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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

Sponsor

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October 2, 2018

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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 an 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).

2 October 2018
Date

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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. The 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	Incorporated	at 10 cm	200	14 days before emergence (= planting)
Leafy vegetables	Incorporated	at 15 cm	500	14 days before emergence (= planting)
Leafy vegetables	Incorporated	at 10 cm	320	14 days before emergence (= planting)
Grass	Granular app	at 0 cm	300	March-April
Vegetables (fruiting)	Incorporated.	at 15 cm	200	14 days before emergence (= planting)
Vegetables (fruiting)	Granular app.	at 0 cm	200	14 days before emergence (= planting)

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

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 1st season (drainage)	02-Apr
Potatoes	D6 2nd 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 1st season (drainage)	10-Apr
vegetables	D3 2nd season (drainage)	25-Jul

vegetables	D4 (drainage)	16-May
vegetables	D6 (drainage)	04-Aug
vegetables	R1 1st season (runoff)	26-Apr
vegetables	R1 2nd season (runoff)	28-Jul
vegetables	R2 1st season (runoff)	06-Mar
vegetables	R2 2nd season (runoff)	08-Aug
vegetables	R3 1st season (runoff)	19-Feb
vegetables	R3 2nd season (runoff)	02-Jun
vegetables	R4 1st season (runoff)	01-Mar
vegetables	R4 2nd 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 $DegT_{50}$ values in water, sediment-system and in soil considered in the simulations are presented in Table 3.

Table 3: $DegT_{50}$-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 $DegT50_{50}$ 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
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

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

Crop		PERLKA	Cyanamide	
		PECsw (µg/L)	PECsw (µg/L)	PECsed (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

Crop		PERLKA	Cyanamide	
		PECsw (µg/L)	PECsw (µg/L)	PECsed (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

Crop		PERLKA	Cyanamide	
		PECsw (µg/L)	PECsw (µg/L)	PECsed (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, uniform incorp. 10 cm	D3_Ditch	0	0.000	0.000
	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	0.003	0.001
	R1_Pond	0	0.000	0.000
	R1_Stream	0	1.310	0.070
	R1_Stream	0.000	0.000	0.000
	R2_Stream	0	4.123	0.242
	R2_Stream	0	0	0
	R3_Stream	0.109	52.960	2.940
	R3_Stream	0	0.078	0.007
	R4_Stream	0.073	54.160	4.191
	R4_Stream	0.000	0.823	0.064
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

Crop		PERLKA	Cyanamide	
		PECsw (µg/L)	PECsw (µg/L)	PECsed (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

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6. Appendix 1: Available Degraation studies and information on moisture correction

Laboratory degradation are undertaken at various moisture contents often between of 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)e	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**

7. Appendix 2: SWASH Report Files

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, occuring 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

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*

* |--------------- 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

*

* 616   Maize(1st)   D4_Pond   soil incorp.   26-Apr/26-May/1   1 400.0000   0.000   0.000

*

* 617   Maize(1st)   D4_Stream   soil incorp.   26-Apr/26-May/1   1 400.0000   0.000   0.000

*

* 618   Maize(1st)   D5_Pond   soil incorp.   26-Apr/26-May/1   1 400.0000   0.000   0.000

*

* 619   Maize(1st)   D5_Stream   soil incorp.   26-Apr/26-May/1   1 400.0000   0.000   0.000

```
*
* 620   Maize(1st)              D6_Ditch             soil incorp.   6-Apr /6-May /1      1  400.0000     0.000           0.000
*
* 621   Maize(1st)              R1_Pond              soil incorp.   19-Apr/19-May/1      1  400.0000     0.000           0.000
*
* 622   Maize(1st)              R1_Stream            soil incorp.   19-Apr/19-May/1      1  400.0000     0.000           0.000
*
* 623   Maize(1st)              R2_Stream            soil incorp.   17-Apr/17-May/1      1  400.0000     0.000           0.000
*
* 624   Maize(1st)              R3_Stream            soil incorp.   17-Apr/17-May/1      1  400.0000     0.000           0.000
*
* 625   Maize(1st)              R4_Stream            soil incorp.   27-Mar/26-Apr/1      1  400.0000     0.000           0.000
*
********************************************** Surface WAter Scenarios Help ************************************************
```

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, occuring 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 (d)	#	Rate (kg/ha)	Mean Deposition (% of Appl. Rate)	Mass Loading (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
* 628	Potatoes(1st)	D4_Stream	soil incorp.	8-May /7-Jun /1	1	400.0000	0.000	0.000
* 629	Potatoes(1st)	D6_Ditch	soil incorp.	27-Mar/26-Apr/1	1	400.0000	0.000	0.000
* 630	Potatoes(2nd)	D6_Ditch	soil incorp.	22-Jul/21-Aug/1	1	400.0000	0.000	0.000
* 631	Potatoes(1st)	R1_Pond	soil incorp.	21-Apr/21-May/1	1	400.0000	0.000	0.000
* 632	Potatoes(1st)	R1_Stream	soil incorp.	21-Apr/21-May/1	1	400.0000	0.000	0.000
* 633	Potatoes(1st)	R2_Stream	soil incorp.	1-Mar /31-Mar/1	1	400.0000	0.000	0.000
* 634	Potatoes(1st)	R3_Stream	soil incorp.	27-Mar/26-Apr/1	1	400.0000	0.000	0.000

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, occuring 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
*
* 637   Sugar beets(1st)         D4_Stream             soil incorp.   20-Apr/20-May/1      1  350.0000     0.000           0.000
*
* 638   Sugar beets(1st)         R1_Pond               soil incorp.   2-Apr /2-May /1      1  350.0000     0.000           0.000
*
* 639   Sugar beets(1st)         R1_Stream             soil incorp.   2-Apr /2-May /1      1  350.0000     0.000           0.000
*
* 640   Sugar beets(1st)         R3_Stream             soil incorp.   6-Mar /5-Apr /1      1  350.0000     0.000           0.000
```

```
*
********************************************** Surface WAter Scenarios Help ************************************************
```

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, occuring 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

*

* 643   Sugar beets(1st)   D4_Stream   soil incorp.   20-Apr/20-May/1   1 200.0000   0.000   0.000

*

* 644   Sugar beets(1st)   R1_Pond   soil incorp.   2-Apr /2-May /1   1 200.0000   0.000   0.000

*

* 645   Sugar beets(1st)   R1_Stream   soil incorp.   2-Apr /2-May /1   1 200.0000   0.000   0.000

```
*
* 646   Sugar beets(1st)         R3_Stream             soil incorp.   6-Mar /5-Apr /1      1  200.0000     0.000           0.000
*
********************************************** Surface WAter Scenarios Help ************************************************
```

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, occuring 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
*
* 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 **********

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, occuring 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
*
* 664   Vegetables, leafy(1st)   D4_Pond               soil incorp.   26-Apr/26-May/1      1  500.0000     0.000           0.000
*
* 665   Vegetables, leafy(1st)   D4_Stream             soil incorp.   26-Apr/26-May/1      1  500.0000     0.000           0.000
*
* 666   Vegetables, leafy(1st)   D6_Ditch              soil incorp.   1-Aug /31-Aug/1      1  500.0000     0.000           0.000
*
```

* 667	Vegetables, leafy(1st)	R1_Pond	soil incorp.	6-Apr /6-May /1	1	500.0000	0.000	0.000
* 668	Vegetables, leafy(2nd)	R1_Pond	soil incorp.	17-Jul/16-Aug/1	1	500.0000	0.000	0.000
* 669	Vegetables, leafy(1st)	R1_Stream	soil incorp.	6-Apr /6-May /1	1	500.0000	0.000	0.000
* 670	Vegetables, leafy(2nd)	R1_Stream	soil incorp.	17-Jul/16-Aug/1	1	500.0000	0.000	0.000
* 671	Vegetables, leafy(1st)	R2_Stream	soil incorp.	14-Feb/16-Mar/1	1	500.0000	0.000	0.000
* 672	Vegetables, leafy(2nd)	R2_Stream	soil incorp.	17-Jul/16-Aug/1	1	500.0000	0.000	0.000
* 673	Vegetables, leafy(1st)	R3_Stream	soil incorp.	15-Feb/17-Mar/1	1	500.0000	0.000	0.000
* 674	Vegetables, leafy(2nd)	R3_Stream	soil incorp.	1-Jun /1-Jul /1	1	500.0000	0.000	0.000
* 675	Vegetables, leafy(1st)	R4_Stream	soil incorp.	15-Feb/17-Mar/1	1	500.0000	0.000	0.000
* 676	Vegetables, leafy(2nd)	R4_Stream	soil incorp.	1-Jun /1-Jul /1	1	500.0000	0.000	0.000

********** Surface WAter Scenarios Help **********

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    : 24-Sep-2018, 13:00
*
* Remarks : SWASH report helps you to set up the needed runs to calculate the PECsw and PECsed, occuring 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-Apr/11-May/1      1  320.0000     0.000           0.000
*
* 690   Vegetables, leafy(2nd)   D3_Ditch             soil incorp.   22-Jul/21-Aug/1      1  320.0000     0.000           0.000
*
* 691   Vegetables, leafy(1st)   D4_Pond              soil incorp.   26-Apr/26-May/1      1  320.0000     0.000           0.000
*
* 692   Vegetables, leafy(1st)   D4_Stream            soil incorp.   26-Apr/26-May/1      1  320.0000     0.000           0.000
*
* 693   Vegetables, leafy(1st)   D6_Ditch             soil incorp.   1-Aug /31-Aug/1      1  320.0000     0.000           0.000
*
* 694   Vegetables, leafy(1st)   R1_Pond              soil incorp.   6-Apr /6-May /1      1  320.0000     0.000           0.000
```

```
*
* 695   Vegetables, leafy(2nd)   R1_Pond            soil incorp.   17-Jul/16-Aug/1     1  320.0000     0.000          0.000
*
* 696   Vegetables, leafy(1st)   R1_Stream          soil incorp.   6-Apr /6-May /1     1  320.0000     0.000          0.000
*
* 697   Vegetables, leafy(2nd)   R1_Stream          soil incorp.   17-Jul/16-Aug/1     1  320.0000     0.000          0.000
*
* 698   Vegetables, leafy(1st)   R2_Stream          soil incorp.   14-Feb/16-Mar/1     1  320.0000     0.000          0.000
*
* 699   Vegetables, leafy(2nd)   R2_Stream          soil incorp.   17-Jul/16-Aug/1     1  320.0000     0.000          0.000
*
* 700   Vegetables, leafy(1st)   R3_Stream          soil incorp.   15-Feb/17-Mar/1     1  320.0000     0.000          0.000
*
* 701   Vegetables, leafy(2nd)   R3_Stream          soil incorp.   1-Jun /1-Jul /1     1  320.0000     0.000          0.000
*
* 702   Vegetables, leafy(1st)   R4_Stream          soil incorp.   15-Feb/17-Mar/1     1  320.0000     0.000          0.000
*
* 703   Vegetables, leafy(2nd)   R4_Stream          soil incorp.   1-Jun /1-Jul /1     1  320.0000     0.000          0.000
*
********************************************** Surface WAter Scenarios Help ************************************************
```

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, occuring 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
*
* 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 ************************************************
```

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, occuring 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)
*
* 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
*
* 683   Vegetables, fruiting(1st) R3_Stream            soil incorp.   26-Apr/26-May/1      1  200.0000     0.000          0.000
*
* 684   Vegetables, fruiting(1st) R4_Stream            soil incorp.   6-Apr /6-May /1      1  200.0000     0.000          0.000
*
********************************************** Surface WAter Scenarios Help ************************************************
```

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, occuring 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
*
* 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 **********************************************
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