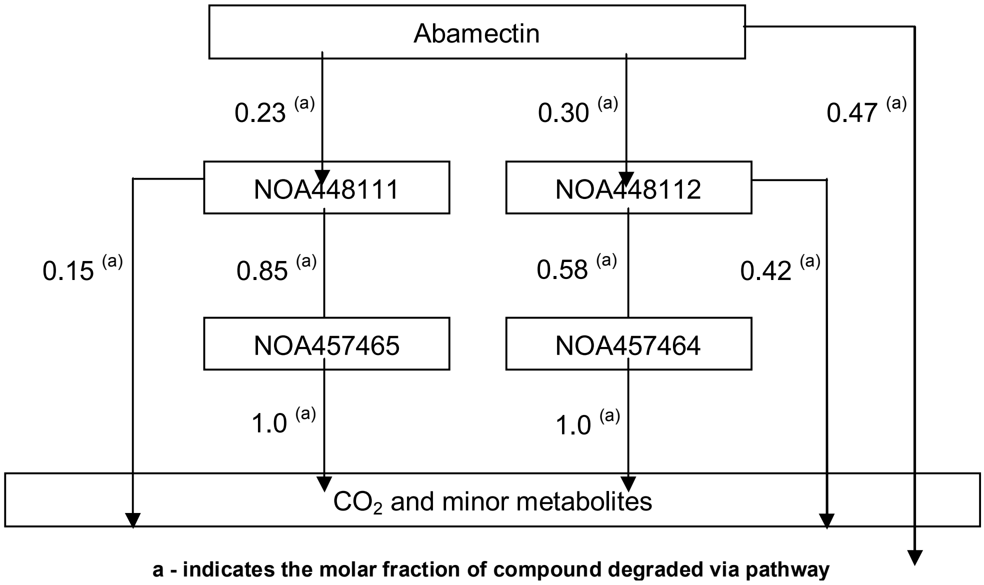
Degradation in soil				
	DT_{50} field soil [d]	**DT_{50} laboratory soil [d]**	**Molar formation fraction[-] source to sink relation [-]**	**Transformation rate [a] [-]**
Abamectin	NA	18.3	0.23 to NOA448111 0.30 to NOA448112 (0.47 to CO_2)	0.008712 to NOA448111 0.011363 to NOA448112 (0.017802 to CO_2)
Remarks	-	Geometric mean; normalised to pF2 and 20°C	EFSA (2008)	-
NOA448111	NA	28.8	0.85 to NOA457465 (0.15 to CO_2)	0.020457 to NOA457465 (0.003610 to CO_2)
Remarks	-	Geometric mean; normalised to pF2 and 20°C	EFSA (2008)	-
NOA448112	NA	22.7	0.58 to NOA457464 (0.42 to CO_2)	0.017710 to NOA457464 (0.012825 to CO_2)
Remarks	-	Geometric mean; normalised to pF2 and 20°C	EFSA (2008)	-
NOA457464	NA	43.4	NA	0.015971 to CO_2
Remarks	-	Geometric mean; normalised to pF2 and 20°C	-	-
NOA457465	NA	74.1	NA	0.009354 to CO_2
Remarks	-	Geometric mean; normalised to pF2 and 20°C	-	-

NA – not applicable
[a] for PELMO; (ln(2) / DT_{50}) * FFm

Sorption to soil			
	K_{FOC} [L/kg]	K_{FOM} [L/kg]	Freundlich exponent 1/n [-]
Abamectin	5638	3270	0.95
Remarks	Arithmetic mean (n=7; EFSA 2008)	Calculated from K_{FOC} K_{FOM} =K_{FOC} / 1.724	-
NOA448111	3997	2318	0.83
Remarks	Arithmetic mean (n=3; EFSA 2008)	Calculated from K_{FOC} K_{FOM} =K_{FOC} / 1.724	-
NOA448112	1943	1127	0.87
Remarks	Arithmetic mean (n=3; EFSA 2008)	Calculated from K_{FOC} K_{FOM} =K_{FOC} / 1.724	-
NOA457464	1738	1008	0.91
Remarks	Arithmetic mean (n=3; EFSA 2008)	Calculated from K_{FOC} K_{FOM} =K_{FOC} / 1.724	-
NOA457465	3908	2267	0.94
Remarks	Arithmetic mean (n=3; EFSA 2008)	Calculated from K_{FOC} K_{FOM} =K_{FOC} / 1.724	-

Crop parameters	
	Crop uptake factor [-]
Abamectin	0
Remarks	Default value
NOA448111	0
Remarks	Default value
NOA448112	0
Remarks	Default value
NOA457464	0
Remarks	Default value
NOA457465	0
Remarks	Default value

Figure B.9.6.1-1: Schematic of the modelled route of degradation of abamectin



a - indicates the molar fraction of compound degraded via pathway

RMS notes that these input values are slightly different than the ones listed in the agreed List of Endpoints. This is due to moisture normalisation of DT_{50} values.

Below the normalisation procedure for the DT_{50} values is presented.

Table B.9.6.1-3: Normalisation of laboratory degradation rates for abamectin

Soil name	Soil type	Study temperature (°C)	Study moisture	Study DT_{50} (days)	Correction factor (f)	Normalised DT_{50} (days)	reference
Gartenacker	Loam	20	40% MHC	18.8	0.61	11.5	Nicollier 2001
Gartenacker	Silt loam	20	40% MHC	23.3	0.61	14.2	Adam 2001
Pappelacker	Loamy sand	20	40% MHC	23.6	0.77	18.2	

Phaff
2003

18 acres	Sandy clay loam	20	40% MHC	11.2	0.62	6.94		
Marsillagues	Silty clay loam	20	40% MHC	49.6	0.57	28.3		
Lufkin	Sandy loam	Ambient *	75% of 1/3 bar	26.9	0.69	18.	19.5	Ku & Jacob 1983
				22.3		15.4		
				42.6		29.4		
				15.1		10.4		
				47.0		32.4		
Industrial	Sand			65.7	0.56	36.8		
Houston	Clay			34.9	0.76	26.5	30.1	
				44.9	0.76	34.1		
Geometric mean**						**18.3**		

* ambient was assumed to be 20 °C by RMS in the Annex I inclusion dossier

** individual soils were geomeaned before taking the overall geomean

Table B.9.6.1-4: Normalisation of laboratory degradation rates for NOA448111

Soil name	Soil type	Study temperature (°C)	Study moisture	Study DT_{50} (days)	Correction factor (f)	Normalised DT_{50} (days)	reference
Gartenacker	Loam	20	40% MHC	50.6	0.61	30.9	Nicollier 2001
Gartenacker	Silt loam	20	40% MHC	40.5	0.61	24.7	Adam 2001

Pappelacker	Loamy sand	20	40% MHC	45.3	0.77	34.9	Phaff 2003
Marsillagues	Silty clay loam	20	40% MHC	45.4	0.57	25.9	
Geometric mean						**28.8**	

Table B.9.6.1-5: Normalisation of laboratory degradation rates for NOA448112

Soil name	Soil type	Study temperature (°C)	Study moisture	Study DT_{50} (days)	Correction factor (f)	Normalised DT_{50} (days)	reference
Gartenacker	Loam	20	40% MHC	30.1	0.61	18.4	Nicollier 2001
Gartenacker	Silt loam	20	40% MHC	26.8	0.61	16.3	Adam 2001
Pappelacker	Loamy sand	20	40% MHC	26.9	0.77	20.7	

Phaff 2003

Marsillagues	Silty clay loam	20	40% MHC	75.4	0.57	43.0	
Geometric mean						**22.7**	

Table B.9.6.1-6: Normalisation of laboratory degradation rates for NOA457464

Soil name	Soil type	Study temperature (°C)	Study moisture	Study DT_{50} (days)	Correction factor (f)	Normalised DT_{50} (days)	reference
Gartenacker	Loam	20	40% MHC	99.0	0.61	60.4	Nicollier 2001
Gartenacker	Silt loam	20	40% MHC	48.5	0.61	29.6	Adam 2001
Pappelacker	Loamy sand	20	40% MHC	59.5	0.77	45.8	Phaff 2003
Geometric mean						**43.4**	

Table B.9.6.1-7: Normalisation of laboratory degradation rates for NOA457465

Soil name	Soil type	Study temperature (°C)	Study moisture	Study DT_{50} (days)	Correction factor (f)	Normalised DT_{50} (days)	reference
Gartenacker	Loam	20	40% MHC	173	0.61	105.5	Nicollier 2001
Gartenacker	Silt loam	20	40% MHC	59.8	0.61	36.5	Adam 2001

Pappelacker	Loamy sand	20	40% MHC	137	0.77	105.5	Phaff 2003
Geometric mean						**74.1**	

Results

Predicted environmental concentrations of abamectin and its metabolites in groundwater (PEC_{GW}) were calculated for the use of abamectin on beans and tomatoes in Europe in accordance with FOCUS guidelines (FOCUS, 2000, 2009, 2012).

The 80th percentile (at 1 m soil depth) PEC_{GW} values generated by the FOCUS-PEARL and FOCUS-PELMO simulations are given in Table B.9.6.1-8 to Table B.9.6.1-13.

Table B.9.6.1-8: PEC$_{GW}$ of abamectin, NOA448111, NOA448112, NOA457464 and NOA457465 following application to field beans (FOCUS-PEARL)

Application rate (g a.s./ha)	Application timing	Scenario	PEC$_{GW}$ at 1 m soil depth [µg/L]				
			Abamectin	NOA488111	NOA488112	NOA457464	NOA457465
1 × 1200	BBCH 12	Hamburg	<0.001	<0.001	<0.001	<0.001	<0.001
		Kremsmünster	<0.001	<0.001	<0.001	<0.001	<0.001
		Okehampton	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Hamburg	<0.001	<0.001	<0.001	<0.001	<0.001
		Kremsmünster	<0.001	<0.001	<0.001	<0.001	<0.001
		Okehampton	<0.001	<0.001	<0.001	<0.001	<0.001
1 × 5000	BBCH 12	Hamburg	<0.001	<0.001	<0.001	<0.001	<0.001
		Kremsmünster	<0.001	<0.001	<0.001	<0.001	<0.001
		Okehampton	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Hamburg	<0.001	<0.001	<0.001	<0.001	<0.001
		Kremsmünster	<0.001	<0.001	<0.001	<0.001	<0.001
		Okehampton	<0.001	<0.001	<0.001	<0.001	<0.001

Table B.9.6.1-9: PEC$_{GW}$ of abamectin, NOA448111, NOA448112, NOA457464 and NOA457465 following application to field beans (FOCUS-PELMO)

Application rate (g a.s./ha)	Application timing	Scenario	PEC$_{GW}$ at 1 m soil depth [µg/L]				
			Abamectin	NOA488111	NOA488112	NOA457464	NOA457465
1 × 1200	BBCH 12	Hamburg	<0.001	<0.001	<0.001	<0.001	<0.001
		Kremsmünster	<0.001	<0.001	<0.001	<0.001	<0.001
		Okehampton	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Hamburg	<0.001	<0.001	<0.001	<0.001	<0.001
		Kremsmünster	<0.001	<0.001	<0.001	<0.001	<0.001
		Okehampton	<0.001	<0.001	<0.001	<0.001	<0.001
1 × 5000	BBCH 12	Hamburg	<0.001	<0.001	<0.001	<0.001	<0.001
		Kremsmünster	<0.001	<0.001	<0.001	<0.001	<0.001
		Okehampton	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Hamburg	<0.001	<0.001	<0.001	<0.001	<0.001
		Kremsmünster	<0.001	<0.001	<0.001	<0.001	<0.001
		Okehampton	<0.001	<0.001	<0.001	<0.001	<0.001

Table B.9.6.1-10: PEC$_{GW}$ of abamectin, NOA448111, NOA448112, NOA457464 and NOA457465 following application to vegetable beans (FOCUS-PEARL)

Application rate (g a.s./ha)	Application timing	Scenario	PEC$_{GW}$ at 1 m soil depth [µg/L]				
			Abamectin	NOA488111	NOA488112	NOA457464	NOA457465
1 × 1200	BBCH 12	Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
1 × 5000	BBCH 12	Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001

Table B.9.6.1-11: PEC$_{GW}$ of abamectin, NOA448111, NOA448112, NOA457464 and NOA457465 following application to vegetable beans (FOCUS-PELMO)

Application rate (g a.s./ha)	Application timing	Scenario	PEC$_{GW}$ at 1 m soil depth [µg/L]				
			Abamectin	NOA488111	NOA488112	NOA457464	NOA457465
1 × 1200	BBCH 12	Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
1 × 5000	BBCH 12	Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001

Table B.9.6.1-12: PEC$_{GW}$ of abamectin, NOA448111, NOA448112, NOA457464 and NOA457465 following application to tomatoes (FOCUS-PEARL)

Application rate (g a.s./ha)	Application timing	Scenario	PEC$_{GW}$ at 1 m soil depth [µg/L]				
			Abamectin	NOA488111	NOA488112	NOA457464	NOA457465
1 × 1200	BBCH 12	Châteaudun	<0.001	<0.001	<0.001	<0.001	<0.001
		Piacenza	<0.001	<0.001	<0.001	<0.001	<0.001
		Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Sevilla	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Châteaudun	<0.001	<0.001	<0.001	<0.001	<0.001
		Piacenza	<0.001	<0.001	<0.001	<0.001	<0.001
		Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Sevilla	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
1 × 5000	BBCH 12	Châteaudun	<0.001	<0.001	<0.001	<0.001	<0.001
		Piacenza	<0.001	<0.001	<0.001	<0.001	<0.001
		Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Sevilla	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Châteaudun	<0.001	<0.001	<0.001	<0.001	<0.001
		Piacenza	<0.001	<0.001	<0.001	<0.001	<0.001
		Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Sevilla	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001

Table B.9.6.1-13: PEC$_{GW}$ of abamectin, NOA448111, NOA448112, NOA457464 and NOA457465 following application to tomatoes (FOCUS-PELMO)

Application rate (g a.s./ha)	Application timing	Scenario	PEC$_{GW}$ at 1 m soil depth [µg/L]				
			Abamectin	NOA488111	NOA488112	NOA457464	NOA457465
1 × 1200	BBCH 12	Châteaudun	<0.001	<0.001	<0.001	<0.001	<0.001
		Piacenza	<0.001	<0.001	<0.001	<0.001	<0.001
		Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Sevilla	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Châteaudun	<0.001	<0.001	<0.001	<0.001	<0.001
		Piacenza	<0.001	<0.001	<0.001	<0.001	<0.001
		Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Sevilla	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
1 × 5000	BBCH 12	Châteaudun	<0.001	<0.001	<0.001	<0.001	<0.001
		Piacenza	<0.001	<0.001	<0.001	<0.001	<0.001
		Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Sevilla	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001
	BBCH 89	Châteaudun	<0.001	<0.001	<0.001	<0.001	<0.001
		Piacenza	<0.001	<0.001	<0.001	<0.001	<0.001
		Porto	<0.001	<0.001	<0.001	<0.001	<0.001
		Sevilla	<0.001	<0.001	<0.001	<0.001	<0.001
		Thiva	<0.001	<0.001	<0.001	<0.001	<0.001

The overall maximum PEC$_{GW}$ values predicted by the FOCUS-PEARL and FOCUS-PELMO simulations are summarised in Tables B.9.6.1-14 - 16.

Table B.9.6.1-14: Overall maximum PEC$_{GW}$ of abamectin, NOA448111, NOA448112, NOA457464 and NOA457465 for field beans

Application rate (g a.s./ha)	PEC$_{GW}$ at 1 m soil depth [µg/L] [a]									
	Abamectin		NOA448111		NOA448112		NOA457464		NOA457465	
	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO
1 × 1200	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1 × 5000	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

[a] Maximum PEC$_{GW}$ across all scenarios and growth stages

Table B.9.6.1-15: Overall maximum PEC_{GW} of abamectin, NOA448111, NOA448112, NOA457464 and NOA457465 for vegetable beans

Application rate (g a.s./ha)	PEC$_{GW}$ at 1 m soil depth [µg/L] [a]									
	Abamectin		NOA448111		NOA448112		NOA457464		NOA457465	
	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO
1 × 1200	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1 × 5000	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

[a] Maximum PEC_{GW} across all scenarios and growth stages

Table B.9.6.1-16: Overall maximum PEC_{GW} of abamectin, NOA448111, NOA448112, NOA457464 and NOA457465 for tomatoes

Application rate (g a.s./ha)	PEC$_{GW}$ at 1 m soil depth [µg/L] [a]									
	Abamectin		NOA448111		NOA448112		NOA457464		NOA457465	
	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO
1 × 1200	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1 × 5000	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

[a] Maximum PEC_{GW} across all scenarios and growth stages

For the active substance, abamectin, and the metabolites NOA448111, NOA448112, NOA457464 and NOA457465, the overall maximum PEC_{GW} in leachate at 1 m soil depth does not exceed 0.001 µg/L.

RMS comments:

The study is acceptable and the conclusions are justified. It is noted that in principle for groundwater assessments it is not always worst-case to pool all applications together instead of modelling a series of applications at different application dates. However, for this substance and its metabolites this is considered acceptable. The choice of the method of application incorporation seems plausible since this implies a homogeneous distribution of the substance over the top 10 cm.

The applicant used DT50 values normalised to pF2 and 20°C. These values differ from the LoEP and are consistently lower. In the LoEP it is indicated that the pF for individual studies for determination of DT50 values varied between pF 2 and 3.5. Therefore the applicant normalised the DT50 of the individual trials for the moisture content. It is noted that this in fact leads to the derivation of new Annex II endpoints, which is not within the scope of this application for extension of the approval.

The used sorption endpoints and corresponding Freundlich exponents comply to the values presented in the box sorption as values to be used in modelling (they differ slightly from the values presented in the PECgw input box). In this particular case the RMS is confident that the changes to the endpoints do not compromise the conclusion on the risk for leaching.

B.8.6.2 PEC surface water

In line with new EFSA GD the approach described for walk-in tunnels was followed by the applicant.

STUDY 9.7.1/3 and 9.8.1/3

Characteristics

Reference/notifier	:	Patterson D. (2014)	GLP statement	:	not applicable
Type of study	:	Estimation of $PEC_{SW/sed}$	Guideline	:	FOCUS (2000, 2012), EFSA 2014
Year of execution	:	2014	Acceptability	:	Acceptable
Test substance	:	Abamectin			

Guidelines

EFSA (2014). EFSA Guidance Document on clustering and ranking of emissions of active substances of plant protection products and transformation products of these active substances from protected crops (greenhouses and crops grown under cover) to relevant environmental compartments. EFSA Journal 2014;12(3):3615.

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 (2012). Generic Guidance for FOCUS Surface Water Scenarios, version 1.2.

Materials and Methods

This report describes a FOCUS modelling study that examined the potential for abamectin to reach surface water following drip irrigation application to walk-in tunnel cultivated fruiting vegetables. The FOCUS tool SWASH (v 3.1), including the operational models FOCUS-MACRO (v 4.4.2), FOCUS-PRZM (v 1.1.1) and FOCUS-TOXSWA (v 3.3.1), was used in the modelling study for Step 3 simulations. According to EFSA guidance on applications of plant protection products during walk-in tunnel cultivation (EFSA, 2014) simulations were only considered for drainage scenarios.

Four and six drip irrigation applications each at a rate of 100 g a.s./ha, from approximately BBCH 12 and with an interval of 10 days were considered. Detailed information on the use patterns of abamectin included in the modelling is presented in Table 9.6.2-1 and 9.6.2-2, below.

Table 9.6.2-1 Application patterns of abamectin to walk-in tunnel cultivated fruiting vegetables used in modelling

Application method	Growth stage [approx. BBCH]	Application rate [g a.s./ha]	No. of applications	Minimum Application interval [d]
Incorporation	12-89	100	6	10

Table 9.6.2-2 Application patterns of abamectin to walk-in tunnel cultivated fruiting vegetables used in modelling

Application method	Growth stage [approx. BBCH]	Application rate [g a.s./ha]	No. of applications	Minimum Application interval [d]
Incorporation	12-89	100	4	10

Drip irrigation application (incorporation) was considered as the application method in all simulations.

An application window has to be specified from which the Pesticide Application Timer (PAT), internal to the model, determines actual application dates which were set generically for all scenarios. For the purposes of this simulation, application timings based on plant development dates specified by FOCUS (2001, 2012) were not considered appropriate for walk-in tunnel cultivation. Agronomic information regarding crop growth and use patterns for walk-in tunnel cultivation of fruiting vegetables indicated the requirement to simulate a single annual crop as well as two consecutive crops in one year. Crop development dates for two consecutive crops were altered to match agronomic practice. The crop development dates along with the method used for simulating two crops in one year are detailed by the notifier as follows:

"The default scenario for fruiting vegetable crops at D6 is only parameterised for a single annual crop and is limited to 8 applications. In order to appropriately simulate a total of ten applications to two consecutive crops in a single year several steps are required.

1. *Calculate appropriate PAT compliant application dates.*
   - *Three separate SWASH projects were constructed (one project comprising 6 early applications to 1st crop; one project comprising 6 late applications to 1st crop; one project comprising 4 applications to 2nd crop.)*
   - *In each case, the application windows were set to represent walk-in tunnel cultivation of annual crops of fruiting vegetables (see Tables 9.6.2-5 & -6).*
   - *The crop growth parameters within MACRO *.par files were edited according to the below tables to represent agronomic practice.*

Walk-in tunnel representative crop development dates used in MACRO modelling for first crop of fruiting vegetables

MACRO parameter	*Value*
IDSTART	*20 (20-Jan)*
IDMAX	*90 (31-Mar)*
IHARV	*203 (22-Jul)*

MACRO parameter	*Value*
ZDATEMIN	*21 (21-Jan)*

Walk-in tunnel representative crop development dates used in MACRO modelling for second crop fruiting vegetables

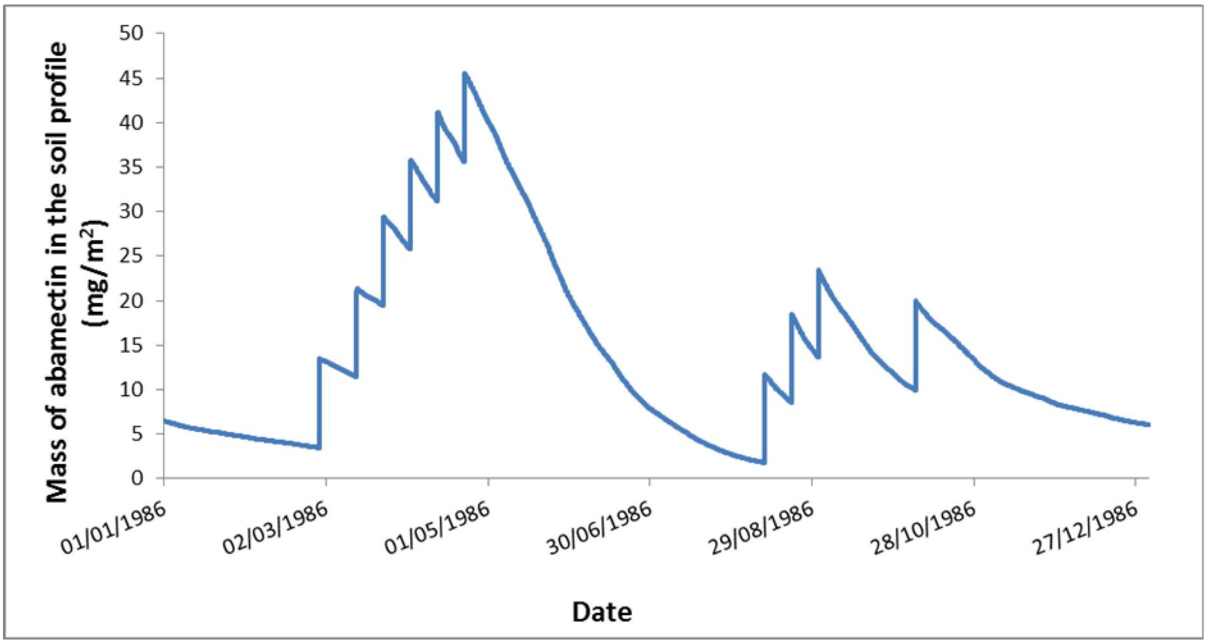
MACRO parameter	*Value*
IDSTART	*213 (24-Jul)*
IDMAX	*244 (01-Sep)*
IHARV	*273 (30-Sep)*
ZDATEMIN	*214 (25-Jul)*

- *These files were executed in MACRO using a batch file.*
- *These *.par files provided PAT compliant application dates to be used in the final simulations with both crops in a single year.*

2. *Construct MACRO *.par files with two crops and 10 applications.*
    - *Two further SWASH projects were then constructed.*
        - *Early applications to the first crop followed by applications to the second crop.*
        - *Late applications to the first crop followed by applications to the second crop.*
    - *SWASH is limited in that it only allows for a maximum of eight applications in a year. Therefore these two simulations were initially set up with only eight applications.*
        - *The SWASH projects were exported into MACRO in order to create the *.par files.*
        - *The *.par files were then edited to include both crops in a single year (according to tables 23 - 24).*
        - *The *.par files were edited to include all ten applications (six to the first crop and four to the second) with the application dates being taken from the three SWASH projects in step 1 above.*
        - *These two edited *.par files were executed using a batch file.*
        - *Confirmation that all ten applications were applied and that two consecutive annual crops were simulated was achieved by plotting parameters from the resulting MACRO *.bin file (see figures 9.6.2-1 and 9.6.2-2) and by checking the change of parameters section at the end of the *.par files.*

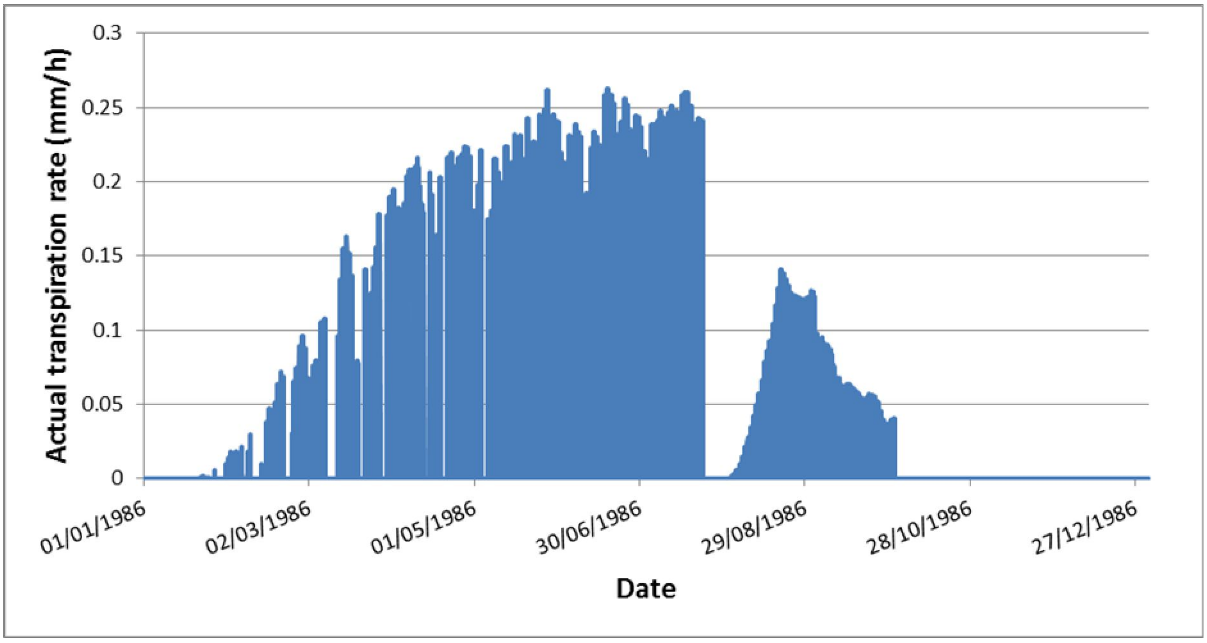
3. *TOXSWA shares the SWASH limitation in that it cannot accept input files where the number of applications exceeds 8. Therefore the MACRO edge of field outputs derived in step 2 were transferred to TOXSWA.*
    - *Two further SWASH projects were set up and run in MACRO*
    - *The resulting *.m2t file from the MACRO runs was edited so that the drainage and pest flux data matched the *.m2t file generated when simulating all ten applications to two consecutive crops in step 2 above.*
    - *As a result of inherent technical limitations within SWASH and TOXSWA it is not possible to specify a simulation with more than 8 applications in any TOXSWA input file and the resulting output files.*
        - *Where the number of applications is listed in the associated TOXSWA files, the number 10 will not be listed nor will the actual application dates.*
        - *These simulations have no drift inputs due to the method of application (incorporation).*
        - *The use of the inputs from a MACRO *.m2t file derived from a simulation with all ten applications to both crops is therefore sufficient to ensure all appropriate loadings are accounted for. Confirmation that both crops were simulated and that all ten applications were made can be seen in Figures 9.6.2-1 & 2. "*

Figure 9.6.2-1: Total mass of abamectin in the soil profile[a] resulting from a simulation of six early applications to a first crop of fruiting vegetables followed by four subsequent applications to a second crop of fruiting vegetables



[a] The total mass in the soil profile was derived by summation of solute storage in the soil and liquid compartments

Figure 9.6.2-2: Actual transpiration rate[a] resulting from a simulation of a first crop of long cycle fruiting vegetables followed by a second short cycle crop of fruiting vegetables



[a] Due to inherent technical limitations of MACRO it is not possible to output a parameter which specifically describes crop development, therefore the actual transpiration rate is used here as a proxy to demonstrate the growth, development and harvesting of two consecutive crops.

Application windows used in modelling for both single crop and two consecutive crops are shown in Tables 9.6.2-3 - 6.

Due to the long application window for applications to the first crop of the year, simulations were conducted for both earlier and later applications. The second crop in the year has a similar BBCH range indicated in the application pattern, however, this second crop is grown over a much shorter period of days. Therefore separate simulations of early and late applications to this second crop were not required. According to EFSA guidance on applications of plant protection products during walk-in tunnel cultivation (EFSA, 2014) simulations were only considered for drainage scenarios.

Table 9.6.2-3: Application windows used in modelling for early applications to a single annual crop of fruiting vegetables

Growth stage [approx. BBCH]	Scenario	First date of application window	Last date of application window
12-89	D6	20-Apr (110)	09-Jul (190)

Numbers in brackets are the corresponding 'Julian Day' numbers

Table 9.6.2-4: Application windows used in modelling for late applications to a single annual crop of fruiting vegetables

Growth stage [approx. BBCH]	Scenario	First date of application window	Last date of application window
12-89	D6	22-May (142)	10-Aug (222)

Numbers in brackets are the corresponding 'Julian Day' numbers

Table 9.6.2-5: Application windows used in modelling for early application to a first crop of fruiting vegetables followed by applications to a second fruiting vegetable crop

Fruiting vegetable crop number	Growth stage [approx. BBCH]	Scenario	First date of application window	Last date of application window
1	12-89	D6	01-Feb (32)	11-Apr (112)
2	12-89	D6	11-Aug (223)	10-Oct (283)

Numbers in brackets are the corresponding 'Julian Day' numbers

Table 9.6.2-6: Application windows used in modelling for late application to a first crop of fruiting vegetables followed by applications to a second fruiting vegetable crop

Fruiting vegetable crop number	Growth stage [approx. BBCH]	Scenario	First date of application window	Last date of application window
1	12-89	D6	01-Aug (123)	30-Sep (203)
2	12-89	D6	11-Aug (223)	10-Oct (283)

Numbers in brackets are the corresponding 'Julian Day' numbers

The exact application dates as modelled are included in the tables containing the results.

The input parameters for abamectin, as used in the modelling are shown in Table 9.6.2-7.

Table 9.6.2-7: Summary of input parameters for abamectin used in FOCUS Step 3 simulations

Physical chemistry properties			
	Molecular weight [g/mol]	**Water solubility at 25°C [mg/L]**	**Vapour pressure at 25°C [Pa]**
Abamectin	873.1	1.21 (25°C)	3.7×10^{-6}
Remarks	EFSA, 2008	EFSA, 2008	Loss due to volatilisation was not considered (i.e. set to 0) → worst case
Degradation in soil			
	DT_{50} field soil [d]	**DT_{50} laboratory soil [d]**	**Formation fraction[-] [a]**
Abamectin	NA	28.7	NA
Remarks	-	Geometric mean (n = 8) EFSA, 2010	-
Degradation in water/sediment systems			
	Whole System DT_{50} [d]	**Water phase DT_{50} [d]**	**Sediment phase DT_{50} [d]**
Abamectin	89	1000	89
Remarks	Geometric mean (n = 2) EFSA, 2008	Default value FOCUS, 2012	Whole system value
Sorption to soil			
	K_{FOC} [L/kg]	**K_{FOM} [L/kg]**	**Freundlich exponent 1/n [-]**
Abamectin	5638	3270	0.94
Remarks	Arithmetic mean (n = 7) EFSA, 2008	Calculated from K_{FOC} $K_{FOM} = K_{FOC} / 1.724$	Arithmetic mean (n = 7) EFSA, 2008

Physical chemistry properties			
	Molecular weight [g/mol]	**Water solubility at 25°C [mg/L]**	**Vapour pressure at 25°C [Pa]**
Crop parameters			
	Crop uptake factor [-]	**Foliar extraction coefficient [1/cm] [b]**	**Foliar DT_{50} [d]**
Abamectin	0	0.5	10
Remarks	Default value	Default value	Default value

NA – not applicable
[a] for metabolite simulations
[b] for FOCUS-PRZM; 0.05 mm^{-1} for FOCUS-MACRO

Results

Predicted environmental concentrations for in surface water (PEC_{SW}) and sediment (PEC_{SED}) were calculated for the use of abamectin on walk-in tunnel cultivated fruiting vegetables in Europe in accordance with FOCUS and EFSA guidelines.

The global maximum PEC_{SW} and PEC_{SED} values generated by the simulations at Step 3, along with the exact application dates, are given in Tables 9.6.2-8 - 11.
Time Weighted Average PEC_{SW} for 7-21-28 days are given in Tables 9.6.2-12 - 15. As all global maximum PEC values are < 0.0001 µg/L, all TWAs are as well.

Table 9.6.2-8: Global maximum Predicted Environmental Concentrations of abamectin at Step 3 for early applications to a single annual crop of fruiting vegetables

Application rate [g a.s./ha]	Scenario	Water body	Application dates	Date of global maximum	PEC_{SW} [µg/L]	PEC_{SED} [µg/kg]	Main route of entry to water body for max. PEC_{SW}
6 x 100	D6	Ditch	23-Apr-1986, 07-May-1986, 19-May-1986, 31-May-1986, 24-Jun-1986, 06-Jul-1986	19-Jan-87	<0.0001	<0.0001	Drainage

Table 9.6.2-9: Global maximum Predicted Environmental Concentrations of abamectin at Step 3 for late applications to a single annual crop of fruiting vegetables

Application rate [g a.s./ha]	Scenario	Water body	Application dates	Date of global maximum	PEC_{SW} [µg/L]	PEC_{SED} [µg/kg]	Main route of entry to water body for max. PEC_{SW}
6 x 100	D6	Ditch	31-May-1986, 24-Jun-1986, 06-Jul-1986, 17-Jul-1986, 27-Jul-1986, 06-Aug-1986	19-Jan-87	<0.0001	<0.0001	Drainage

Table 9.6.2-10: Global maximum Predicted Environmental Concentrations of abamectin at Step 3 for early applications to a first crop of fruiting vegetables followed by applications to a second fruiting vegetable crop

Application rate [g a.s./ha]	Scenario	Water body	Application dates	Date of global maximum	PEC_{SW} [µg/L]	PEC_{SED} [µg/kg]	Main route of entry to water body for max. PEC_{SW}
6 x 100[a] & 4 x 100[b]	D6	Ditch	27-Feb-1986, 13-Mar-1986, 23-Mar-1986, 02-Apr-1986, 12-Apr-1986, 22-Apr-1986, 11-Aug-1986, 21-Aug-1986, 31-Aug-1986, 06-Oct-1986	19-Jan-87	<0.0001	<0.0001	Drainage

[a] applications to first crop

[b] applications to second crop

Table 9.6.2-11: Global maximum Predicted Environmental Concentrations of abamectin at Step 3 for late applications to a first crop of fruiting vegetables followed by applications to a second fruiting vegetable crop

Application rate [g a.s./ha]	Scenario	Water body	Application dates	Date of global maximum	PEC_{SW} [µg/L]	PEC_{SED} [µg/kg]	Main route of entry to water body for max. PEC_{SW}
6 x 100[a] & 4 x 100[b]	D6	Ditch	07-May-1986, 19-May-1986, 31-May-1986, 24-Jun-1986, 06-Jul-1986, 17-Jul-1986, 11-Aug-1986, 21-Aug-1986, 31-Aug-1986, 06-Oct-1986	19-Jan-87	<0.0001	<0.0001	Drainage

[a] applications to first crop

[b] applications to second crop

Table 9.6.2-12: Time Weighted Average PEC_{SW} of abamectin at Step 3 for early applications to a single annual crop of fruiting vegetables

Application rate [g a.s./ha]	Scenario	Water body	TWA PEC_{SW} [µg/L]		
			7 day	21 day	28 day
6 x 100	D6	Ditch	<0.0001	<0.0001	<0.0001

Table 9.6.2-13: Time Weighted Average PEC_{SW} of abamectin at Step 3 for late applications to a single annual crop of fruiting vegetables

Application rate [g a.s./ha]	Scenario	Water body	TWA PEC_{SW} [µg/L]		
			7 day	21 day	28 day
6 x 100	D6	Ditch	<0.0001	<0.0001	<0.0001

Table 9.6.2-14: Time Weighted Average PEC_{SW} of abamectin at Step 3 for early applications to a first crop of fruiting vegetables followed by applications to a second fruiting vegetable crop

Application rate [g a.s./ha]	Scenario	Water body	TWA PEC_{SW} [µg/L]		
			7 day	21 day	28 day
6 x 100[a] & 4 x 100[b]	D6	Ditch	<0.0001	<0.0001	<0.0001

[a] applications to first crop

[b] applications to second crop

Table 9.6.2-15: Time Weighted Average PEC_{SW} of abamectin at Step 3 for late applications to a first crop of fruiting vegetables followed by applications to a second fruiting vegetable crop

Application rate [g a.s./ha]	Scenario	Water body	TWA PEC_{SW} [µg/L]		
			7 day	21 day	28 day
6 x 100[a] & 4 x 100[b]	D6	Ditch	<0.0001	<0.0001	<0.0001

[a] applications to first crop
[b] applications to second crop

RMS comments

The followed procedure is in line with the EFSA guidance. The approach to simulate two crop cycles seems valid to the RMS. It is noted that the application windows for the first and second crop cycle overlap in the case that a late application is made to the first crop cycle, however in the actual modelling this was no problem. The approach to manually manipulate the input files in order to be able to asses 10 applications seems valid.

In the FOCUS sws guidance document it is indicated (paragraph 5.2.3) that when two crops per year are grown these are run separately and the one producing the highest PEC value is used for further assessment. In that regard the approach chosen by the notifier is conservative.

The result shows that for this scenario abamectin does not enter the surface water by drainage which is understandable from its sorption properties. It is noted that the D6 scenario has a very specific drain flow timing, irrespective of the date of application. When looking at the scenario description in the FOCUS sws guidance (paragraph 6.2.2) it becomes clear that drainflow only occurs between January and April, with the highest drainflow occurring in January. The fact that only D6 is modelled (since it is the only scenario available for fruiting vegetables) with drain events very far away from the time of application creates a rather small basis for the assessment. For instance the D2 and D3 scenarios show a much more diverse drain event pattern. However based on the substance properties (quick degradation, high sorption) the RMS is content that the exposure assessment is covered by the submitted modelling.

It is noted that no surface water exposure assessment for the metabolites was submitted. This is not considered necessary since their risk to aquatic organisms is covered by the parent assessment.

B.10 References relied on

Annex point(s)	Author(s)	Year	Title Source Report ID GLP or GEP status Published or not	Data Protection Claimed Y/N	Owner
KIIIA1 9.6.1 / 01	Mason D, Li Z	2010	Abamectin - A Leaching Assessment for Parent and Soil Metabolites NOA448111, NOA448112, NOA457464 and NOA457465 Using the FOCUS Groundwater Scenarios Following Application to Grass Syngenta - Jealott's Hill, Bracknell, United Kingdom Syngenta - Jealott's Hill, Bracknell, United Kingdom, RAJ0775B Not GLP, not published Syngenta File No NOA422601_10007 This is CONFIDENTIAL INFORMATION*	N	SYN
KIIIA1 9.6.1 / 02	Mason D	2010	Abamectin - Predicted Environmental Concentrations in Groundwater for Abamectin using the FOCUS Groundwater Scenarios Following Application to Grass Syngenta - Jealott's Hill, Bracknell, United Kingdom Syngenta - Jealott's Hill, Bracknell, United Kingdom, TK0006924_1 Not GLP, not published Syngenta File No NOA422601_10016 This is CONFIDENTIAL INFORMATION*	N	SYN
KIIIA1 9.6.1 / 03	Wallace D.	2012	Abamectin - Predicted Environmental Concentration of metabolite U8 in ground water Syngenta European Product Registration, Basel, Switzerland, Not GLP, not published Syngenta File No NOA422601_10021 This is CONFIDENTIAL INFORMATION*	N	SYN
KIIIA1 9.6.1 / 04	Carnall J.	2014	Abamectin - A Leaching Assessment for Parent and Soil Metabolites NOA448111, NOA448112, NOA457464 and NOA457465 Using the FOCUS Groundwater Scenarios Following Drip Irrigation Application to Beans and Tomatoes in the EU DRAFT Report	Y	SYN
KIIIA 9.6.2/1	Patterson D.	2014	Abamectin A Fate assessment for Parent using the FOCUS Surface Water Scenarios at Step 3 Following Application to Walk-in Tunnel Cultivated Fruiting Vegetables.	Y	SYN

* Syngenta requests data confidentiality for these data. Disclosure of the information might undermine Syngenta commercial interests by providing access to Syngenta specific know-how used to develop unique positions and approaches to risk assessments