FINAL REGISTRATION REPORT

Part B

Section 5

Analytical Methods

Detailed summary of the risk assessment

Product code: CHR/H/PENDIF 599.5 SC

Product name(s): Cevino Trio 599.5 SC/ Trivino 599.5 SC

Chemical active substance(s):

Penoxsulam, 37.5 g/L
Diflufenican, 250 g/L
Flufenacet, 312 g/L

Central Zone

Zonal Rapporteur Member State: Poland

CORE ASSESSMENT

(authorization)

Applicant: Innvigo Sp. z o.o.

Submission date: October 2021

MS Finalisation date: 24/08/2022

Version history

When	What
February 2022	Dossier sent for evaluation
April 2022	zRMS evaluation of dRR
August 2022	Final version prepared by zRMS after Commenting period

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zRMS comments:
The text highlighted in grey was provided by the evaluator.

5 Analytical methods

In the following document, data for active substances - penoxsulam, diflufenican and flufenacet - was described during its inclusion on Annex 1 process in respectively 2010, 2009 and 2004 . Were reference to active substance data in the current risk assessment has been made, it was based on the data which protection for expired 10 years from date of inclusion of active substances on Annex I

5.1 Conclusion and summary of assessment

Sufficiently sensitive and selective analytical methods are ~~not~~ available for the active substance(s) and relevant impurities in the plant protection product.
Noticed data gaps are: none

- ~~data gap 1~~
- ~~data gap 2~~
- ~~data gap 3~~

The document was not rewritten by the evaluator. The evaluator text is on grey background.
Sufficiently sensitive and selective analytical methods – in the context of the authorisation request - are available for all analytes included in the residue definitions. They were accepted previously on EU level and for penoxsulam in wheat they were evaluated and accepted within the present authorization request.
Noticed data gaps in the context of the authorisation request are: none

Commodity/crop	Supported/ Not supported
Cereals	Supported

5.2 Methods used for the generation of pre-authorization data (KCP 5.1)

5.2.1 Analysis of the plant protection product (KCP 5.1.1)

5.2.1.1 Determination of active substance and/or variant in the plant protection product (KCP 5.1.1)

An overview on the acceptable methods and possible data gaps for analysis of Penoxsulam, Diflufenican and Flufenacet in plant protection product is provided as follows:

Comments of zRMS:	The method is accepted and may be used for analysing active substances in the PPP

Reference:	KCP 5.1.1/01
Report	Validation of analytical method for CHR/H/PENDIF 599.5 SC for determination of penoxulam, flufenacet and diflufenican.; Study code: ICB/114/2020, Marta Patrzałek, 2021
Guideline(s):	SANCO/3030/99 rev.5 22/03/19
Deviations:	No
GLP:	Yes
Acceptability:	yes

Materials and methods

Validation - Results and discussions

Table 5.2-1: Methods suitable for the determination of active substances Penoxsulam, Diflufenican, Flufenacet in plant protection product CHR/H/PENDIF 599.5 SC

	Penoxsulam	Diflufnican	Flufenacet
Author(s), year	M. Patrzałek, 2021		
Principle of method	HPLC-DAD		

Results for primary chromatographic system.

Active ingredients	Linearity	Precision [%] (100% without standard addition)	Horwitz ratio	Recovery [%]	100 % with standard addition (20-30%)
penoxulam	R^2 = 0.9999459	0.65	0.29	101.25 – 103.94	24.67
flufenacet	R^2 = 0.9999998	0.59	0.36	97.12 – 99.10	25.11
diflufenican	R^2 = 0.9999640	0.40	0.24	99.41 – 102.84	24.40

Validation level	Active ingredients	Precision [%]	Horwitz ratio	Recovery [%]
LOQ	penoxulam	0.90	0.29	102.0
	flufenacet	1.81	0.59	112.8
	diflufenican	0.64	0.21	100.4

Validation level	Active ingredients	Precision [%]	Horwitz ratio	Recovery [%]
ULOQ	penoxulam	0.43	0.23	98.2
	flufenacet	0.59	0.32	99.1
	diflufenican	0.46	0.25	98.8

Results for secondary chromatographic system.

Active ingredients	Linearity	Precision [%] (100% without standard addition)	Horwitz ratio	Recovery [%]	100 % with standard addition (20-30%)
penoxulam	R^2 = 0.9999667	0.64	0.28	101.68 – 106.61	24.57
flufenacet	R^2 = 0.9999848	0.69	0.42	97.46 – 99.58	24.84
diflufenican	R^2 = 0.9999839	0.56	0.33	102.16 – 102.95	24.09

Validation level	Active ingredients	Precision [%]	Horwitz ratio	Recovery [%]
LOQ	penoxulam	0.95	0.31	96.9
	flufenacet	2.58	0.84	104.0
	diflufenican	1.83	0.59	113.3

Validation level	Active ingredients	Precision [%]	Horwitz ratio	Recovery [%]
ULOQ	penoxulam	0.66	0.36	99.2
	flufenacet	0.69	0.38	100.1
	diflufenican	0.52	0.28	100.3

Linearity:
In order to check the linearity of penoxulam, calibration curves were prepared using standard solutions with concentrations: 1.024; 5.119; 10.238; 20.476; 40.953 [µg/ml].. Linearity range of penoxulam is from 1.024 to 312.116 [µg/mL].
In order to check the linearity of flufenacet, calibration curves were prepared using standard solutions with concentrations: 1.034; 12.922; 25.844; 51.688; 103.376 [µg/ml]. Linearity range of flufenacet is from 1.034 to 308.14 [µg/mL].
In order to check the linearity of diflufenican, calibration curves were prepared using standard solutions with concentrations: 1.121; 14.008; 28.016; 56.031; 112.062 [µg/ml]. A graph of the peak area to the concentration of diflufenican was plotted. The resulting curve is linear in the tested concentrations. Linearity range of flufenacet is from 1.121 to 304.73 [µg/mL].

Specificity.
Specificity of the method was evaluated based on the analysis of chromatograms for blank samples (placebo) against samples of placebo spiked with penoxulam, flufenacet and diflufenican standards. Analysis showed no overlapping of determined substances signal with the signals of matrix components under method conditions hence method specificity criterion is fulfilled.

Precision was tested for five samples of the PPP. Nevertheles a standard addition method was used for analysing the Precision and recovery (five samples) at LOQ (corresponding to the lowest calibration curve /linearity curve concentration. ULOQ was tested as well.

Conclusion

It was confirmed that the method is specific. There were no peaks from placebo interfering with determined compounds. The validation parameters (specificity, linearity, instrument precision, re-peatability, accuracy and LOQ) are within the acceptance range and fulfil EU requirements given in SANCO /3030 /99 rev.5.

5.2.1.2 Description of analytical methods for the determination of relevant impurities (KCP 5.1.1)

An overview on the acceptable methods and possible data gaps for analysis of relevant impurities in plant protection product is provided as follows:

Comments of zRMS:	The method is accepted and may be used to analyse the impurity in the PPP.

Reference:	KCP 5.1.1/02
Report	Method validation and determination of a relevant impurity before and after an accelerated storage procedure for 14 days at 54ºC on one batch of CHR/H/PENDIF 599.5 SC, S. Lobstein, 2021, Study No.: C1028
Guideline(s):	Regulation (EC) No. 1107/2009 Commission regulato n (EU) No. 284/2013 SANCO/3030/99 rev. 5 (22/03/19) ENV/JM/MONO(2014)20 (11/07/14)
Deviations:	No
GLP:	Yes
Acceptability:	Yes

Validation - Results and discussions

Table 5.2-2: Methods suitable for the determination of the relevant impurities in plant protection product (PPP) CHR/H/PENDIF 599.5 SC

	Bis-CHYMP max. 0.1 g/kg
Author(s), year	S. Lobstein, 2021
Principle of method	HPLC-DAD

Linearity

	Linearity range Min – Max (ng/mL)	Linearity range Min – Max (mg/kg)	Number of Levels	R^2	r
seq210325	15.1 – 161.1	0.50 – 5.37	11	0.99933	0.99966
seq210408	15.1 – 161.4	0.50 – 5.38	11	0.99657	0.99829

The linear correlation coefficient was > 0.99, showing a good linearity.

Repeatability of the system

Reference of solution used	Average of peak area (au)	Number of determinations	RSD (%)	RSD_r (1) (%)
NZ 24 III 21 A8	1341	5	3.51	9.75

The results obtained show a relative standard deviation < RSDr (1) given by the modified Horwitz equation based on the theoretical amount found in the spiked test item, which indicates a good consistency of the data according to SANCO/3030/99 rev. 5.

Repeatability of the method

Average Percentage of recovery (%)	Number of determinations	Average Theoretical Amount in spiked samples (mg/kg)	RSD (%)	RSD_r (1) (%)	Horrat value H_r
101.4	5	1.88	1.14	9.75	0.12

The results obtained indicate a good precision of the data (RSD < RSD_r (1) given by modified Horwitz equation based on the average theoretical amount in spiked samples and the Horrat Value $H_r \leq 1$).

Accuracy

Spiking level (mg/kg)	Number of determinations	Average Percentage of recovery (%)	Average Theoretical Amount in spiked samples (mg/kg)	RSD (%)	RSD_r (1) (%)
1.87	5	101.4	1.88	1.14	9.75
3.70	5	102.7	3.69	1.01	8.81

The results obtained show a good accuracy which indicates acceptable data (acceptability according to the values given in SANCO/3030/99 rev.5 (22/03/19), mean recovery must be between 70 and 130 % for a theoretical amount in spiked samples below 100 mg/kg and RSD < RSD_r (1) given by modified Horwitz equation based on theoretical amount in the spiked samples).

Intermediate precision

Number of determinations	Mean Percent recovery (%)	RSD (%)	RSD_R (2) (%)
10	102.1	2.25	14.55

The results obtained show a good intermediate precision as the relative standard deviation obtained is below the RSD_R (2) given by Horwitz equation.

Specificity

No interference can be seen in the area of Bis-CHYMP retention time during the analysis of the solvent and of the blank formulation.

Limit of quantification

The limit of quantification was validated at 1.87 mg/kg (fivefold determination at this level gave a good accuracy and a good precision).

Limit of detection

LOD (ng/mL)	LOD (mg/kg)
14	0.5

Note: The Horrat value (H) is calculated as follows:

Conclusion

It was confirmed that the method is specific. There were no peaks from placebo interfering with determined compounds. The validation parameters (specificity, linearity, instrument precision, repeatability, accuracy and LOQ) are within the acceptance range and fulfil EU requirements given in SANCO /3030 /99 rev.5.

5.2.1.3 Description of analytical methods for the determination of formulants (KCP 5.1.1)

Please refer to PART C – Confidential data.

5.2.1.4 Applicability of existing CIPAC methods (KCP 5.1.1)

Analytical methods for determination of penoxsulam impurities and relevance of CIPAC methods in CHR/H/PENDIF 599.5 SC were not evaluated as part of the EU review. Therefore, all relevant data are provided and are considered adequate.

5.2.2 Methods for the determination of residues (KCP 5.1.2)

An overview on the acceptable methods and possible data gaps for analysis of residues of penoxsulam, diflufenican and flufenacet for the generation of pre-authorization data is given in the following table.

Table 5.2-3: Validated methods for the generation of pre-authorization data

Component of residue definition: Penoxsulam				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing / EU agreed**
Food/feed of plant origin (Residues)	Primary	0.01 mg/kg	GC-MS	Hastings, M.J., Schelle, G.E. (2002)
	Confirmatory	Not required		
Animal products, food of animal origin (Residues)	Primary	No methods have been developed for determination residues in meat, milk or eggs because no resi-dues of penoxsulam occur in crops that are components of animal feed		
	Confirmatory (if required)			
Soil	Primary	0.003 mg/kg	LC-MS/MS	Almendinger, H., Bachlechner, G.(1994) II A 4.2.2 to 4.2.4, IIIA 5.2 DAR Flufenacet , B.4: Methods of analysis 1997
	Confirmatory (if required)	Not required		
Water (surface, ground and drinking water) (Environmental fate)	Primary	0.003 □g/mL	LC-MS/Ms	Hastings, M. J. (2002):
	Confirmatory (if required)	Not required		
Air	Primary	1.5 µg/m^3	LC-Ms/MS	Wais, A. (2002)
	Confirmatory (if required)	Not required		
	Confirmatory (if required)			
Body fluids, air, (Exposure)	Primary	0.01 µg/ml	LC-MS/MS	Chickering, C.D. (2002)
	Confirmatory (if required)	Not required		

Table 5.2-4: Validated methods for the generation of pre-authorization data

Component of residue definition: diflufenican				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing / EU agreed**
Plants, plant products,...	Primary	0.01 mg/kg		Bacher,R.. (2002)
	Confirmatory (if required)	Not required		
Animal products,	Primary	0.01 mg/kg	GC-MS	Klumpp M, 2002

Component of residue definition: diflufenican				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing / EU agreed**
food of animal origin,...	Confirmatory (if required)	Not required		
Soil	Primary	0.002 mg/kg	GC-MS	Doran A.M., McGuire G.M., 2002
	Confirmatory (if required)	Not required		
Water	Primary	0.05 mg/kg	LC-MS/MS	Bacher R. (2002)
	Confirmatory (if required)			
Air	Primary	0.04 □g/m^3	GC-MSD	Bacher R,. 2002
	Confirmatory (if required)			
Body fluids,	Primary	Not required. The active ingredient is not classified as toxic or highly toxic.		
	Confirmatory (if required)			

Table 5.2-5: Validated methods for the generation of pre-authorization data

Component of residue definition: Flufenacet				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing / EU agreed**
Food/feed of plant origin (Residues)	Primary	0.05 mg/kg	GC-MS	Seym 1994 and 1995a, II A 4.2.1, IIIA 5.2 DAR Flufenacet , B.4: Methods of analysis 1997
	Confirmatory	Not required		
Animal products, food of animal origin (Residues)	Primary	0.01 mg/kg-0.01 mg.kg	GC-MS	Seym 1994 and 1995a, II A 4.2.2, IIIA 5.2 DAR Flufenacet , B.4: Methods of analysis 1997
	Confirmatory (if required)	Not required		
Soil (Environmental fate)	Primary	0.01 mg/kg	HPLC-MS-MS	Almendinger, H., Bachlechner, G.(1994) II A 4.2.2 to 4.2.4, IIIA 5.2 DAR Flufenacet , B.4: Methods of analysis 1997

Component of residue definition: Flufenacet				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing / EU agreed**
	Confirmatory (if required)	Not required		
Water (surface, ground and drinking water) (Environmental fate)	Primary	0.05 □g/L	GC-ECD	Konig, T 1996., II A 4.2.2 to 4.2.4, IIIA 5.2 DAR Flufenacet , B.4: Methods of analysis 1997
	Confirmatory (if required)	0.04 □g/L	LC-ESI-MS-MS	Bethem, R.A., Peterson R.G., Leimkuhler, W., Mattern, G.C 1995., II A 4.2.2 to 4.2.4, IIIA 5.2 DAR Flufenacet , B.4: Methods of analysis 1997
Air (Environmental fate)	Primary	2.2µg/m^3	HPLC-UV	Riegner.K,1995 II A 4.2.2 to 4.2.4, IIIA 5.2 DAR DAR Flufenacet , B.4: Methods of analysis 1997
	Confirmatory (if required)	N/A		
Feed, body fluids,... (Toxicology)	Primary	No data submitted or required as Flufenacet is not classified as toxic or very toxic		
	Confirmatory (if required)			
Body fluids, air, (Exposure)	Primary	No data submitted or required as flufenacet is not classified as toxic or very toxic		
	Confirmatory (if required)			
Soil, water. (Ecotoxicology)	Primary	All data was evaluted during Annex I inclusion , and no new studies are necessery. All methods are described separatly in DAR Vol3 B8 Ecotoxicology 1997. Please refer to the DAR 1997. No general analytical methods were developed for risk assessment apart those reported as specific in studies in support of ecotoxicological studies.		
	Confirmatory (if required)			

5.3 Methods for post-authorization control and monitoring purposes (KCP 5.2)

Data provided on Annex I inclusion is sufficient for post-authorizations methods. All data is de-scribed in EU approved documents for :

- DAR, Penoxsulam - Volume 3, Annex B.5: Methods of analysis
- - DAR, Diflufenican - Volume 3, Annex B.5: Methods of analysis
- DAR, Flufenacet - Volume 3, Annex B.5: Methods of analysis

Methods are described and presented in Table 5.2-3 in point KCP 5.1.2.

5.3.1 Analysis of the plant protection product (KCP 5.2)

Analytical methods for the determination of the active substance and relevant impurities in the plant protection product shall be submitted, unless the applicant shows that these methods already submitted in accordance with the requirements set out in point 5.2.1 can be applied.

5.3.2 Description of analytical methods for the determination of residues of

penoxsulam (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of relevant impurities in plant protection product is provided as follows:

Reference:	KCP 5.2/01
Report	Magnitude of the residue of Penoxsulam in Winter Wheat (Raw Agricultural Commodity) after one application of CHR/H/PENDIF 599.5 SC – one decline curve trial in Germany – 2020, G. Paszek, Study code: DPL/206/2020, SGS Polska – SP. z o.o., ul. Jana Kazimierza 3, 01-248 Warszawa, Poland
Guideline(s):	SANCO/3029/99 rev.4
Deviations:	No
GLP:	Yes
Acceptability:	Yes

Materials and methods

Validation was carried out using untreated plant material. Material was spiked with phenoxsulam at three different concentration levels (LOD, LOQ and 10 x LOQ). Linearity, specificity, precision, recovery, expanded uncertainty and the limit of quantification were determined.
Following sequence of samples was analyzed during validation process:

- blank calibration solution with no addition of a matrix (checking the purity of the reagents used in the method
- 6 levels of calibration (based on the addition of reference item to a matrix solutions)
- 2 sample as "blank matrix"
- 2 samples fortified at 0.003 mg/kg (LOD)
- 5 samples fortified at 0.010 mg/kg - limit of quantification (LOQ)
- 5 samples fortified with standard at 0.10 mg/kg - the 10-fold higher concentration than the LOQ

Validation parameters were determined in relation to the requirements SANCO/3029/99, rev. 4 guidelines.

Validation - Results and discussions

Table 5.3-1: Methods suitable for the determination of the relevant impurities in plant protection product (PPP) CHR/H/PENDIF 599.5 SC

	Bis-CHYMP max. 0.1 g/kg
Author(s), year	G. Paszek, 2021
Principle of method	LC-Ms/MS

	Grain	**Straw**	**Plant**
Linearity (linear between mg/L) (correlation coefficient, expressed as r)	The linearity of the detector response was demonstrated by single determination of matrix-matched calibration standards at six concentration levels ranging from 0.5 ppb to 500 ppb of phenoxsulam. The coefficient of determination (R2) were determined. R2 were greater than 0.990.		

Precision – Repeatability Mean 5 (%RSD)	Recovery data was generated from five samples fortified at the limit of quantification (LOQ) and five samples fortified at the 10-fold higher concentration than the LOQ (10 x LOQ). Precision of the method was determined as the relative standard deviation (RSD) of recovery at each fortification level.		
Accuracy 5 (% Recovery)	The mean recovery at each fortification level should be in the range of 70 – 120%. Wherever applicable ($n \geq 3$), the relative standard deviation was determined and should be ≤ 20% for each level (RSD were determined only during validation process).		
Interference/ Specificity	LC-MS/MS method was used during the study. Two mass transitions were evaluated and used for quantification. The specificity of the method was evaluated on the basis of the analysis of chromatograms recorded for the matrix blank samples. No interferences at above 30% of the LOQ were detected at the retention time of active substance in matrix blank samples		
LOQ	The LOQ is the lowest validated fortification level for which an average recovery in the range of 70 – 120% and RSD ≤ 20 % is achieved. For phenoxsulam LOQ was successfully established at 0.010 mg/kg for wheat. Limit of detection (LOD) was established at 0.003 mg/kg as 30% LOQ.		
Comment			

Conclusion

It was confirmed that the method is specific. There were no peaks from placebo interfering with determined compounds. The validation parameters (specificity, linearity, instrument precision, repeatability, accuracy and LOQ) are within the acceptance range and fulfil EU requirements given in SANCO /3029 /99 rev.4

5.3.2.1 Overview of residue definitions and levels for which compliance is required

Compared to the residue definition proposed in the Draft Assessment Report (incl. its addenda) the current legal residue definition is not identical.

Table 5.3-2: Relevant residue definitions for monitoring/enforcement and levels for which compliance is required

Matrix	Residue definition	MRL / limit	Reference for MRL/level Remarks
Plant, high water content	Penoxsulam	0.01 mg/kg	Reg. (EU) 2018/1516
Plant, high acid content		0.01 mg/kg	Reg. (EU) 2018/1516
Plant, high protein/high starch content (dry commodities)		0.01 mg/kg	Reg. (EU) 2018/1516
Plant, high oil content		0.01 mg/kg	Reg. (EU) 2018/1516
Plant, difficult matrices (hops, spices, tea)		0.05 mg/kg	Reg. (EU) 2018/1516
Muscle	Penoxsulam	0.01 mg/kg	Reg. (EU) 2018/1516
Milk		0.01 mg/kg	Reg. (EU) 2018/1516
Eggs		0.01 mg/kg	Reg. (EU) 2018/1516
Fat		0.01 mg/kg	Reg. (EU) 2018/1516
Liver, kidney		0.01 mg/kg	Reg. (EU) 2018/1516

Matrix	Residue definition	MRL / limit	Reference for MRL/level Remarks
Soil (Ecotoxicology)	Penoxsulam	0.18 mg/kg	AOEL
Drinking water (Human toxicology)	Penoxsulam	0.1 µg/L	general limit for drinking water
Surface water (Ecotoxicology)	Penoxsulam	86.4 µg/L	Lowest endpoint
Air	Penoxsulam	1.5 µg/m^3	AOEL sys/AOEL inhal: 0.05 mg/kg bw/d
Tissue (meat or liver)	Penoxsulam	0.01 µg/ml	notclassified as T / T+
Body fluids		0.01 µg/ml	notclassified as T / T+

5.3.2.2 Description of analytical methods for the determination of residues in plant matrices (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of penoxsulam in plant matrices is given in the following tables.

Table 5.3-3: Validated methods for food and feed of plant origin (required for all matrix types, "difficult" matrix only when indicated by intended GAP)

Component of residue definition: penoxsulam				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing / EU agreed**
High protein/high starch content (dry)	Primary	0.01 mg/kg	LC-MS/MS	Hastings, M.J., Schelle, G.E. (2002)
	ILV	0.01 mg/kg	LC-MS/MS	Chickering, C.D., (2002)
	Confirmatory (if required)	Not required		

For any special comments or remarkable points concerning the analytical methods for the determination of residues in plant matrices, please refer to Appendix 2.

Table 5.3-4: Statement on extraction efficiency

	Method for products of plant origin
Required, available from:	DAR Penoxsulam, Volume 3, Annex B.5
Not required, because:	

5.3.2.3 Description of analytical methods for the determination of residues in animal matrices (KCP 5.2)

According to EFSA Scientific Report (2009) 343, 47-90:
"No methods have been developed for determination residues in meat, milk or eggs because no residues of penoxsulam occur in crops that are components of animal feed."

5.3.2.4 Description of methods for the analysis of soil (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of penoxsulam in soil is given in the following tables.

Table 5.3-5: Validated methods for soil (if appropriate)

Component of residue definition: penoxsulam			
Method type	**Method LOQ**	**Principle of method (*i.e.* GC-MS or HPLC-UV)**	**Author(s), year / missing**
Primary	0.003 mg/kg	LC/MS/MS	Hastings, M. J., Schelle G.E. (2002):
Confirmatory	Not required		

5.3.2.5 Description of methods for the analysis of water (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of penoxsulam in surface and drinking water is given in the following tables.

Table 5.3-6: Validated methods for water (if appropriate)

Component of residue definition: penoxsulam and metabolites				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Drinking water	Primary	0.003 mg/L	LC-MS-MS	Hastings, M. J. (2002)
	ILV	-		
	Confirmatory	Not required		
Surface water	Primary	0.003 mg/L	LC-MS-MS	Hastings, M. J. (2002)
	Confirmatory	Not required		

Table 5.3-7: Validated methods for water (if appropriate)

Component of residue definition: penoxsulam				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Drinking water	Primary	0.00005 mg/L	LC-MS-MS	Hastings, M. J. (2002)
	ILV	-		
	Confirmatory	Not required		
Surface water	Primary	0.00005 mg/L	LC-MS-MS	Hastings, M. J. (2002)
	Confirmatory	Not required		

For any special comments or remarkable points concerning the analytical methods for water please refer to Appendix 2.

5.3.2.6 Description of methods for the analysis of air (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of penoxsulam in air is given in the following tables.

Table 5.3-8: Validated methods for air (if appropriate)

Component of residue definition: penoxsulam			
Method type	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Primary	1.5 µg/m^3	LC-MS	Wais, A. (2002)
Confirmatory	Not required		

For any special comments or remarkable points concerning the analytical methods for air it is referred to Appendix 2.

5.3.2.7 Description of methods for the analysis of body fluids and tissues (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of penoxsulam in body fluids and tissues is given in the following tables.

Table 5.3-9: Validated methods for body fluids and tissues (if appropriate)

Component of residue definition: penoxsulam			
Method type	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Primary	0.01 µg/mL	LC-MS/MS	Chickering, C.D. (2002)
Confirmatory	Not required		

For any special comments or remarkable points concerning the analytical methods for air it is referred to Appendix 2.

5.3.2.8 Other studies/ information

Not required

5.3.3 Description of analytical methods for the determination of residues of diflufenican (KCP 5.2)

5.3.3.1 Overview of residue definitions and levels for which compliance is required

Compared to the residue definition proposed in the Draft Assessment Report (incl. its addenda) the current legal residue definition is not identical.

Table 5.3-10: Relevant residue definitions for monitoring/enforcement and levels for which compliance is required

Matrix	Residue definition	MRL / limit	Reference for MRL/level Remarks
Plant, high water content	Diflufenican	0.01 mg/kg	Reg. (EU) 2017/623
Plant, high acid content		0.01 mg/kg	Reg. (EU) 2017/623
Plant, high protein/high starch content (dry commodities)		0.01 mg/kg	Reg. (EU) 2017/623

Matrix	Residue definition	MRL / limit	Reference for MRL/level Remarks
Plant, high oil content		0.01	Reg. (EU) 2017/623
Plant, difficult matrices (hops, spices, tea)		0.05 mg/kg	Reg. (EU) 2017/623
Muscle	Diflufenican	0.02 mg/kg	Reg. (EU) 2017/623
Milk		0.01 mg/kg	Reg. (EU) 2017/623
Eggs		0.02 mg/kg	Reg. (EU) 2017/623
Fat		0.02 mg/kg	Reg. (EU) 2017/623
Liver, kidney		0.02 mg/kg	Reg. (EU) 2017/623
Soil (Ecotoxicology)	Diflufenican	0.11 mg/kg	AOEL
Drinking water (Human toxicology)	Diflufenican	0.1 µg/L	general limit for drinking water
Surface water (Ecotoxicology)	Diflufenican	0.015 mg/L	lowest NOEC [EFSA Scientific Report (2007) 122]
Air	Diflufeniacn	0.051 µg/m^3	AOEL sys/AOEL inhal: 0.017 mg/kg bw/d
Tissue (meat or liver)	Diflufenican	Not required	notclassified as T / T+
Body fluids		Not required	notclassified as T / T+

5.3.3.2 Description of analytical methods for the determination of residues in plant matrices (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of diflufenican in plant matrices is given in the following tables.

Table 5.3-11: Validated methods for food and feed of plant origin (required for all matrix types, "difficult" matrix only when indicated by intended GAP)

Component of residue definition: diflufenican				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing / EU agreed**
High water content	Primary	0.01 mg/kg	GC-ECD	Bacher R. 2002
	ILV	0.01 mg/kg	GC-ECD	Thom M. 2003a
	Confirmatory (if required)	0.01 mg/kg	GC-MS	Bacher R. 2002g
High acid content	Primary	0.01 mg/kg	GC-ECD	Bacher R. 2002g
	ILV	0.01 mg/kg	GC-ECD	Thom M. 2003a
	Confirmatory (if required)	0.01 mg/kg	GC-MS	Bacher R. 2002g
High oil content	Primary	0.01 mg/kg	GC-ECD	Bacher R. 2002g
	ILV	0.01 mg/kg	GC-ECD	Thom M. 2003a

Component of residue definition: diflufenican				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing / EU agreed**
	Confirmatory (if required)	0.01 mg/kg	GC-MS	Bacher R. 2002g
High protein/high starch content (dry)	Primary	0.02 mg/kg	GC-ECD	Sharpe J.P. 1984b
	ILV	0.01 mg/kg	GC-ECD	Klumpp M. 2001a
	Confirmatory (if required)	0.01 mg/kg	GC-MS	Class T. 2001b

For any special comments or remarkable points concerning the analytical methods for the determination of residues in plant matrices, please refer to Appendix 2.

Table 5.3-12: Statement on extraction efficiency

	Method for products of plant origin
Required, available from:	DAR Diflufenican, Volume 3, Annex B.5
Not required, because:	

5.3.3.3 Description of analytical methods for the determination of residues in animal matrices (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of diflufenican in animal matrices is given in the following tables.

Table 5.3-13: Validated methods for food and feed of animal origin (if appropriate)

Component of residue definition: diflufenican				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (*i.e.* GC-MS or HPLC-UV)**	**Author(s), year / missing**
Milk	Primary	0.01 mg/kg	GC-MS	(Class T. 1999c)
	ILV	0.01 mg/kg	GC-MS	Klumpp, M. 2002a
	Confirmatory (if required)	Not required		
Eggs	Primary	0.02 mg/kg	GC-ECD	Guillet, M; Simonin, B. 1996
	ILV	0.02 mg/kg	GC-MS	Klumpp, M. 2002
	Confirmatory (if required)	Not required		
Muscle	Primary	0.02 mg/kg	GC-ECD	Guillet, M; Simonin, B. 1996
	ILV	0.02 mg/kg	GC-Ms	Klumpp, M. 2002
	Confirmatory (if required)	0.02 mg/kg	GC-MS	Class T. 1999
Fat	Primary	0.02 mg/kg	GC-ECD	Guillet, M; Simonin, B.

Component of residue definition: diflufenican				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (*i.e.* GC-MS or HPLC-UV)**	**Author(s), year / missing**
				1996
	ILV	0.02 mg/kg	GC-MS	Klumpp, M. 2002
	Confirmatory (if required)	Not required		
Kidney, liver	Primary	0.02 mg/kg	GC-ECD	Guillet, M; Simonin, B. 1996
	ILV	0.02 mg/kg	GC-MS	Klumpp, M. 2002
	Confirmatory (if required)	Not required		

For any special comments or remarkable points concerning the analytical methods for the determination of residues in animal matrices, please refer to Appendix 2.

Table 5.3-14: Statement on extraction efficiency

	Method for products of animal origin
Required, available from:	DAR Diflufenican, Volume 3, Annex B.5
Not required, because:	-

5.3.3.4 Description of methods for the analysis of soil (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of diflufenican in soil is given in the following tables.

Table 5.3-15: Validated methods for soil (if appropriate)

Component of residue definition: diflufenican			
Method type	**Method LOQ**	**Principle of method (*i.e.* GC-MS or HPLC-UV)**	**Author(s), year / missing**
Primary	0.002 mg/kg	GC-MS	Doran A.M.; McGuire G.M. 2002
Confirmatory	0.002 mg/kg	LC-MS/MS	Bacher R. 2002

Table 5.3-16: Validated methods for soil (if appropriate)

Component of residue definition: AE B107137			
Method type	**Method LOQ**	**Principle of method (*i.e.* GC-MS or HPLC-UV)**	**Author(s), year / missing**
Primary	0.002 mg/kg	GC-MS	Doran A.M.; McGuire G.M. 2002
Confirmatory	0.002 mg/kg	LC-MS/MS	Bacher R. 2002

Table 5.3-17: Validated methods for soil (if appropriate)

Component of residue definition: AE 0542291			
Method type	**Method LOQ**	**Principle of method (*i.e.* GC-MS or HPLC-UV)**	**Author(s), year / missing**
Primary	0.002 mg/kg	GC-MS	Doran A.M.; McGuire G.M. 2002
Confirmatory	0.002 mg/kg	LC-MS/MS	Bacher R. 2002

For any special comments or remarkable points concerning the analytical methods for soil please refer to Appendix 2.

5.3.3.5 Description of methods for the analysis of water (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of diflufenican in surface and drinking water is given in the following tables.

Table 5.3-18: Validated methods for water (if appropriate)

Component of residue definition: diflufenican				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Drinking water	Primary	0.05 µg/L	LC-MS-MS	Bacher, R. 2002
	ILV	-		
	Confirmatory	-		
Surface water	Primary	0.05 µg/L	LC-MS-MS	Bacher, R. 2002
	Confirmatory			

For any special comments or remarkable points concerning the analytical methods for water please refer to Appendix 2.

5.3.3.6 Description of methods for the analysis of air (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of diflufenican in air is given in the following tables.

Table 5.3-19: Validated methods for air (if appropriate)

Component of residue definition: diflufenican			
Method type	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Primary	0.4 µg/m^3	LC-MS-MS	Bacher, R., 2002
Confirmatory			

For any special comments or remarkable points concerning the analytical methods for air it is referred to Appendix 2.

5.3.3.7 Description of methods for the analysis of body fluids and tissues (KCP 5.2)

Not required. The active substant is not classification like as toxic or very toxic.

5.3.3.8 Other studies/ information

Not required

5.3.4 Description of analytical methods for the determination of residues of flufenacet (KCP 5.2)

5.3.4.1 Overview of residue definitions and levels for which compliance is required

Compared to the residue definition proposed in the Draft Assessment Report (incl. its addenda) the current legal residue definition is identical.

Table 5.3-20: Relevant residue definitions for monitoring/enforcement and levels for which compliance is required

Matrix	Residue definition	MRL / limit	Reference for MRL/level Remarks
Plant, high protein/high starch content (dry commodities) –cereals, maize	Flufenacet	LOQ 0.05 mg/kg	DAR (1997) Flufenacet Vol 3 B4
Muscle	Flufenacet	LOQ 0.05 mg/kg	DAR (1997) Flufenacet Vol 3 B4
Milk		LOQ 0.01 mg/kg	
Eggs		LOQ 0.05 mg/kg	
Fat, kidney		LOQ 0.05 mg/kg	
Liver,		LOQ 0.02 mg/kg	
Soil	Flufenacet, FOE 5043 alcohol, FOE 5043 oxalate, FOE 5043-sulfonic acid	LOQ 0.01 mg/kg	DAR (1997) Flufenacet Vol 3 B4
Water (drinking)	Flufenacet,	0.1 µg/L	general limit for drinking water
Water (Surface) Ecotox	Flufenacet	2.04 µg/L (lowest endpoint from algae study)	7469/VI/98-Final 3 July 2003
Air	Flufenacet	2.2 µg/m^3	AOEL sys/AOEL inhal: 0.0032 mg/kg bw/d
Tissue (meat or liver)	Flufenacet	Not required	notclassified as T / T+
Body fluids		Not required	notclassified as T / T+

5.3.4.2 Description of analytical methods for the determination of residues in plant matrices (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of Flufenacet in plant matrices is given in the following tables. For the detailed evaluation of additional studies it is referred to Appendix 2.

Table 5.3-21: Validated methods for food and feed of plant origin (required for all matrix types, "difficult" matrix only when indicated by intended GAP)

Component of residue definition: Flufenacet				
Matrix type	**Method type**	**Method LOQ**	**Principle of method**	**Author(s), year / missing / EU agreed**
High protein/high starch content (dry) High oil content High water content	Primary	0.02 mg/kg	GC-MS	Gould, T.J., Lemke V.J 1995 and Seym 1995a DAR (1997) Flufenacet Vol 3 B4
	ILV	0.02mg/kg	GC MS	Seym M 1994 DAR (1997) Flufenacet Vol 3 B4
	Confirmatory (if required)		Not required	

Table 5.3-22: Statement on extraction efficiency

	Method for products of plant origin
Not required,	Oxidation and hydrolysis

5.3.4.3 Description of analytical methods for the determination of residues in animal matrices (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of Flufenacet in animal matrices is given in the following tables. For the detailed evaluation of additional studies it is re-ferred to Appendix 2.

Component of residue definition: Flufenacet				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (*i.e.* GC-MS or HPLC-UV)**	**Author(s), year / missing**
Milk	Primary	LOQ 0.01 mg/kg		Gould, T.J., Zemke, V.J, K.L (1995) DAR (1997) Flufenacet Vol 3 B4
	ILV	LOQ 0.05 mg/kg		Bajzik, M.E 1995 DAR (1997) Flufenacet Vol 3 B4
	Confirmatory (if required)	Not required		
Eggs	Primary	LOQ 0.05 mg/kg		Seym M. (1995) DAR (1997) Flufenacet Vol 3 B4
	ILV	LOQ 0.05 mg/kg		Bajzik, M.E 1995 DAR (1997) Flufenacet Vol 3 B4
	Confirmatory (if required)	Not required		
Muscle	Primary	LOQ 0.05 mg/kg		Gould, T.J., Zemke, V.J, K.L (1995) DAR (1997) Flufenacet Vol 3 B4
	ILV	LOQ 0.05 mg/kg		Bajzik, M.E 1995 DAR (1997) Flufenacet Vol 3 B4

Component of residue definition: Flufenacet				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (*i.e.* GC-MS or HPLC-UV)**	**Author(s), year / missing**
	Confirmatory (if required)	Not required		
Fat	Primary	LOQ 0.05 mg/kg		Gould, T.J., Zemke, V.J, K.L (1995) DAR (1997) Flufenacet Vol 3 B4
	ILV	LOQ 0.05 mg/kg		Bajzik, M.E 1995 DAR (1997) Flufenacet Vol 3 B4
	Confirmatory (if required)	Not required		
Kidney	Primary	LOQ 0.05 mg/kg		Gould, T.J., Zemke, V.J, K.L (1995) DAR (1997) Flufenacet Vol 3 B4
	ILV	LOQ 0.05 mg/kg		Bajzik, M.E 1995 DAR (1997) Flufenacet Vol 3 B4
	Confirmatory (if required)	Not required		
Liver	Primary	LOQ 0.02 mg/kg		Gould, T.J., Zemke, V.J, K.L (1995) DAR (1997) Flufenacet Vol 3 B4
	ILV	LOQ 0.05 mg/kg		Bajzik, M.E 1995 DAR (1997) Flufenacet Vol 3 B4
	Confirmatory (if required)	Not required		

Table 5.3-23: Statement on extraction efficiency

	Method for products of animal origin
Not required, because:	Residues below LOQ

5.3.4.4 Description of methods for the analysis of soil (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of Flufenacet in soil is given in the following tables. No new methods are necessary.

Table 5.3-4: Validated methods for soil (if appropriate)

Component of residue definition: Flufenacet, FOE 5043 alcohol, FOE 5043 oxalate, FOE 5043-sulfonic acid			
Method type	**Method LOQ**	**Principle of method (*i.e.* GC-MS or HPLC-UV)**	**Author(s), year / missing**
Primary	LOQ=0.01 mg/kg	LC MS/MS	Allmendinger, H., Bachlechner, G. 1994
Confirmatory	Not required		

5.3.4.5 Description of methods for the analysis of water (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of Flufenacet in drinking water is given in the following tables. No new method is necessary.

Table 5.3-5: Validated methods for water (if appropriate)

Component of residue definition: Flufenacet				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Drinking water	Primary	LOQ=0.05 □g/L	LC-ESI-MS/MS	DAR of flufenacet 1997 Konig T. 1996: Method for the determination of FOE 5043 in drinking water by gas chromatography. Doc No: MR-894/95
	ILV		Not available	
	Confirmatory	Not required		
Surface water	Primary	0.04 □g/L	HPLC- ESI/MS/MS	Bethem, R.A., Peterson R.G., Leimkuhler, W., Mattern, G.C 1995., II A 4.2.2 to 4.2.4, IIIA 5.2 DAR Flufenacet , B.4: Methods of analysis 1997
	Confirmatory	Not required		

Table 5.3-5: Validated methods for water (if appropriate)

Component of residue definition: FOE 5043 sulfonic acid				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Surface water	Primary	0.02 □g/L	HPLC- ESI/MS/MS	Bethem, R.A., Peterson R.G., Leimkuhler, W., Mattern, G.C 1995., II A 4.2.2 to 4.2.4, IIIA 5.2 DAR Flufenacet , B.4: Methods of analysis 1997
	Confirmatory	Not required		

Table 5.3-5: Validated methods for water (if appropriate)

Component of residue definition: FOE 5043 alcohol				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Surface water	Primary	0.04 □g/L	HPLC- ESI/MS/MS	Bethem, R.A., Peterson R.G., Leimkuhler, W., Mattern, G.C 1995., II A 4.2.2 to 4.2.4, IIIA 5.2

Component of residue definition: FOE 5043 alcohol				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
				DAR Flufenacet , B.4: Methods of analysis 1997
	Confirmatory	Not required		

Table 5.3-5: Validated methods for water (if appropriate)

Component of residue definition: FOE 5043 oxalate				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Surface water	Primary	0.05 □g/L	HPLC- ESI/MS/MS	Bethem, R.A., Peterson R.G., Leimkuhler, W., Mattern, G.C 1995., II A 4.2.2 to 4.2.4, IIIA 5.2 DAR Flufenacet , B.4: Methods of analysis 1997
	Confirmatory	Not required		

Table 5.3-5: Validated methods for water (if appropriate)

Component of residue definition: FOE 5043 thiadone				
Matrix type	**Method type**	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Surface water	Primary	0.08 □g/L	HPLC- ESI/MS/MS	Bethem, R.A., Peterson R.G., Leimkuhler, W., Mattern, G.C 1995., II A 4.2.2 to 4.2.4, IIIA 5.2 DAR Flufenacet , B.4: Methods of analysis 1997
	Confirmatory	Not required		

5.3.4.6 Description of methods for the analysis of air (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of Flufenacet in air is given in the following tables. No new method necessary.

Table 5.3-6: Validated methods for air (if appropriate)

Component of residue definition: flufenacet			
Method type	**Method LOQ**	**Principle of method (i.e. GC-MS or HPLC-UV)**	**Author(s), year / missing**
Primary	2.2 µg/m^3	HPLC-UV	Riegner, K (1995)
Confirmatory		Not required	

For any special comments or remarkable points concerning the analytical methods for air it is referred to Appendix 2.

5.3.4.7 Description of methods for the analysis of body fluids and tissues (KCP 5.2)

An overview on the acceptable methods and possible data gaps for analysis of Flufenacet in body fluids and tissues is given in the following table. No new methods are necessary.

No methods are necessary, since no MRLs for animal tissues have not been set. No data submitted or required as Flufennacet is not classified as toxic or very toxic.

5.3.4.8 Other studies/ information

No other studies are provided.

Appendix 1 Lists of data considered in support of the evaluation

List of data submitted by the applicant and relied on

Data point	Author(s)	Year	**Title** **Company Report No.** **Source (where different from company)** **GLP or GEP status** **Published or not**	**Verte-brate study Y/N**	Owner
KCP 5.1.1/01	M. Patrzałek	2021	Validation of analytical method for CHR/H/PENDIF 599.5 SC for determination of penoxulam, flufenacet and diflufenican. ICB/114/2020 ICB Pharma, Lema 10 Street, 43-600, Jaworzno, POLAND GLP Unpublished	N	Chemirol Sp. z o.o.
KCP 5.1.1/02	S. Lobstein	2021	Method validation and determination of a relevant impurity before and after an accelerated storage procedure for 14 days at 54ºC on one batch of CHR/H/PENDIF 599.5 SC C1028 ANADIAG, 16 rue Ampere, 67500 HAGUENAU, FRANCE GLP Unpublished	N	Chemirol Sp. z o.o.
KCP 5.2/01	G. Paszek	2021	Magnitude of the residue of Penoxsulam in Winter Wheat (Raw Agricultural Commodity) after one application of CHR/H/PENDIF 599.5 SC – one decline curve trial in Germany – 2020 DPL/206/2020 SGS Polska – Sp. z o.o., ul. Jana Kazimierza 3, 01-248 Warszawa, Poland GLP Unpublished	N	Chemirol Sp. z o.o.

List of data submitted or referred to by the applicant and relied on, but already evaluated at EU peer review

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Verte-brate study Y/N	Owner
KCP 5.1/01	Class, T.	2002	Assessment and Possible Validation of the multi-Residue Enforcement method DFG S19 for the determination of XDE-638 in Plant Material 021195 PTRL Europe Helmholtzer 22 Science Park D-89081 Ulm, Germany GLP Unpublished	N	Dow AgroScience
KCP 5.1/02	Hastings, M.J., Schelle, G.E.	2002	Determination of Residues of XDE-638 in Rice and Rice Processed Products by Liquid Chromatography with Tandem Mass Spectrometry GRM 01.25 Dow AgroSciences LLC, Indianapolis,Indiana, USA GLP Unpublished	N	Dow AgroScience
KCP 5.1/03	Chickering, C.D	2002	Independent Laboratory Validation of Dow AgroSciences LLC Method GRM 01.25 - Determination of XDE-638 Residues in Rice and Rice Processed Products by Liquid Chromatography with Tandem Mass Spectrometry Detection GH-C 5491 ABC Laboratories Indianapolis Columbia, Missouri, USA GLP Unpublished	N	Dow AgroScience
KCP 5.2/01	Hastings, M.J.	2002	Determination of Residues of XDE-638 and Metabolites in Soil and Sediment by Liquid Chromatography with Tandem Mass Spectrometry. GRM 01.31 Dow AgroSciences LLC, Indianapolis, Indiana, USA GLP Unpublished	N	Dow AgroScience
KCP 5.2/02	Hastings, M.J	2002	Determination of Residues of XDE-638 and Metabolites in Water by Liquid Chromatography with Tandem Mass Spectrometry.	N	Dow AgroScience

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Verte-brate study Y/N	Owner
			GRM 02.15 Dow AgroSciences LLC, Indianapolis, Indiana, USA		
KCP 5.2/03	Wais, A.	2002	Validation of the Residue Analytical Method for XDE-638 in Air by HPLC/MS GHE-P-9898 RCC Ltd Zelgliweg 1 CH-4452 Itingen/Switzerland GLP Unpublished	N	Dow AgroScience
KCP 5.2/04	Chickering, C.D.	2002	Determination of Residues of XDE-638 in Whole Blood and Urine by Liquid Chromatography with Tandem Mass Spectrometry Detection GRM 02.22 ABC Laboratories Columbia, Missouri, USA	N	Dow AgroScience
KCP 5.1/04	Sharpe, J.P.	1984	Herbicides: Diflufenican (M&B 38544) – Analytical procedure for the determination of residues in cereal grain, straw and silage. Generated by: Rhone-Poulenc; May & Baker Ltd., Essex; Environmental Science Department Document No: **R000944** GLP / GEP unpublished	N	BCS
KCP 5.1/05	Maycey P.A., Outram J.R.	1987	Herbicides: Diflufenican - Analytical method for the determination residues in cereal leaves, grain and straw Generated by: Rhone-Poulenc; May & Baker Ltd., England; Analytical Chemistry Document No: **R001011** GLP / GEP unpublished	N	BCS
KCP 5.1/06	Class, T.	2001	Validation of the DFG S19 multi-residue enforcement method for the determination of diflufenican in wheat Generated by: PTRL Europe, Ulm, DEU; PTRL Europe, Ulm, DEU; Aventis CropScience GmbH, DEU; Residues and Human Exposure, Frankfurt	N	BCS

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Verte-brate study Y/N	Owner
			Document No: C013331 GLP / GEP Yes Unpublished		
KCP 5.1/07	Bacher R.	2002	Assessment and validation of the multi-residue enforcement method DFG S19 for the determination of diflufenican in plant material Generated by: PTRL Europe, Germany; PTRL Europe, Germany; BCS GmbH, DEU; Residues and Human Exposure, Frankfurt Document No: C028188 GLP / GEP Yes unpublished	N	BCS
KCP 5.2/05	Klumpp, M.	2001	Independent laboratory validation of the German multiresidue enforcement method DFG S19 for the determination of diflufenican in wheat green plant, grain and straw Generated by: Arbeitsgemeinsch. GAB GmbH & IFU GmbH; Aventis CropScience GmbH, DEU; Document No: C018307 GLP / GEP Yes unpublished	N	BCS
KCP 5.2/06	Thom, M.	2003	Independent laboratory validation of the German multiresidue enforcement method DFG S19 for the determination of diflufenican in plant material Generated by: BCS GmbH, DEU; Arbeitsgemeinsch. GAB GmbH & IFU GmbH,DEU; BCS GmbH, DEU; Industriepark Hoechst, Frankfurt Document No: C031483 GLP / GEP Yes unpublished	N	BCS
KCP 5.2/07	Guillet M., Simonin B.	1996	Diflufenican: Analytical method for the determination of residues in animal products Generated by: Rhone-Poulenc; Rhone-Poulenc Secteur Agro, Lyon; Centre de Recherche de la Dargoire Rhone-Poulenc Agro;	N	BCS

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Verte-brate study Y/N	Owner
			Document No: R002767 GLP / GEP Yes unpublished		
KCP 5.2/08	Class, T.	1999	Multi-residue enforcement method for the determination of diflufenican in foodstuff of animal origin Generated by: Rhone-Poulenc; Rhone-Poulenc Agro, Lyon; PTRL Europe,Labor f.Umwelt-und Pestizid-chemie, DEU; Rhone-Poulenc Agro, Lyon; Document No: R004321 GLP / GEP Yes unpublished	N	BCS
KCP 5.1/08	Klumpp, M.	2002	Validation of the German multiresidue enforcement method DFG S19 (modified) for the determination of diflufenican in animal tissues (muscle, milk, eggs, fat and liver) Generated by: Arbeitsgemeinsch. GAB GmbH & IFU GmbH, DEU; Aventis CropScience GmbH, DEU; Document No: C022357 GLP / GEP Yes unpublished	N	BCS
KCP 5.2/09	Sharpe J.P., Hill W.S.	1984	Herbicides: Diflufenican - Analytical procedure for the determination of residues in soil Generated by: Rhone-Poulenc; May & Baker Ltd., Essex, GBR; Environmental Chemistry Deaprtment, Ongar Document No: R006375 GLP / GEP unpublished	N	BCS
KCP 5.2/10	Maycey P.A., Outram J.R.	1987	Herbicides: Diflufencican - Analytical method for the determination of residues in dried soil Generated by: Rhone-Poulenc; May & Baker Ltd., England; Analytical Chemistry Document No: R001052 GLP / GEP unpublished	N	BCS
KCP	Brockelsby	1991	Herbicides: M&B 38181: Analytical method for the determination of residues in soil	N	BCS

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Verte-brate study Y/N	Owner
5.2/11	C.H., Maycey P.A., Savage E.A.		Generated by: Rhone-Poulenc Agriculture Ltd., Ongar, GBR; Analytical Chemistry Department Document No: **C022101** GLP / GEP Yes unpublished		
KCP 5.2/12	Doran A.M., McGuire G.M.	2002	Validation of an analytical method to determine residues of Diflufenican and its metabolites M & B 38181 and M & B 43625 in soil Generated by: Inveresk Research International Ltd; Inveresk Research International Ltd; Aventis CropScience GmbH, DEU; Document No: C025222 GLP / GEP Yes	N	BCS
KCP 5.2/13	Bacher R.	2002	Development and validation of an analytical method for the determination of diflufenican in soil Generated by: PTRL Europe, Ulm, DEU; PTRL Europe, Ulm, DEU; BCS GmbH, DEU; Residues and Human Exposure, Frankfurt Document No: C025918 GLP / GEP Yes unpublished	N	BCS
KCP 5.2/14	Bacher, R.	2002	Development and validation of an analytical method for the determination of diflufenican and its metabolites in water Generated by: PTRL Europe GmbH, Ulm, DEU; PTRL Europe GmbH, Ulm, DEU; BCS GmbH, DEU; Residues and Human Exposure, Frankfurt Document No: C026100 GLP / GEP Yes unpublished	N	BCS
KCP 5.2/15	Bacher R.	2002	Analytical method for the determination of Diflufenican in air Generated by: PTRL Europe,Labor f.Umwelt-und Pestizidchemie, DEU; BCS GmbH, DEU; PTRL Europe,Labor f.Umwelt-und Pestizidchemie, DEU; Document No: C025825	N	BCS

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Verte-brate study Y/N	Owner
			GLP / GEP Yes unpublished		
KCP 5.1/09	Seym. M	1994	Independent laboratory validation of the residue analytical method for FOE 5043 residues in plant. Bayer AG, Report No.106907, (RA - 352-94) GLP, Unpublished	N	Bayer
KCP 5.1/10	Bajzik, M.E	1995	Independent laboratory validation of the analytical method for the determination of FOE 5043 residues in animal matrices. Source: Huntingdon Analytical Services Bayer AG, Report No. 106913 GLP, Unpublished	N	Bayer
KCP 5.1/11	Gould, T.J., Lemke, V.J., Zoloty, K.L	1995	An analytical method for the determination of FOE 5043 residues in animal matrices. Source: Bayer Corp. Bayer AG, Report No. 106773, method 00418 GLP, Unpublished	N	Bayer
KCP 5.1/12	Seym, M.	1995b	Modification M001 for eggs. Source: Bayer Corp. Bayer AG, Report No. MR-118/95, method 00418/M001 GLP, Unpublished	N	Bayer

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Verte-brate study Y/N	Owner
KCP 5.1/13	Gould, T.J. Lemke, V.J.	1995	An analytical method for the determination of FOE 5043 residues in plant matrices. Source: Bayer Corp. Bayer AG, Report No. 106406 GLP, Unpublished	N	Bayer
KCP 5.1/14	Seym, M.	1995	Analytical method for the determination of the total residue of FOE 5043 in plant materials. Bayer AG, Report No. MR-981/95, method 00346, Date: 22.09.1995 a) amended: M. Seym, 20.10.1995 GLP, Unpublished	N	Bayer
KCP 5.2/16	Allmendinger, H., Bachlechner G.	1994	Validated method for the determination of the herbicide FOE 5043 and its metabolites FOE 5043 alcohol, FOE 5043 oxalate and FOE 5043 sulfonic acid in soil using HPLC-MS-MS. Bayer AG, Report No. RA-399/94, method 00359 GLP, Unpublished	N	Bayer

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Verte-brate study Y/N	Owner
KCP 5.2/17	Bethem, R.A., Peterson, R.G., Leimuhler W., Mattern, G.C	1995	Determination of FOE 5043 and the alcohol, oxalate, thiadone and sulfonic acid metabolites in groundwater by high performance liquid chromatography electrospray tandem mass spectrometry (LC-ESI/MS/MS). Source: ALTA Analytical Laboratory Bayer AG, Report No. 107138 (ALTA file No.: AMFOE3) GLP, Unpublished	N	Bayer
KCP 5.2/18	Konig, T.	1996	Method for the determination of FOE 5043 in drinking water by gas chromatography Bayer AG, Report No.: MR-894/95, method No. 00412 GLP, Unpublished	N	Bayer
KCP 5.2/19	Riegner, K.	1995	Method for the determination of FOE 5043 in air. Bayer AG, Report No. MR-798/95, method 00410 GLP, Unpublished	N	Bayer

Appendix 2 Detailed evaluation of submitted analytical methods

A 2.1 Analytical methods for penoxsulam

A 2.1.1 Methods used for the generation of pre-authorization data (KCP 5.1)

No new or additional studies have been submitted

A 2.1.2 Methods for post-authorization control and monitoring purposes (KCP 5.2)

SEE SECTION 7 – THE METHODS WERE ACCEPTED AS IMPLOYED ONES IN RESIDUE FIELD TRIALS.

A 2.1.2.1 Description of analytical methods for the determination of residues in plant matrices (KCP 5.2)

Reference:	KCP 5.2/01
Report	Magnitude of the residue of Penoxsulam in Winter Wheat (Raw Agricultural Commodity) after one application of CHR/H/PENDIF 599.5 SC – one decline curve trial in Germany – 2020, G. Paszek, Study code: DPL/206/2020, SGS Polska – SP. z o.o., ul. Jana Kazimierza 3, 01-248 Warszawa, Poland
Guideline(s):	SANCO/3029/99 rev.4
Deviations:	No
GLP:	Yes
Acceptability:	Yes

Materials and methods

Validation was carried out using untreated plant material. Material was spiked with phenoxsulam at three different concentration levels (LOD, LOQ and 10 x LOQ). Linearity, specificity, precision, recovery, expanded uncertainty and the limit of quantification were determined.
Following sequence of samples was analyzed during validation process:

- blank calibration solution with no addition of a matrix (checking the purity of the reagents used in the method
- 6 levels of calibration (based on the addition of reference item to a matrix solutions)
- 2 sample as "blank matrix"
- 2 samples fortified at 0.003 mg/kg (LOD)
- 5 samples fortified at 0.010 mg/kg - limit of quantification (LOQ)
- 5 samples fortified with standard at 0.10 mg/kg - the 10-fold higher concentration than the LOQ

Validation parameters were determined in relation to the requirements SANCO/3029/99, rev. 4 guidelines.

Validation - Results and discussions

Table 5.3-1: Methods suitable for the determination of the relevant impurities in plant protection product (PPP) CHR/H/PENDIF 599.5 SC

	Bis-CHYMP **max. 0.1 g/kg**
Author(s), year	G. Paszek, 2021
Principle of method	LC-Ms/MS

	Grain	Straw	Plant
Linearity (linear between mg/L) (correlation coefficient, expressed as r)	The linearity of the detector response was demonstrated by single determination of matrix-matched calibration standards at six concentration levels ranging from 0.5 ppb to 500 ppb of phenoxsulam. The coefficient of determination (R2) were determined. R2 were greater than 0.990.		
Precision – Repeatability Mean 5 (%RSD)	Recovery data was generated from five samples fortified at the limit of quantification (LOQ) and five samples fortified at the 10-fold higher concentration than the LOQ (10 x LOQ). Precision of the method was determined as the relative standard deviation (RSD) of recovery at each fortification level.		
Accuracy 5 (% Recovery)	The mean recovery at each fortification level should be in the range of 70 – 120%. Wherever applicable ($n \geq 3$), the relative standard deviation was determined and should be $\leq 20\%$ for each level (RSD were determined only during validation process).		
Interference/ Specificity	LC-MS/MS method was used during the study. Two mass transitions were evaluated and used for quantification. The specificity of the method was evaluated on the basis of the analysis of chromatograms recorded for the matrix blank samples. No interferences at above 30% of the LOQ were detected at the retention time of active substance in matrix blank samples		
LOQ	The LOQ is the lowest validated fortification level for which an average recovery in the range of 70 – 120% and RSD ≤ 20 % is achieved. For phenoxsulam LOQ was successfully established at 0.010 mg/kg for wheat. Limit of detection (LOD) was established at 0.003 mg/kg as 30% LOQ.		
Comment			

Conclusion

It was confirmed that the method is specific. There were no peaks from placebo interfering with determined compounds. The validation parameters (specificity, linearity, instrument precision, repeatability, accuracy and LOQ) are within the acceptance range and fulfil EU requirements given in SANCO /3029 /99 rev.4

A 2.1.2.2 Description of analytical methods for the determination of residues in animal matrices (KCP 5.2)

No new or additional studies have been submitted

A 2.1.2.3 Description of Methods for the Analysis of Soil (KCP 5.2)

No new or additional studies have been submitted

A 2.1.2.4 Description of Methods for the Analysis of Water (KCP 5.2)

No new or additional studies have been submitted

A 2.1.2.5 Description of Methods for the Analysis of Air (KCP 5.2)

No new or additional studies have been submitted

A 2.1.2.6 Description of Methods for the Analysis of Body Fluids and Tissues (KCP 5.2)

No new or additional studies have been submitted

A 2.1.2.7 A.2.A.9 Other Studies/ Information

No new or additional studies have been submitted

A 2.2 Analytical methods for Diflufenican

A 2.2.1 Methods used for the generation of pre-authorization data (KCP 5.1)

No new or additional studies have been submitted

A 2.2.2 Methods for post-authorization control and monitoring purposes (KCP 5.2)

A 2.2.2.1 Description of analytical methods for the determination of residues in plant matrices (KCP 5.2)

No new or additional studies have been submitted

A 2.2.2.2 Description of analytical methods for the determination of residues in animal matrices (KCP 5.2)

No new or additional studies have been submitted

A 2.2.2.3 Description of Methods for the Analysis of Soil (KCP 5.2)

No new or additional studies have been submitted

A 2.2.2.4 Description of Methods for the Analysis of Water (KCP 5.2)

No new or additional studies have been submitted

A 2.2.2.5 Description of Methods for the Analysis of Air (KCP 5.2)

No new or additional studies have been submitted

A 2.2.2.6 Description of Methods for the Analysis of Body Fluids and Tissues (KCP 5.2)

No new or additional studies have been submitted

A 2.2.2.7 A.2.A.9 Other Studies/ Information

No new or additional studies have been submitted

A 2.3 Analytical methods for Flufenacet

A 2.3.1 Methods used for the generation of pre-authorization data (KCP 5.1)

No new or additional studies have been submitted

A 2.3.2 Methods for post-authorization control and monitoring purposes (KCP 5.2)

A 2.3.2.1 Description of analytical methods for the determination of residues in plant matrices (KCP 5.2)

No new or additional studies have been submitted

A 2.3.2.2 Description of analytical methods for the determination of residues in animal matrices (KCP 5.2)

No new or additional studies have been submitted

A 2.3.2.3 Description of Methods for the Analysis of Soil (KCP 5.2)

No new or additional studies have been submitted

A 2.3.2.4 Description of Methods for the Analysis of Water (KCP 5.2)

No new or additional studies have been submitted

A 2.3.2.5 Description of Methods for the Analysis of Air (KCP 5.2)

No new or additional studies have been submitted

A 2.3.2.6 Description of Methods for the Analysis of Body Fluids and Tissues (KCP 5.2)

No new or additional studies have been submitted

A 2.3.2.7 A.2.A.9 Other Studies/ Information

No new or additional studies have been submitted