

Study Report

Predicted Environmental Concentrations in Surface Water
of Cyanamide and PERLKA after fertilization with PERLKA
based on FOCUS STEP3

*Simulations maize, potatoes, sugar beet, grass, strawberries,
and vegetables*

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Cyanamide and PERLKA based on FOCUS STEP3 - page 3/43 -**

GLP-compliance

This study "*Predicted Environmental Concentrations in Surface Water for cyanamide and PERLKA based on FOCUS STEP3 Simulations maize, potatoes, sugar beet, grass, strawberries, and vegetables*" was conducted according to the procedures described herein. This report is a true and accurate record of the results obtained. There were no circumstances that may have adversely impacted the quality or integrity of the study.

The study does not describe an experimental study, so the GLP-regulation is not applicable. However, the study was performed in accordance to the "Codex of Good Modelling Practices" (Görlitz 1993 und Travis 1995).



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1. Simulation models

For the calculations the computer tool SWASH was used which mainly creates the necessary input data for MACRO 5.5.4, PRZM 4.3.1 and TOXSWA 4.4 which were used for the simulations. All models are described in FOCUS (2001). The standard buffer was 1 m. They represent start of the art PEC-calculations for all type active compounds (pesticides, biocides and veterinary compound). They are also the most recent versions. The history of versions is summarised at the FOCUS homepage (<https://esdac.jrc.ec.europa.eu/projects/focus-dg-sante>).

2. Input parameters

2.1 Agricultural use pattern

PERLKA is applied in various crops with different application pattern as summarised in the following table.

Table 1: Application pattern of PERLKA in various crops considered for the simulations

Crop	App. method	Incorp. Depth (cm)	App. Rate (kg/ha)	Start of the application window
Maize	Incorporated	at 10 cm	400	14 days before emergence (= planting)
Potatoes	Incorporated	at 15 cm	400	14 days before emergence (= planting)
Sugar Beets	Incorporated	at 10 cm	350	14 days before emergence (= planting)
Sugar Beets	deep placement	at 10 cm	200	14 days before emergence (= planting)
cabbage*	Incorporated	at 15 cm	500	14 days before emergence (= time of planting)
cabbage*	Incorporated	at 15 cm	400	14 days before emergence (= time of planting)
cabbage*	Incorporated	at 10 cm	320 [^]	4 weeks after planting
Grass	Granular app	at 0 cm	300	March-April
Vegetables (fruiting)	Incorporated.	at 15 cm	200	14 days before emergence (= time of planting)
Vegetables (fruiting)	Granular app.	at 0 cm	200	14 days before emergence (= time of planting)

* The FOCUS crop "leafy vegetables" was used [^]400 kg/ha with 20% crop interception

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Based on the information given in Table 1 following application dates were automatically calculated for the different crops at the different scenarios.

Table 2: Application pattern in winter cereals considered for the simulations

Crop	Scenario	application date calculated
		by FOCUS PAT
Maize	D3 (drainage)	20-Apr
Maize	D4 (drainage)	26-Apr
Maize	D5 (drainage)	26-Apr
Maize	D6 (drainage)	09-Apr
Maize	R1 (runoff)	26-Apr
Maize	R2 (runoff)	22-Apr
Maize	R3 (runoff)	22-Apr
Maize	R4 (runoff)	07-Apr
Potatoes	D3 (drainage)	04-May
Potatoes	D4 (drainage)	17-May
Potatoes	D6 1 st season (drainage)	02-Apr
Potatoes	D6 2 nd season (drainage)	25-Jul
Potatoes	R1 (runoff)	26-Apr
Potatoes	R2 (runoff)	01-Mar
Potatoes	R3 (runoff)	28-Mar
Sugar beet	D3 (drainage)	10-Apr
Sugar beet	D4 (drainage)	20-Apr
Sugar beet	R1 (runoff)	26-Apr
Sugar beet	R3 (runoff)	10-Mar
vegetables	D3 1 st season (drainage)	10-Apr
vegetables	D3 2 nd season (drainage)	25-Jul

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vegetables	D4 (drainage)	16-May
vegetables	D6 (drainage)	04-Aug
vegetables	R1 1 st season (runoff)	26-Apr
vegetables	R1 2 nd season (runoff)	28-Jul
vegetables	R2 1 st season (runoff)	06-Mar
vegetables	R2 2 nd season (runoff)	08-Aug
vegetables	R3 1 st season (runoff)	19-Feb
vegetables	R3 2 nd season (runoff)	02-Jun
vegetables	R4 1 st season (runoff)	01-Mar
vegetables	R4 2 nd season (runoff)	01-Jun
grass	D2 (drainage)	01-Apr
grass	D3 (drainage)	04-Apr
grass	D4 (drainage)	18-Apr
grass	D5 (drainage)	08-Apr
grass	R2 (runoff)	22-Apr
grass	R3 (runoff)	04-Apr
vegetables (fruiting)	D6 (drainage)	03-Apr
vegetables (fruiting)	R2 (runoff)	01-Mar
vegetables (fruiting)	R3 (runoff)	26-Apr
vegetables (fruiting)	R4 (runoff)	08-Apr

2.2 Substance properties of Calcium Cyanamide (PERLKA) and Cyanamide

PERLKA

The maximum concentration of calcium cyanamide in PERLKA is about 45%. In order to adequately simulate the slow release of cyanamide from PERLKA granules to soil, cyanamide was defined as a metabolite. According to experimental data the half-life of

PERLKA (Ca CN₂) in soil was found to be between 0.60 days and 1.80 days. The experimental values were normalised to 20 °C using a Q10 factor of 2.2 as recommended by FOCUS (2000). The experimental half-lives were also normalised to pF 2 (see appendix 1) using an exponent of 0.7 as the model requires degradation at optimised moisture conditions. Also the moisture correction was done according to FOCUS (2000). The geometric mean of all normalised half-lives was found to be 0.506 days. This value was considered for the modelling transformation in soil.

A half life of 1 day was considered for the water phase. This value was used as a minimum number for the simulation model FOCUS TOXSWA.

Cyanamide

According to experimental data cyanamide is further transformed to urea. Also for cyanamide the experimental half-lives were normalised to 20 °C using a Q10-Factor of 2.2 as given by FOCUS (2000). However, for cyanamide no soil moisture normalisation was done since according to the experimental results the degradation of cyanamide does not increase with soil moisture. Consequently, the soil moisture correction in the models FOCUS MACRO and PRZM are not suitable and the moisture correction was switched off. For the modelling a half-life of 0.766 days was used. The value represents the geometric mean of all experimental data after normalisation to 20 °C but without soil moisture normalisation [see Klein 2018].

Furthermore, according to EFSA (2010) the half life of cyanamide in the water-sediment system is 3.5 days (geometric mean of two studies). According to the FOCUS recommendations, this value of 3.5 days must be considered for the transformation of cyanamide in water whereas a default value of 1000 days was considered for the sediment phase. The experimental disappearance time cannot be used for the modelling since it includes not only degradation but also transportation which is considered in the model separately.

All DegT₅₀ values in water, sediment-system and in soil considered in the simulations are presented in Table 3.

Table 3: DegT₅₀-values (d) of PERLKA and cyanamide

Parameter	PERLKA	Cyanamide
Water	1 (at 20 °C)	3.5 (at 20 °C)
Sediment	1 (at 20 °C)	1000 (at 20 °C)
Soil	0.506 (at 20 °C)	0.766 (at 20 °C)

The DegT50₅₀ values in soil represent geometric mean half lives of several studies which are summarised in the appendix

PERLKA granules cannot be dissolved in water without being transformed to cyanamide. In order to simulate the fate of PERLKA realistically the sorption constant in soil K_{OC} was set to an artificial, high number (172400 L/kg). That should guarantee that the granules remain at the applied location in soil and are only transformed to cyanamide without leaching to deeper soil layers. For PERLKA residues in surface water the same value was considered as for cyanamide.

For cyanamide an average (geomean) sorption constant of 4 L/kg was considered which was based on experimental sorption studies. It was considered more reliable than results based on the HPLC methodology.

Cyanamide has a Henry's law constant of 2.68 10⁻⁵ J/mol. However this value cannot be entered directly into the simulation model but will be internally calculated based on water solubility, vapour pressure and molecular mass.

Plant uptake was not considered since the granules are usually applied before emergence of the crop.

All other input parameters used for the simulations are summarised in Table 4.

Table 4: Other input parameters used for the simulations of PERLKA and Cyanamide

Parameter	PERLKA	Cyanamide	remark
Sorption constant KOC in soil (L/kg)	172400	4	EFSA (2010)
Sorption constant KOC in water body (L/kg)	0	4	EFSA (2010)
Freundlich exponent (-)	1	1	EFSA (2010)
vapour pressure (20°C, Pa)	0	0.51 Pa	
Molar mass (g/mol)	80.11	42.04*	
Henry's law constant (J/mol)	-	2.68 10 ⁻⁵	EFSA (2010)
Water solubility (20°C, mg/L)	800000	800000	EFSA (2010)
molar enthalpy of vaporisation	95000	95000	default
molar enthalpy of dissolution	27000	27000	default
diffusion coefficient in water	4.3 10 ⁻⁵	4.3 10 ⁻⁵	default
diffusion coefficient in air	0.43	0.43	default
Plant uptake factor	0	0	default

* hydrogen cyanamide

3. Results

The global maximum concentrations for all scenarios and crops are summarised in the following Table 5. In total 94 FOCUS crop-location combinations were simulated.

The following maximum concentrations were calculated for cyanamide in the simulations:

Maize, 400kg, uniform incorp. 10 cm: 17.35 µg/L
Potatoes, 400kg, uniform incorp. 15 cm: 554.8 µg/L
Sugar beet, 350kg, uniform incorp. 10 cm: 672.8 µg/L
Sugar beet, 200kg, deep placement 10 cm: 0.000236 µg/L
Cabbage, 500kg, uniform incorp. 15 cm: 56.42 µg/L
Cabbage, 400kg, uniform incorp. 15 cm: 45.14 µg/L
Cabbage, 320kg, uniform incorp. 10 cm: 151.8 µg/L
Grassland, 300kg, uniform incorp. 0 cm: 1900.4 µg/L
Strawberries, 200kg, uniform incorp. 15 cm: 5.854 µg/L
Strawberries, 200kg, uniform incorp. 0 cm: 37.53 µg/L

Table 5: Global maximum concentrations of PERLKA and Cyanamide at FOCUS Step 3

Crop		PERLKA	Cyanamide	
		PEC _{sw} (µg/L)	PEC _{sw} (µg/L)	PEC _{sed} (µg/kg)
Maize, 400kg, uniform incorp. 10 cm	D3_Ditch	0	0	0
	D4_Pond	0	0	0
	D4_Stream	0	0	0
	D5_Pond	0	0	0
	D5_Stream	0	0	0
	D6_Ditch	0	0	0
	R1_Pond	0	0	0
	R1_Stream	0	9	0
	R2_Stream	0	0	0
	R3_Stream	0	0	0
	R4_Stream	0	17	1
Potatoes, 400kg, uniform incorp. 15 cm	D3_Ditch	0	0	0
	D4_Pond	0	0	0
	D4_Stream	0	0	0
	D6_Ditch	0	0	0
	D6_Ditch	0	0	0
	R1_Pond	0	0	0
	R1_Stream	0.002	5.721	0.328
	R2_Stream	0.002	0.8747	0.06844
	R3_Stream	0.304	554.8	26.03
Sugar beet, 350kg, uniform incorp. 10 cm	D3_Ditch	0	0	0
	D4_Pond	0	0.000	0.000
	D4_Stream	0	0.000	0.000
	R1_Pond	0	0.007	0.001
	R1_Stream	0.001	2.357	0.126
	R3_Stream	0.557	672.800	31.510
Sugar beet, 200kg, deep placement	D3_Ditch	0	0	0
	D4_Pond	0	0.000	0.000

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Crop		PERLKA	Cyanamide	
		PEC _{sw} (µg/L)	PEC _{sw} (µg/L)	PEC _{sed} (µg/kg)
10 cm	D4_Stream	0	0.000	0.000
	R1_Pond	0	0.000	0.000
	R1_Stream	0.000	0.000	0.000
	R3_Stream	0.000	0.000	0.000
Leafy vegetables , 400kg, uniform incorp. 15 cm	D3_Ditch	0	0	0
	D3_Ditch	0	0	0
	D4_Pond	0	0	0
	D4_Stream	0	0.000002	0
	D6_Ditch	0	0.000009	0
	R1_Pond	0.000	0.003	0.000
	R1_Pond	0.000	0.000	0
	R1_Stream	0.001	1.092	0.058
	R1_Stream	0.000	0.000	0.000
	R2_Stream	0	3.436	0
	R2_Stream	0.000	0	0
	R3_Stream	0.091	44.130	2.450
	R3_Stream	0	0.065	0.006
	R4_Stream	0.061	45.140	3.492
	R4_Stream	0.000	0.686	0.053
Cabbage, 500kg, uniform incorp. 15 cm	D3_Ditch	0	0	0
	D3_Ditch	0	0.000	0.000
	D4_Pond	0	0.000	0.000
	D4_Stream	0	0.000	0.000
	D6_Ditch	0	0.000	0.000
	R1_Pond	0	0.004	0.001
	R1_Pond	0	0	0
	R1_Stream	0	1.365	0.073
	R1_Stream	0.000	0	0
	R2_Stream	0.001	4.296	0.2522
	R2_Stream	0	0	0

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Crop		PERLKA	Cyanamide	
		PEC _{sw} (µg/L)	PEC _{sw} (µg/L)	PEC _{sed} (µg/kg)
	R3_Stream	0.114	55.16	3.063
	R3_Stream	0.000016	0.08145	0.007124
	R4_Stream	0.077	56.42	4.366
	R4_Stream	0.000	0.8571	0.06677
Cabbage, 320kg (400 kg/ha with 20% crop interception), uniform incorp. 10 cm	D3_Ditch	0	0	0
	D3_Ditch	0	0.000065	0.000042
	D4_Pond	0	0.000102	0.000062
	D4_Stream	0	0.000325	0.000162
	D6_Ditch	0	0.01036	0.000751
	R1_Pond	0.002102	3.022	0.4173
	R1_Pond	0.000004	0.009265	0.00172
	R1_Stream	0.06669	151.8	9.029
	R1_Stream	0.002066	5.124	0.2266
	R2_Stream	0.02484	99.31	5.189
	R2_Stream	0	0	0
	R3_Stream	0	0.001346	0.000114
	R3_Stream	0.000004	0.09803	0.007621
	R4_Stream	0.08801	71.42	5.547
	R4_Stream	0.00062	3.324	0.256
Grassland, 300kg, uniform incorp. 0 cm	D1_Ditch	-	-	-
	D1_Stream	-	-	-
	D2_Ditch	0	1900.400	375.500
	D2_Stream	0	1792.900	184.300
	D3_Ditch	0	0	0
	D4_Pond	0	0	0
	D4_Stream	0	0	0
	D5_Pond	0	0	0
	D5_Stream	0	0	0
	R2_Stream	0	0	0
	R3_Stream	0	0.365	0.031

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Crop		PERLKA	Cyanamide	
		PEC _{sw} (µg/L)	PEC _{sw} (µg/L)	PEC _{sed} (µg/kg)
Strawberries, 200kg, uniform incorp. 15 cm	D6_Ditch	0	0.001	0.000
	R2_Stream	0	0.460	0.036
	R3_Stream	0	3	0
	R4_Stream	0	5.854	0.500
Strawberries, 200kg, uniform incorp. 0 cm	D6_Ditch	0	0.001	0.000
	R2_Stream	0	2.961	0.235
	R3_Stream	0	19	1
	R4_Stream	0	37.530	3.253

4. Conclusions

The following maximum concentrations were calculated for cyanamide at step 3 simulations (no buffer strip to the surface water body):

Maize, 400kg, uniform incorp. 10 cm: 17.35 µg/L
Potatoes, 400kg, uniform incorp. 15 cm: 554.8 µg/L
Sugar beet, 350kg, uniform incorp. 10 cm: 672.8 µg/L
Sugar beet, 200kg, deep placement 10 cm: 0.000236 µg/L
Leafy vegetables, 400kg, uniform incorp. 15 cm: 45.14 µg/L
Cabbage, 500kg, uniform incorp. 15 cm: 56.42 µg/L
Cabbage, 320kg, uniform incorp. 10 cm: 54.16 µg/L
Grassland, 300kg, uniform incorp. 0 cm: 1900.4 µg/L
Strawberries, 200kg, uniform incorp. 15 cm: 5.854 µg/L
Strawberries, 200kg, uniform incorp. 0 cm: 37.53 µg/L

5. References

- FOCUS (2000): "FOCUS groundwater scenarios in the EU review of active substances". Report of the FOCUS Groundwater Scenarios Workgroup, EC Doc. Ref. SANCO/321/2000 rev. 2; and "Generic guidance for FOCUS groundwater scenarios". FOCUS Groundwater Scenario Workgroup, May 2001, Version
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6. Appendix 1: Available Degradation studies and information on moisture correction

Laboratory degradation are undertaken at various moisture contents often between 40-50% MWHC. Additional data provided in study reports may include the actual moisture content of the soil during the study as volumetric (% volume/volume), or as gravimetric (% mass/mass). Other studies may define the reference soil moisture in terms of; % field capacity (FC), or as matric potential values such as pF, kPa or Bar. According to FOCUS (2000) a special procedure called “normalisation” has to be performed before an average value can be calculated.

For the normalisation following equation is used:

$$DT50_{pF2} = DT50_{exp} \cdot \left(\frac{\Theta_{exp}}{\Theta_{pF2}} \right)^{0.7}$$

DT50_{pF2}: DT50 value at moisture content pF2 (normalised condition)

DT50_{exp}: DT50 value at experimental conditions

Θ_{exp}: experimental soil moisture

Θ_{pF2}: normalised soil moisture (pF 2)

In the following table the resulting normalised values are presented for the transformation of Ca CN2 to cyanamide:

Table 6: Soil moisture normalisation of DT50 values of Ca CN2 to reference conditions (pF 2)

Soil	Soil type (USDA)	Moisture at pF2 (%) [*]	Moisture in the experiment (%)	normalisation factor	DT50 (at exp. soil moisture) in days	Dt50 at pF 2 in days
Refesol 01-A	Loamy sand	12	10	0.880	0.585	0.515
Refesol 01-A	Loamy sand	12	5	0.542	0.958	0.519
Refesol 02-A	Silt loam	26	21	0.861	0.463	0.399
Refesol 02-A	Silt loam	26	10.4	0.527	0.867	0.457
Refesol 01-A	Loamy sand	12	10	0.880	0.6	0.528
Refesol 01-A	Loamy sand	12	5	0.542	1.21	0.656
Geometric mean					0.546	0.506

^{*} These are default values taken from FOCUS (2000)

For cyanamide no soil moisture normalisation was done since according to the experimental results the degradation of cyanamide does not increase with soil moisture (see the following table). Consequently, the soil moisture correction in the models MACRO and PRZM are not suitable and the moisture correction was switched off in the simulation. For the modelling a half-life of 0.766 days was used. The value represents the geometric mean of all experimental data after normalisation to 20 °C but without soil moisture normalisation.

Studies on degradation (hydrolysis) of Ca CN₂ to cyanamide

Table 7: DT50 values of cyanamide under different conditions

Study	Soil	Temperature (°C)	exp. soil moisture	DT50 after normalisation to 20 °C (days)
Güthner	Refesol 01-A	12	10%	1.171
	Refesol 01-A	12	5%	0.692
Weinfurtner	Refesol 02-A	12	21%	0.506
	Refesol 02-A,	12	10.4%	0.420
Weinfurtner.	Refesol 01-A	20	10%	0.820
	Refesol 01-A	20	5%	0.770
	Sandy Loam (Ashland, USA)	20		0.700
	Loamy sand (SP 257)	20		0.960
	Loamy sand (SP 357)	20		1.240
Geometric mean (only temperature normalisation)				0.766

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7.

7.1 Maize, 400 kg, uniform incorp. 10 cm

```
* SWASH report file
* made by FOCUS-SWASH UI v. 5 (internal version 5.1.0, 02 April 2015)
*
* File Name      : E:\SwashProjects\CN2_M2\CN2_M2_report.txt
* Description    : Maize, 400kg, uniform incorp. 10 cm
* Substance     : CN2Gr
*
* Creation       : 24-Sep-2018, 12:42
*
* Remarks : SWASH report helps you to set up the needed runs to calculate the PECsw and PECsed, occurring in the EU
            for the selected substance, used on the selected crop. The scenario code informs you which models you need to
            run for this scenario.
            D1-D6: drainage entries calculated by the MACRO model, fate in surface water calculated by the TOXSWA model
            R1-R4: runoff and erosion entries calculated by the PRZM model, fate in surface water calculated by the TOXSWA model
            For STREAMS the Mean Deposition and Mass Loading, as calculated by the FOCUS Drift Calculator, have been multiplied by a
            factor 1.2 to account for pesticide mass incoming from the upstream catchment as decided by the FOCUS Surface Water
            Scenarios Working Group.
*****
*   CREATED RUNS
*****
*                                     |----- APPLICATION -----|---- on Water Surface ----|
* -ID-----Crop(1st/2nd)-----Scenario-WaterbodyType-|-Method-----First/Last/Interval--#---Rate-|-Mean Deposition-Mass Loading
*                                               (d)           (kg/ha) (% of Appl. Rate)         (mg/m2)
*
* 615   Maize(1st)                D3_Ditch              soil incorp.    21-Apr/21-May/1        1  400.0000    0.000          0.000
```

***** Surface Water Scenarios Help *****

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7.2

Potatoes, 400kg, uniform incorp. 15 cm

```

* SWASH report file
* made by FOCUS-SWASH UI v. 5 (internal version 5.1.0, 02 April 2015)
*
* File Name      : E:\SwashProjects\CN2_PO3\CN2_PO3_report.txt
* Description    : Potatoes, 400kg, uniform incorp. 15 cm
* Substance      : CN2Gr
*
* Creation       : 24-Sep-2018, 12:44
*
* Remarks : SWASH report helps you to set up the needed runs to calculate the PECsw and PECsed, occurring in the EU
*           for the selected substance, used on the selected crop. The scenario code informs you which models you need to
*           run for this scenario.
*           D1-D6: drainage entries calculated by the MACRO model, fate in surface water calculated by the TOXSWA model
*
*           R1-R4: runoff and erosion entries calculated by the PRZM model, fate in surface water calculated by the TOXSWA model
*
*           For STREAMS the Mean Deposition and Mass Loading, as calculated by the FOCUS Drift Calculator, have been multiplied by a
*           factor 1.2 to account for pesticide mass incoming from the upstream catchment as decided by the FOCUS Surface Water
*           Scenarios Working Group.
*
*
* *****
*   CREATED RUNS
* *****
*
*
*  -ID-----Crop(1st/2nd)-----Scenario-WaterbodyType-|----- APPLICATION -----|----- on Water Surface -----|
*  -ID-----Crop(1st/2nd)-----Scenario-WaterbodyType-|Method-----First/Last/Interval--#---Rate-|-Mean Deposition-Mass Loading
*                                     (d)                (kg/ha) (% of Appl. Rate) (mg/m2)
*
* 626   Potatoes(1st)                D3_Ditch                soil incorp.   26-Apr/26-May/1       1 400.0000    0.000    0.000
*
* 627   Potatoes(1st)                D4_Pond                soil incorp.   8-May /7-Jun /1       1 400.0000    0.000    0.000

```

***** Surface Water Scenarios Help *****

Report: **Report:** **Predicted Environmental Concentration in Surface Water of**
Cyanamide based on FOCUS STEP3 **- page 24/39 -**

7.3 Sugar beet, 350kg, uniform incorp. 10 cm

```

* SWASH report file
* made by FOCUS-SWASH UI v. 5 (internal version 5.1.0, 02 April 2015)
*
* File Name   : E:\SwashProjects\CN2_SB5\CN2_SB5_report.txt
* Description : Sugar beet, 350kg, uniform incorp. 10 cm
* Substance   : CN2Gr
*
* Creation    : 24-Sep-2018, 12:46
*
* Remarks : SWASH report helps you to set up the needed runs to calculate the PECsw and PECsed, occurring in the EU
*           for the selected substance, used on the selected crop. The scenario code informs you which models you need to
*           run for this scenario.
*           D1-D6: drainage entries calculated by the MACRO model, fate in surface water calculated by the TOXSWA model
*
*           R1-R4: runoff and erosion entries calculated by the PRZM model, fate in surface water calculated by the TOXSWA model
*
*           For STREAMS the Mean Deposition and Mass Loading, as calculated by the FOCUS Drift Calculator, have been multiplied by a
*           factor 1.2 to account for pesticide mass incoming from the upstream catchment as decided by the FOCUS Surface Water
*           Scenarios Working Group.
*
*
*****
*   CREATED RUNS
*****
*
*           |----- APPLICATION -----|----- on Water Surface -----|
* -ID-----Crop(1st/2nd)-----Scenario-WaterbodyType-|-Method-----First/Last/Interval--#---Rate-|-Mean Deposition-Mass Loading
*                                     (d)                (kg/ha) (% of Appl. Rate)    (mg/m2)
*
* 635   Sugar beets(1st)           D3_Ditch                soil incorp.   11-Apr/11-May/1      1  350.0000    0.000    0.000
*
* 636   Sugar beets(1st)           D4_Pond                soil incorp.   20-Apr/20-May/1      1  350.0000    0.000    0.000

```

Report: **Report:** **Predicted Environmental Concentration in Surface Water of**
Cyanamide based on FOCUS STEP3 **- page 26/39 -**

7.4 Sugar beet, 200kg, deep placement 10 cm

```

* SWASH report file
* made by FOCUS-SWASH UI v. 5 (internal version 5.1.0, 02 April 2015)
*
* File Name   : E:\SwashProjects\CN2_SB6\CN2_SB6_report.txt
* Description : Sugar beet, 200kg, deep placement 10 cm
* Substance   : CN2Gr
*
* Creation    : 24-Sep-2018, 12:48
*
* Remarks : SWASH report helps you to set up the needed runs to calculate the PECsw and PECsed, occurring in the EU
*           for the selected substance, used on the selected crop. The scenario code informs you which models you need to
*           run for this scenario.
*           D1-D6: drainage entries calculated by the MACRO model, fate in surface water calculated by the TOXSWA model
*
*           R1-R4: runoff and erosion entries calculated by the PRZM model, fate in surface water calculated by the TOXSWA model
*
*           For STREAMS the Mean Deposition and Mass Loading, as calculated by the FOCUS Drift Calculator, have been multiplied by a
*           factor 1.2 to account for pesticide mass incoming from the upstream catchment as decided by the FOCUS Surface Water
*           Scenarios Working Group.
*
*
*****
*   CREATED RUNS
*****
*
*           |----- APPLICATION -----|----- on Water Surface -----|
* -ID-----Crop(1st/2nd)-----Scenario-WaterbodyType-|-Method-----First/Last/Interval--#---Rate-|-Mean Deposition-Mass Loading
*                                     (d)                (kg/ha) (% of Appl. Rate)    (mg/m2)
*
* 641   Sugar beets(1st)           D3_Ditch                soil incorp.   11-Apr/11-May/1      1  200.0000    0.000    0.000
*
* 642   Sugar beets(1st)           D4_Pond                soil incorp.   20-Apr/20-May/1      1  200.0000    0.000    0.000

```

Report: **Report:** **Predicted Environmental Concentration in Surface Water of**
Cyanamide based on FOCUS STEP3 **- page 28/39 -**

7.5 Leafy vegetables , 400kg, uniform incorp. 15 cm

```

* SWASH report file
* made by FOCUS-SWASH UI v. 5 (internal version 5.1.0, 02 April 2015)
*
* File Name   : E:\SwashProjects\CN2_VG1\CN2_VG1_report.txt
* Description : Leafy vegetables , 400kg, uniform incorp. 15 cm
* Substance   : CN2Gr
*
* Creation    : 24-Sep-2018, 12:50
*
* Remarks : SWASH report helps you to set up the needed runs to calculate the PECsw and PECsed, occurring in the EU
*           for the selected substance, used on the selected crop. The scenario code informs you which models you need to
*           run for this scenario.
*           D1-D6: drainage entries calculated by the MACRO model, fate in surface water calculated by the TOXSWA model
*
*           R1-R4: runoff and erosion entries calculated by the PRZM model, fate in surface water calculated by the TOXSWA model
*
*           For STREAMS the Mean Deposition and Mass Loading, as calculated by the FOCUS Drift Calculator, have been multiplied by a
*           factor 1.2 to account for pesticide mass incoming from the upstream catchment as decided by the FOCUS Surface Water
*           Scenarios Working Group.
*
*****
*   CREATED RUNS
*****
*
*           |----- APPLICATION -----|----- on Water Surface -----|
* -ID-----Crop(1st/2nd)-----Scenario-WaterbodyType-|-Method-----First/Last/Interval--#---Rate-|-Mean Deposition-Mass Loading
*                                     (d)                (kg/ha) (% of Appl. Rate)    (mg/m2)
*
* 647  Vegetables, leafy(1st)   D3_Ditch                soil incorp.   11-Apr/11-May/1       1  400.0000      0.000      0.000
*
* 648  Vegetables, leafy(2nd)   D3_Ditch                soil incorp.   22-Jul/21-Aug/1       1  400.0000      0.000      0.000

```

Report: **Report: Predicted Environmental Concentration in Surface Water of**
Cyanamide based on FOCUS STEP3 **- page 29/39 -**

*									
* 649	Vegetables, leafy(1st)	D4_Pond	soil incorp.	26-Apr/26-May/1	1	400.0000	0.000	0.000	
*									
* 650	Vegetables, leafy(1st)	D4_Stream	soil incorp.	26-Apr/26-May/1	1	400.0000	0.000	0.000	
*									
* 651	Vegetables, leafy(1st)	D6_Ditch	soil incorp.	1-Aug /31-Aug/1	1	400.0000	0.000	0.000	
*									
* 652	Vegetables, leafy(1st)	R1_Pond	soil incorp.	6-Apr /6-May /1	1	400.0000	0.000	0.000	
*									
* 653	Vegetables, leafy(2nd)	R1_Pond	soil incorp.	17-Jul/16-Aug/1	1	400.0000	0.000	0.000	
*									
* 654	Vegetables, leafy(1st)	R1_Stream	soil incorp.	6-Apr /6-May /1	1	400.0000	0.000	0.000	
*									
* 655	Vegetables, leafy(2nd)	R1_Stream	soil incorp.	17-Jul/16-Aug/1	1	400.0000	0.000	0.000	
*									
* 656	Vegetables, leafy(1st)	R2_Stream	soil incorp.	14-Feb/16-Mar/1	1	400.0000	0.000	0.000	
*									
* 657	Vegetables, leafy(2nd)	R2_Stream	soil incorp.	17-Jul/16-Aug/1	1	400.0000	0.000	0.000	
*									
* 658	Vegetables, leafy(1st)	R3_Stream	soil incorp.	15-Feb/17-Mar/1	1	400.0000	0.000	0.000	
*									
* 659	Vegetables, leafy(2nd)	R3_Stream	soil incorp.	1-Jun /1-Jul /1	1	400.0000	0.000	0.000	
*									
* 660	Vegetables, leafy(1st)	R4_Stream	soil incorp.	15-Feb/17-Mar/1	1	400.0000	0.000	0.000	
*									
* 661	Vegetables, leafy(2nd)	R4_Stream	soil incorp.	1-Jun /1-Jul /1	1	400.0000	0.000	0.000	
*									

***** Surface Water Scenarios Help *****

Report: **Report:** **Predicted Environmental Concentration in Surface Water of**
Cyanamide based on FOCUS STEP3 **- page 30/39 -**

7.6 Cabbage, 500kg, uniform incorp. 15 cm

```

* SWASH report file
* made by FOCUS-SWASH UI v. 5 (internal version 5.1.0, 02 April 2015)
*
* File Name   : E:\SwashProjects\CN2_VG2\CN2_VG2_report.txt
* Description : Cabbage, 500kg, uniform incorp. 15 cm
* Substance   : CN2Gr
*
* Creation    : 24-Sep-2018, 12:52
*
* Remarks : SWASH report helps you to set up the needed runs to calculate the PECsw and PECsed, occurring in the EU
*           for the selected substance, used on the selected crop. The scenario code informs you which models you need to
*           run for this scenario.
*           D1-D6: drainage entries calculated by the MACRO model, fate in surface water calculated by the TOXSWA model
*
*           R1-R4: runoff and erosion entries calculated by the PRZM model, fate in surface water calculated by the TOXSWA model
*
*           For STREAMS the Mean Deposition and Mass Loading, as calculated by the FOCUS Drift Calculator, have been multiplied by a
*           factor 1.2 to account for pesticide mass incoming from the upstream catchment as decided by the FOCUS Surface Water
*           Scenarios Working Group.
*
*
*****
*   CREATED RUNS
*****
*
*                                     |----- APPLICATION -----|----- on Water Surface -----|
* -ID-----Crop(1st/2nd)-----Scenario-WaterbodyType-|-Method-----First/Last/Interval--#---Rate-|-Mean Deposition-Mass Loading
*                                     (d)                (kg/ha) (% of Appl. Rate)    (mg/m2)
*
* 662  Vegetables, leafy(1st)   D3_Ditch                soil incorp.   11-Apr/11-May/1       1 500.0000      0.000      0.000
*
* 663  Vegetables, leafy(2nd)   D3_Ditch                soil incorp.   22-Jul/21-Aug/1       1 500.0000      0.000      0.000

```

Report: Predicted Environmental Concentration in Surface Water of Cyanamide based on FOCUS STEP3 - page 31/39 -

*

***** Surface Water Scenarios Help *****

Report: **Report:** **Predicted Environmental Concentration in Surface Water of**
Cyanamide based on FOCUS STEP3 **- page 32/39 -**

7.7 Cabbage, 320kg, uniform incorp. 10 cm

```

* SWASH report file
* made by FOCUS-SWASH UI v. 5 (internal version 5.1.0, 02 April 2015)
*
* File Name   : E:\SwashProjects\CN2_VG3\CN2_VG3_report.txt
* Description : Cabbage, 320kg, uniform incorp. 10 cm
* Substance   : CN2Gr
*
* Creation    : 05-Oct-2018, 12:11
*
* Remarks : SWASH report helps you to set up the needed runs to calculate the PECsw and PECsed, occurring in the EU
*           for the selected substance, used on the selected crop. The scenario code informs you which models you need to
*           run for this scenario.
*           D1-D6: drainage entries calculated by the MACRO model, fate in surface water calculated by the TOXSWA model
*
*           R1-R4: runoff and erosion entries calculated by the PRZM model, fate in surface water calculated by the TOXSWA model
*
*           For STREAMS the Mean Deposition and Mass Loading, as calculated by the FOCUS Drift Calculator, have been multiplied by a
*           factor 1.2 to account for pesticide mass incoming from the upstream catchment as decided by the FOCUS Surface Water
*           Scenarios Working Group.
*
*
*****
*   CREATED RUNS
*****
*
*                                     |----- APPLICATION -----|----- on Water Surface -----|
* -ID-----Crop(1st/2nd)-----Scenario-WaterbodyType-|-Method-----First/Last/Interval--#---Rate-|-Mean Deposition-Mass Loading
*                                     (d)                (kg/ha) (% of Appl. Rate)    (mg/m2)
*
* 689  Vegetables, leafy(1st)   D3_Ditch                soil incorp.   11-May/10-Jun/1      1  320.0000      0.000      0.000
*
* 690  Vegetables, leafy(2nd)   D3_Ditch                soil incorp.   21-Aug/20-Sep/1      1  320.0000      0.000      0.000

```

Report: **Report: Predicted Environmental Concentration in Surface Water of**
Cyanamide based on FOCUS STEP3 **- page 33/39 -**

*									
* 691	Vegetables, leafy(1st)	D4_Pond	soil incorp.	26-May/25-Jun/1	1	320.0000	0.000	0.000	
*									
* 692	Vegetables, leafy(1st)	D4_Stream	soil incorp.	26-May/25-Jun/1	1	320.0000	0.000	0.000	
*									
* 693	Vegetables, leafy(1st)	D6_Ditch	soil incorp.	31-Aug/30-Sep/1	1	320.0000	0.000	0.000	
*									
* 694	Vegetables, leafy(1st)	R1_Pond	soil incorp.	5-Jun /8-Jul /1	1	320.0000	0.000	0.000	
*									
* 695	Vegetables, leafy(2nd)	R1_Pond	soil incorp.	15-Sep/15-Oct/1	1	320.0000	0.000	0.000	
*									
* 696	Vegetables, leafy(1st)	R1_Stream	soil incorp.	5-Jun /8-Jul /1	1	320.0000	0.000	0.000	
*									
* 697	Vegetables, leafy(2nd)	R1_Stream	soil incorp.	15-Sep/15-Oct/1	1	320.0000	0.000	0.000	
*									
* 698	Vegetables, leafy(1st)	R2_Stream	soil incorp.	16-Mar/15-Apr/1	1	320.0000	0.000	0.000	
*									
* 699	Vegetables, leafy(2nd)	R2_Stream	soil incorp.	16-Aug/15-Sep/1	1	320.0000	0.000	0.000	
*									
* 700	Vegetables, leafy(1st)	R3_Stream	soil incorp.	17-Mar/16-Apr/1	1	320.0000	0.000	0.000	
*									
* 701	Vegetables, leafy(2nd)	R3_Stream	soil incorp.	1-Jul /31-Jul/1	1	320.0000	0.000	0.000	
*									
* 702	Vegetables, leafy(1st)	R4_Stream	soil incorp.	17-Mar/16-Apr/1	1	320.0000	0.000	0.000	
*									
* 703	Vegetables, leafy(2nd)	R4_Stream	soil incorp.	1-Jul /31-Jul/1	1	320.0000	0.000	0.000	
*									

***** Surface Water Scenarios Help *****

Report: **Report:** **Predicted Environmental Concentration in Surface Water of**
Cyanamide based on FOCUS STEP3 **- page 34/39 -**

7.8 Grassland, 300kg, uniform incorp. 0 cm

```

* SWASH report file
* made by FOCUS-SWASH UI v. 5 (internal version 5.1.0, 02 April 2015)
*
* File Name   : E:\SwashProjects\CN2_GR\CN2_GR_report.txt
* Description : Grassland, 300kg, uniform incorp. 0 cm
* Substance   : CN2Gr
*
* Creation    : 24-Sep-2018, 10:19
*
* Remarks : SWASH report helps you to set up the needed runs to calculate the PECsw and PECsed, occurring in the EU
*           for the selected substance, used on the selected crop. The scenario code informs you which models you need to
*           run for this scenario.
*           D1-D6: drainage entries calculated by the MACRO model, fate in surface water calculated by the TOXSWA model
*
*           R1-R4: runoff and erosion entries calculated by the PRZM model, fate in surface water calculated by the TOXSWA model
*
*           For STREAMS the Mean Deposition and Mass Loading, as calculated by the FOCUS Drift Calculator, have been multiplied by a
*           factor 1.2 to account for pesticide mass incoming from the upstream catchment as decided by the FOCUS Surface Water
*           Scenarios Working Group.
*
*
*****
*   CREATED RUNS
*****
*
*           |----- APPLICATION -----|----- on Water Surface -----|
* -ID-----Crop(1st/2nd)-----Scenario-WaterbodyType-|Method-----First/Last/Interval--#---Rate-|-Mean Deposition-Mass Loading
*                                           (d)           (kg/ha) (% of Appl. Rate)   (mg/m2)
*
* 535   Grass/alfalfa(1st)      D1_Ditch          granular appl. 1-Apr /1-May /1      1 300.0000      0.000      0.000
*
* 536   Grass/alfalfa(1st)      D1_Stream         granular appl. 1-Apr /1-May /1      1 300.0000      0.000      0.000

```

Report: **Report: Predicted Environmental Concentration in Surface Water of**
Cyanamide based on FOCUS STEP3 **- page 35/39 -**

*								
* 537	Grass/alfalfa(1st)	D2_Ditch	granular appl. 1-Apr /1-May /1	1	300.0000	0.000	0.000	
*								
* 538	Grass/alfalfa(1st)	D2_Stream	granular appl. 1-Apr /1-May /1	1	300.0000	0.000	0.000	
*								
* 539	Grass/alfalfa(1st)	D3_Ditch	granular appl. 1-Apr /1-May /1	1	300.0000	0.000	0.000	
*								
* 540	Grass/alfalfa(1st)	D4_Pond	granular appl. 1-Apr /1-May /1	1	300.0000	0.000	0.000	
*								
* 541	Grass/alfalfa(1st)	D4_Stream	granular appl. 1-Apr /1-May /1	1	300.0000	0.000	0.000	
*								
* 542	Grass/alfalfa(1st)	D5_Pond	granular appl. 1-Apr /1-May /1	1	300.0000	0.000	0.000	
*								
* 543	Grass/alfalfa(1st)	D5_Stream	granular appl. 1-Apr /1-May /1	1	300.0000	0.000	0.000	
*								
* 544	Grass/alfalfa(1st)	R2_Stream	granular appl. 1-Apr /1-May /1	1	300.0000	0.000	0.000	
*								
* 545	Grass/alfalfa(1st)	R3_Stream	granular appl. 1-Apr /1-May /1	1	300.0000	0.000	0.000	
*								
*								

***** Surface Water Scenarios Help *****

Report:

Report:

Predicted Environmental Concentration in Surface Water of

Cyanamide based on FOCUS STEP3

- page 36/39 -

7.9

Strawberries, 200kg, uniform incorp. 15 cm

```
* SWASH report file
* made by FOCUS-SWASH UI v. 5 (internal version 5.1.0, 02 April 2015)
*
* File Name      : E:\SwashProjects\CN2_TO3\CN2_TO3_report.txt
* Description    : Strawberries, 200kg, uniform incorp. 15 cm
* Substance     : CN2Gr
*
* Creation      : 24-Sep-2018, 13:02
*
* Remarks       : SWASH report helps you to set up the needed runs to calculate the PECsw and PECsed, occurring in the EU
                  for the selected substance, used on the selected crop. The scenario code informs you which models you need to
                  run for this scenario.
                  D1-D6: drainage entries calculated by the MACRO model, fate in surface water calculated by the TOXSWA model
                  R1-R4: runoff and erosion entries calculated by the PRZM model, fate in surface water calculated by the TOXSWA model
                  For STREAMS the Mean Deposition and Mass Loading, as calculated by the FOCUS Drift Calculator, have been multiplied by a
                  factor 1.2 to account for pesticide mass incoming from the upstream catchment as decided by the FOCUS Surface Water
                  Scenarios Working Group.
*
*****
*   CREATED RUNS
*****
*


| -ID----- | Crop(1st/2nd)-----        | Scenario-WaterbodyType- | Method-----  | First/Last/Interval--#--- | Rate-                     | Mean Deposition-Mass Loading |
|----------|---------------------------|-------------------------|--------------|---------------------------|---------------------------|------------------------------|
|          |                           |                         |              | (d)                       | (kg/ha) (% of Appl. Rate) | (mg/m2)                      |
| 681      | Vegetables, fruiting(1st) | D6_Ditch                | soil incorp. | 27-Mar/26-Apr/1           | 1 200.0000                | 0.000 0.000                  |
| 682      | Vegetables, fruiting(1st) | R2_Stream               | soil incorp. | 1-Mar /31-Mar/1           | 1 200.0000                | 0.000 0.000                  |


*
```

Report: Report: Predicted Environmental Concentration in Surface Water of
Cyanamide based on FOCUS STEP3 - page 38/39 -

7.10 Strawberries, 200kg, uniform incorp. 0 cm

```

* SWASH report file
* made by FOCUS-SWASH UI v. 5 (internal version 5.1.0, 02 April 2015)
*
* File Name   : E:\SwashProjects\CN2_TO4\CN2_TO4_report.txt
* Description : Strawberries, 200kg, uniform incorp. 0 cm
* Substance   : CN2Gr
*
* Creation    : 24-Sep-2018, 13:04
*
* Remarks : SWASH report helps you to set up the needed runs to calculate the PECsw and PECsed, occurring in the EU
*           for the selected substance, used on the selected crop. The scenario code informs you which models you need to
*           run for this scenario.
*           D1-D6: drainage entries calculated by the MACRO model, fate in surface water calculated by the TOXSWA model
*
*           R1-R4: runoff and erosion entries calculated by the PRZM model, fate in surface water calculated by the TOXSWA model
*
*           For STREAMS the Mean Deposition and Mass Loading, as calculated by the FOCUS Drift Calculator, have been multiplied by a
*           factor 1.2 to account for pesticide mass incoming from the upstream catchment as decided by the FOCUS Surface Water
*           Scenarios Working Group.
*
*****
*   CREATED RUNS
*****
*
*           |----- APPLICATION -----|----- on Water Surface -----|
* -ID-----Crop(1st/2nd)-----Scenario-WaterbodyType-|-Method-----First/Last/Interval--#---Rate-|-Mean Deposition-Mass Loading
*                                           (d)           (kg/ha) (% of Appl. Rate)   (mg/m2)
*
* 685   Vegetables, fruiting(1st) D6_Ditch                granular appl. 27-Mar/26-Apr/1      1   200.0000      0.000      0.000

```

Report:

Report:

Predicted Environmental Concentration in Surface Water of

- page 39/39 -

```

*
* 686  Vegetables, fruiting(1st) R2_Stream          granular appl. 1-Mar /31-Mar/1      1  200.0000    0.000    0.000
*
* 687  Vegetables, fruiting(1st) R3_Stream          granular appl. 26-Apr/26-May/1      1  200.0000    0.000    0.000
*
* 688  Vegetables, fruiting(1st) R4_Stream          granular appl. 6-Apr /6-May /1      1  200.0000    0.000    0.000
*
***** Surface Water Scenarios Help *****

```