Analytical method for Epyrifenacil (S-3100; V-10456) and two its degradates S-3100-CA and S-3100-CA-UR in water

Reports: ECM: EPA MRID No. 51778739. DeVellis, S., 2021. V-10456, S-3100-CA, and S-3100-CA-UR - Validation of the Analytical Method for the Determination of the Test Substance in Aqueous Solutions. Smithers Study No.: 12709.6509. Task No.: TK0603012. Report prepared by Smithers, Wareham, Massachusetts; sponsored and submitted by Valent U.S.A., LLC, Dublin, California; 83 pages. Final report issued February 16, 2021.

ILV: EPA MRID No. 51778715. Mumford, J., 2021. Independent Laboratory Validation of Analytical Method 12709.6509 for the Determination of V-10456, S-3100-CA, and S-3100-CA-UR in Ground and Surface Water. Smithers ERS Project ID: 3203100. Report prepared by Smithers ERS Limited, Harrogate, United Kingdom; sponsored and submitted Valent U.S.A., LLC, Dublin, California; 146 pages. Final report issued November 9, 2021.

Document No.: MRIDs 51778715 & 51778739

Guideline: 850.6100

Statements: ECM: This study was conducted in accordance with USEPA FIFRA Good Laboratory Practices (40 CFR Part 160, 1989) and as accepted by the OECD Principles of GLP (1998; p. 3 of MRID 51778739). Signed and dated No Data Confidentiality and Quality Assurance statements were provided (pp. 2-3, and 5 of MRID 51778739).

ILV: The study was conducted in accordance with United Kingdom GLP Monitoring Authority, Medicines and Healthcare products Regulatory Agency (MHRA) GLP Regulations 1999, Statutory Instrument 1999 No. 3106 as amended by the GLP Regulations, 2004 and the OECD Series on Principles of GLP and Compliance monitoring [ENV/MC/CHEM(98)17, 1998.; p. 3 of MRID 51778715). Signed and dated No Data Confidentiality, GLP, and Quality Assurance statements were provided (pp. 2-4 of MRID 51778715).

Classification: This analytical method is classified as **Supplemental**. Since the reported method LOQ was not based on scientifically acceptable procedures defined in 40 CFR Part 136, the reported LOQ is the lowest level of method validation (LLMV) rather than LOQ. No 10×LOQ fortifications were prepared in the ECM for any analyte; therefore, the reproducibility of the method could not be assessed at the 10×LOQ fortification levels since only one set of performance data was submitted. The ECM method (Smithers Study No**.** 12709.6509) should be updated to include storage stability data for the stock solutions and final extracts of the analytes, since degradation in the S-3100-CA-UR stock solution was indicated in ECM MRID 51778739 and ILV MRID 51778715. The ECM test matrix (dilute, natural, filtered

seawater) was not well-characterized, and dilute, natural, filtered seawater was not included as an ILV test matrix. The ECM reported that the test matrix was "heated to the required test temperature" prior to fortification; the ECM should be updated to clarify this statement or include the required test temperature.

PC Code:	116100		
EFED Final Reviewer:	He Zhong, Ph.D., Biologist	Signature:	HE ZHONG Digitally signed by HE ZHONG Date: 2024.09.12 17:28:29 -04'00'
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This Data Evaluation Record may have been altered by the Environmental Fate and Effects Division subsequent to signing by PB&A/CSS Joint Venture personnel. The PB&A/CSS JV role does not include establishing Agency policies.

Executive Summary

This analytical method, Smithers Study No. 12709.6509, is designed for the quantitative determination of epyrifenacil (S-3100; V-10456) at the LOQ of 0.100 µg/L and metabolites S-3100-CA, and S-3100-CA-UR at the LOQ of 1.00 µg/L for in water using LC/MS/MS. The LOQ is less than the lowest toxicological level of concern of aquatic plants for epyrifenacil (1.1 µg/L) and its degradates 3100-CA (11 µg/L). Since the reported method LOQ was not based on scientifically acceptable procedures defined in 40 CFR Part 136, the reported LOQ is the lowest level of method validation (LLMV) rather than an LOQ. Based on the performance data submitted by the ILV and ECM, the LLMV was equivalent to the ECM reported method LOQ of 0.100 µg/L for epyrifenacil (S-3100; V-10456) and 1.00 µg/L for S-3100-CA and S-3100-CA-UR in water.

The ILV validated the method, Smithers Study No. 12709.6509, with the first trial as written, except for minor modifications to optimize the instrumentation used in the ILV as allowed by the ECM. These modifications included: 1) changing the LC instrumentation; 2) the ion spray voltage; and specified dwell time change for the analytes. An updated ECM is not required for these modifications; however, the ECM method (Smithers Study No. 12709.6509) should be updated to include storage stability data for the stock solutions and final extracts of the analytes, since degradation in the S-3100-CA-UR stock solution was indicated in ECM and ILV. The ECM test matrix was uncharacterized dilute, natural, filtered sea water. The ILV test matrices were characterized ground and surface water matrices.

All ILV and ECM data regarding repeatability, accuracy, precision, linearity, and specificity were satisfactory for epyrifenacil (S-3100; V-10456), S-3100-CA, and S-3100-CA-UR at the respective LOQ-level fortification and high-level fortification (1000 µg/L). All ILV data regarding repeatability, accuracy, precision, linearity, and specificity were satisfactory for epyrifenacil (S-3100; V-10456), S-3100-CA, and S-3100-CA-UR at the respective 10×LOQ-level fortification. In the ECM, no samples were prepared at 10×LOQ for any analyte; therefore, the reproducibility of the method could not be assessed at the 10×LOQ fortification levels since only one set of performance data was submitted.

Table 1. Analytical Method Summary

Analyte(s) by Pesticide	MRID		EPA Review	Matrix	Method Date (dd/mm/yyyy)	Registrant	Analysis	Limit of Quantitation (LOQ)
	Environmental Chemistry Method	Independent Laboratory Validation						
Epyrifenacil (S-3100; V-10456)	51778739[1]	51778715[2]		Water	16/02/2021	Valent U.S.A., LLC	LC/MS/MS	0.100 µg/L
S-3100-CA								1.00 µg/L
S-3100-CA-UR								

1 In the ECM, the source of the surface water (dilute, natural, filtered seawater) was reported as Cape Cod Canal, Bourne, Massachusetts (p. 16 of MRID 51778739). The water was collected *ca.* 1-4 meters off shore at a depth of *ca.* 0.5 meters and diluted to a salinity of 20 ± 3% with on-site laboratory well water which was a mixture of unadulterated water from a 100-meter bedrock well and dechlorinated Town of Wareham well water. The water was filtered through 50-µm and 1-µm polypropylene bag filters and heated to the required test temperature. Water characteristics including pH, hardness, and conductivity were not reported.

2 The ground water matrix source was an aquifer below pinewoods (accessed via borehole) in Harrogate Spring Water, Harrogate, United Kingdom (Harrogate Spa Water) and had the following characteristics: pH: 7.02; suspended solids: 1 mg/L; conductivity: 404 µS/cm; total hardness: 202 mg/L as $CaCO_3$; and dissolved organic carbon (DOC): 1.40 ppm. The surface water matrix source was The Lake, Studley Royal, Ripon, United Kingdom (Fountains Abbey) and had the following characteristics: pH: 9.53; suspended solids: 3 mg/L; conductivity: 296 µS/cm; total hardness: 169 as $CaCO_3$; and DOC: 10.1 ppm. The surface and ground water matrices were sourced by Smithers ERS Limited (p. 20 of MRID 51778715). The water characterization for the ground water and surface water was performed by Smithers ERS Limited in Harrogate, United Kingdom (Appendix 2, pp. 116-117 of MRID 51778715).

I. Principle of the Method

Water matrix samples were collected through polyvinyl chloride (PVC) pipes, transferred the laboratory in a polyethylene holding tank, diluted to a salinity of 20 ± 3% with on-site laboratory well water, and filtered through 50-µm and 1-µm polypropylene bag filters and heated to the required test temperature (p. 16 of MRID 51778739).

The following liquid reagent solutions were typically prepared by mixing well using a stir bar and a stir plate for 5 minutes (pp. 16-18 of MRID 51778739).

- A solution of acetonitrile:purified reagent water: formic acid (50:50:0.1; v:v:v) typically was prepared by combining 120 mL of acetonitrile, 120 mL of purified reagent water, and 0.240 mL of formic acid.

- A solution of acetonitrile:purified reagent water: formic acid (56:44:0.1; v:v:v) typically was prepared by combining 560 mL of acetonitrile, 440 mL of purified reagent water, and 1.00 mL of formic acid.

- A solution of acetonitrile:dilute, natural, filtered sea water:purified reagent water:formic acid (50:10:40:0.1; v:v:v:v) typically was prepared by combining 500 mL of acetonitrile, 100 mL of dilute, natural, filtered sea water, 400 mL of purified reagent water, and 1.00 mL of formic acid.

- A solution of acetonitrile:purified reagent water (50:50; v:v) typically was prepared by combining 150 mL of acetonitrile and 150 mL of purified reagent water.

- A 0.1% formic acid in ultra-purified reagent water mobile phase solution was prepared by combining 4.00 mL of formic acid to 4000 mL of purified reagent water. This solution was mixed will with a stir bar and stir plate for 5 minutes, then degassed under vacuum with sonication for 10 minutes.

Primary and secondary stock solutions were stored refrigerated at 2 to 8°C in amber glass bottles fitted with Teflon-lined caps (p. 19 of MRID 51778739). Actual volumes of reagent solutions and stock solutions may be adjusted for future testing (pp. 16-17).

Water samples (final volume 5 mL) were fortified using combined fortification solutions to LOQ concentrations of 0.100, 1.00, and 1.00 µg/L of epyrifenacil (S-3100; V-10456), S-3100-CA, and S-3100-CA-UR, respectively, or The high-levelconcentration of 1000 µg/L of epyrifenacil (S-3100; V-10456), S-3100-CA, and S-3100-CA-UR (pp. 19-21 of MRID 51778739).. Fortified samples were diluted to a final composition of 50:10:40:0.1 (acetonitrile:dilute, natural, filtered sea water:purified reagent water:formic acid; v:v:v:v) and mixed well with a stir bar on a stir plate for 5 minutes. LOQ samples were analyzed by HPLC, while high-level fortification samples were further diluted 5560xs (S-3100-CA and S-3100-CA-UR) or 27,800xs (epyrifenacil) prior analysis by HPLC analysis. Note: due to the fact that the "original S-3100-CA-UR High-level results failed to meet acceptance criteria for the original analysis,…the High-level samples for S-3100-CA-UR were prepared on a separate occasion" (p. 20).

Samples were analyzed using a Shimadzu liquid chromatography (LC) system with a Shimadzu LC-20ADXR solvent delivery pump coupled to a MDS Sciex API 5000 mass spectrometer (MS) equipped with an ESI Turbo V ion source (p. 15 of MRID 51778739). The following LC conditions were used: Phenomenex Kinetex Phenyl-hexyl (50 mm x 3 mm column; 2.6 µm particle size; column temperature ambient/40°C), mobile phase of (A) 0.1% formic acid in ultra-purified reagent water, and (B) 0.1% formic acid in acetonitrile [mobile gradient phase of percent A:B (v:v) at 0.01-4.00 min. 90:10, 4.00-4.50 min. 0:100, 4.60-6.00 min. 90:10, flow rate 0.5 mL/min., and injection volume of 35.0 µL. A needle wash of acetonitrile:methanol:purified reagent water (30:30:40; v:v:v) was used (p. 21 of MRID 51778739).

The following MS/MS conditions were used: 5500V positive (+) ESI mode, (source temperature 650°C), Turbo Ion Spray interface, and multiple reaction monitoring (MRM; pp. 21-22 of MRID 51778739). Two ion pair transitions were monitored for epyrifenacil (S-3100; V10456), S-3100-CA, and S-3100-CA-UR. The following MS settings were reported in the ECM.

Analyte	Primary	Confirmatory	Mode	Expected Retention Times (minutes)
Epyrifenacil (S-3100; V-10456)	*m/z* 518.1→472.1	*m/z* 518.1→444.1	Positive	*ca.* 4.0
S-3100-CA	*m/z* 490.2→249.9	*m/z* 490.2→292.9	Positive	*ca.* 3.6
S-3100-CA-UR	*m/z* 370.2→312.9	*m/z* 370.2→351.7	Positive	*ca.* 3.0

The independent laboratory performed the ECM as written, except the following modification: 1) The equipment used differed from the equipment in the ECM. A Shimadzu Nexera series HPLC system was used coupled with a Sciex API 500 mass spectrometer (p. 25 of MRID 51778715). The LC settings including column specifications, the column temperature, the injection volume, and flow rate were the same as used in the ECM. The ECM and ILV list a rinse solvent as acetonitrile:methanol:purified reagent water (30:30:40; v:v:v).

The MS parameters of the ILV were the same as those of the ECM (p. 26 of MRID 51778715) with the following exception: 1) the ion spray voltage was 4500 V 2) dwell time was specified as 100 msec, the dwell time was not specified in the ECM. The ILV monitored ion transitions were the same as those of the ECM for all analytes.

The Limit of Quantification (LOQ) for epyrifenacil (S-3100; V-10456) in the test matrices (dilute, filtered, natural sea water for the ECM; groundwater, and surface water for the ILV) was reported as 0.100 µg/L in the ECM and the ILV (pp. 12 and 25 of MRID 51778739; pp. 13 and 32 of MRID 51778715). The LOQ for S-3100-CA and S-3100-CA-UR was reported as 1.00 µg/L in the ECM and the ILV (pp. 12 and 25 of MRID 51778739 and pp. 13, 32, and 34-39 of MRID 51778715).

The Limit of Detection (LOD) for epyrifenacil (S-3100; V-10456) in the ECM water matrix, dilute, natural, filtered sea water, was 0.007 µg/L for the primary ion pair transition and 0.008 for the confirmatory ion pair transition (p. 25 of MRID 51778739). In the ILV surface water and groundwater matrices, the LOD for epyrifenacil (S-3100; V-10456) ranged from 0.007015 to 0.009316 µg/L (Tables 13-14, pp. 55-56 of MRID 51778715). The LOD for S-3100-CA in the ECM water matrix was 0.008 µg/L for the primary ion pair transition and 0.01 µg/L for the confirmatory ion pair transition (p. 25 of MRID 51778739). In the ILV water matrices, the LOD for S-3100-CA ranged from 0.011936 to 0.016084 µg/L (Tables 13-14, pp. 55-56 of MRID 51778715). The LOD for S-3100-CA-UR in the ECM water matrix was 0.05 µg/L for the primary ion pair transition and 0.08 µg/L for the confirmatory ion pair transition (p. 25 of MRID 51778739). In the ILV water matrices, the LOD for S-3100-CA-UR ranged from 0.025862 to 0.346997 µg/L (Tables 13-14, pp. 55-56 of MRID 51778715). The LOD calculated in the ECM and the ILV varied depending on the matrix and transition ion pair for each analyte.

Since the LOQs were not based on scientifically acceptable procedures defined in 40 CFR Part 136, the reported LOQs are the lowest levels of method validation (LLMVs) rather than LOQs.

II. Recovery Findings

ECM (MRID 51778739): Mean recoveries and relative standard deviations (RSDs) met requirements (mean 70-120%; RSD ≤20%) for dilute, natural, filtered sea water matrix samples fortified with epyrifenacil (S-3100; V-10456) and metabolites S-3100-CA and S-3100-CA-UR at the LOQ and high-level fortification (1000 µg/L; Tables 1-6, pp. 33-38 of MRID 51778739). LOQ-level fortifications were 0.100 µg/L for epyrifenacil (S-3100; V-10456) and 1.00 µg/L for S-3100-CA and S-3100-CA-UR. No 10×LOQ fortification samples were prepared for any analyte. Two reagent blanks, five control samples, and five samples for at each fortification level were analyzed for epyrifenacil (S-3100; V-10456) and the target metabolites (Figure 1, p. 42; Figures 3-6, pp. 44-47; Figures 8-11; pp. 49-52, and Figures 13-15, pp. 54-56 of MRID 51778739). Performance data for the quantification and confirmation ion pair transitions were evaluated and comparable. Residues of epyrifenacil (S-3100; V-10456) and metabolites S-3100-CA and S-3100-CA-UR were less than 30% of the LOQ in the control samples and reagent blanks (Tables 1-6, pp. 33-38 of MRID 51778739).

In the ECM, the source of the surface water (dilute, natural, filtered seawater) was reported as Cape Cod Canal, Bourne, Massachusetts (p. 16 of MRID 51778739). The water was collected *ca.* 1-4 meters off shore at a depth of *ca.* 0.5 meters and diluted to a salinity of 20 ± 3% with on-site laboratory well water which was a mixture of unadulterated water from a 100-meter bedrock well and dechlorinated Town of Wareham well water. The water was filtered through 50-µm and 1-µm polypropylene bag filters and heated to the required test temperature. Water characteristics including pH, hardness, and conductivity were not reported.

ILV (MRID 51778715): Mean recoveries and RSDs met requirements for surface water and groundwater matrix samples fortified with epyrifenacil (S-3100; V-10456) and metabolites S-3100-CA and S-3100-CA-UR at the LOQ, 10x LOQ, and high-level fortification (1000 µg/L; Tables 1-12, pp. 42-53 of MRID 51778739). LOQ-level fortifications were 0.100 µg/L for epyrifenacil (S-3100; V-10456) and 1.00 µg/L for S-3100-CA and S-3100-CA-UR. Fortifications at 10x LOQ were 1.00 µg/L for epyrifenacil (S-3100; V-10456) and 10.0 µg/L for S-3100-CA and S-3100-CA-UR. Two reagent blanks, five control samples, five samples for each matrix at each fortification level were analyzed for epyrifenacil (S-3100; V-10456) and the target metabolites (Figures 19-48, pp. 73-87 of MRID 51778715). The analytes were quantified one ion pair transition and confirmatory ion pair transition. The quantitation and confirmatory ion pair transitions are listed in Section I. Performance data for the quantification and confirmation ion pair transitions were comparable, except for the analysis of epyrifenacil (S-3100; V-10456) at 10x LOQ in the surface water matrix. Epyrifenacil (S-3100; V-10456) and the metabolites were <30% of the LOQ in the control samples and reagent blanks.

The ground water matrix source was an aquifer below pinewoods (accessed via borehole) in Harrogate Spring Water, Harrogate, United Kingdom (Harrogate Spa Water) and had the following characteristics: pH: 7.02; suspended solids: 1 mg/L; conductivity: 404 µS/cm; total hardness: 202 mg/L as $CaCO_3$; and dissolved organic carbon (DOC): 1.40 ppm. The surface water matrix source was The Lake, Studley Royal, Ripon, United Kingdom (Fountains Abbey)

and had the following characteristics: pH: 9.53; suspended solids: 3 mg/L; conductivity: 296 µS/cm; total hardness: 169 as CaCO3; and DOC: 10.1 ppm. The surface and ground water matrices were sourced by Smithers ERS Limited (p. 20 of MRID 51778715). The water characterization for the ground water and surface water was performed by Smithers ERS Limited in Harrogate, United Kingdom (Appendix 2, pp. 116-117 of MRID 51778715).

The method (Smithers Study No**.** 12709.6509) was validated by the ILV in the surface water matrix and the ground water matrix with modifications to the analytical method (see Reviewer's Comment #9). The ILV validated the method in one trial and no matrix suppression or enhancement was observed (p. 32, Tables 15-20, pp. 57-59; Appendix 5, p. 143 of MRID 51778715). The ILV method was based on the ECM method; however, the ILV was modified to optimize the LC-MS/MS equipment in the ILV. An updated ECM is not required based on ILV modifications.

Table 2. Initial Validation Method Recoveries for Epyrifenacil (S-3100; V-10456), S-3100-CA, and S-3100-CA-UR in Water[1,2]

Analyte	Fortification Level (µg/L)	Number of Tests	Recovery Range (%)	Mean Recovery (%)	Standard Deviation (%)	Relative Standard Deviation (%)
Dilute, Natural, Filtered Sea Water						
Quantitation ion transition						
Epyrifenacil (S-3100; V-10456)	0.100 (LOQ)	5	94.1-103	100	4.05	4.05
	1000 (High)	5	99.0-109	105	3.63	3.46
S-3100-CA	1.00 (LOQ)	5	95.5-102	98.8	2.29	2.32
	1000 (High)	5	104-110	108	2.43	2.26
S-3100-CA-UR	1.00 (LOQ)	5	95.9-106	102	3.88	3.80
	1000 (High)	5	97.0-111	106	5.24	4.95
Confirmation ion transition						
Epyrifenacil (S-3100; V-10456)	0.100 (LOQ)	5	93.0-104	98.7	3.94	3.99
	1000 (High)	5	105-109	107	1.29	1.21
S-3100-CA	1.00 (LOQ)	5	97.5-104	100	2.44	2.43
	1000 (High)	5	107-110	108	0.843	0.778
S-3100-CA-UR	1.00 (LOQ)	5	93.3-107	100	5.24	5.22
	1000 (High)	5	95.4-113	106	7.72	7.30

Data (uncorrected recovery results; pp. 20-21) were obtained from Tables 1, 3, and 5 (quantitation ion pair transition) and Tables 2, 4, and 6 (confirmatory ion pair transition); pp. 33-38 of MRID 51778739). Since the LOQ was not based on scientifically acceptable procedures defined in 40 CFR Part 136, the reported LOQ is the lowest level of method validation (LLMV) rather than an LOQ.

1 Two ion pair transitions were monitored (primary and confirmatory, respectively): *m/z* 518.1→472.1 and *m/z* 518.1→444.1 for epyrifenacil (S-3100; V10456), *m/z* 490.2→249.9 and *m/z* 490.2→292.9 for S-3100-CA, and *m/z* 370.2→312.9 and *m/z* 370.2→351.7 for S-3100-CA-UR (p. 22 of MRID 51778739).

2 In the ECM, the source of the surface water (dilute, natural, filtered seawater) was reported as Cape Cod Canal, Bourne, Massachusetts (p. 16 of MRID 51778739). The water was collected *ca.* 1-4 meters off shore at a depth of *ca.* 0.5 meters and diluted to a salinity of 20 ± 3% with on-site laboratory well water which was a mixture of unadulterated water from a 100-meter bedrock well and dechlorinated Town of Wareham well water. The water was filtered through 50-µm and 1-µm polypropylene bag filters and heated to the required test temperature. Water characteristics including pH, hardness, and conductivity were not reported.

Table 3. Independent Validation Method Recoveries for Epyrifenacil (S-3100; V-10456), S-3100-CA, and S-3100-CA-UR in Water[1,2]

Analyte	Fortification Level (µg/L)	Number of Tests	Recovery Range (%)	Mean Recovery (%)	Standard Deviation (%)[3]	Relative Standard Deviation (%)
Surface water						
Quantitation ion transition						
Epyrifenacil (S-3100; V-10456)	0.10000 (LOQ)	5	89.4-112	96.0	9.16	9.54
	1.0000 (10x LOQ)	5	74.4-104	84.9	11.5	13.5
	1000.00000 (High)	5	88.6-101	95.1	5.55	5.84
S-3100-CA	1.0000 (LOQ)	5	92.8-107	97.6	6.27	6.42
	10.0000 (10x LOQ)	5	89.2-106	96.3	6.31	6.55
	1000.00000 (High)	5	91.7-102	97.7	4.63	4.74
S-3100-CA-UR	1.0000 (LOQ)	5	74.1-89.0	81.6	6.91	8.46
	10.0000 (10x LOQ)	5	73.4-89.3	80.7	7.00	8.67
	1000.00000 (High)	5	77.7-82.5	80.2	2.00	2.50
Confirmation ion transition						
Epyrifenacil (S-3100; V-10456)	0.10000 (LOQ)	5	95.0-121	104	10.2	9.77
	1.0000 (10x LOQ)	5	99.9-125	108	10.3	9.57
	1000.00000 (High)	5	89.6-106	97.3	7.34	7.54
S-3100-CA	1.0000 (LOQ)	5	81.2-103	96.0	9.19	9.57
	10.0000 (10x LOQ)	5	85.1-102	92.7	7.49	8.08
	1000.00000 (High)	5	90.3-104	96.9	4.93	5.09
S-3100-CA-UR	1.0000 (LOQ)	5	70.4-78.9	75.1	3.69	4.91
	10.0000 (10x LOQ)	5	65.1-85.1	70.4	8.37	11.9
	1000.00000 (High)	5	67.0-86.0	77.9	7.43	9.55
Ground water						
Quantitation ion transition						
Epyrifenacil (S-3100; V-10456)	0.10000 (LOQ)	5	80.1-98.9	92.7	7.50	8.09
	1.0000 (10x LOQ)	5	77.3-101	85.4	9.52	11.2
	1000.00000 (High)	5	85.3-99.9	91.2	7.61	8.35
S-3100-CA	1.0000 (LOQ)	5	84.3-99.3	93.3	6.08	6.52
	10.0000 (10x LOQ)	5	94.0-105	100	4.48	4.47
	1000.00000 (High)	5	90.7-101	96.5	5.24	5.43
S-3100-CA-UR	1.0000 (LOQ)	5	82.0-96.7	88.6	5.60	6.32
	10.0000 (10x LOQ)	5	76.2-84.4	80.9	3.03	3.75
	1000.00000 (High)	5	81.7-91.5	84.8	3.99	4.71
Confirmation ion transition						
Epyrifenacil (S-3100; V-10456)	0.10000 (LOQ)	5	81.5-120	101	18.4	18.2
	1.0000 (10x LOQ)	5	70.5-93.6	78.5	9.67	12.3
	1000.00000 (High)	5	84.6-104	93.7	7.35	7.84
S-3100-CA	1.0000 (LOQ)	5	80.0-96.6	88.9	6.73	7.56
	10.0000 (10x LOQ)	5	91.1-97.0	92.8	2.43	2.62
	1000.00000 (High)	5	88.4-105	96.6	7.39	7.65
S-3100-CA-UR	1.0000 (LOQ)	5	75.1-88.9	84.7	5.89	6.95
	10.0000 (10x LOQ)	5	79.8-94.5	86.0	5.35	6.22
	1000.00000 (High)	5	82.0-91.5	87.1	3.50	4.02

Data (uncorrected recovery results) were obtained from Tables 1, 3, and 5 (quantitation ion pair transition) and Tables 2, 4, and 6 (confirmatory ion pair transition); pp. 43-48 of MRID 51778715). Since the LOQ was not based

on scientifically acceptable procedures defined in 40 CFR Part 136, the reported LOQ is the lowest level of method validation (LLMV) rather than an LOQ.

1 Two ion pair transitions were monitored (primary and confirmatory, respectively): *m/z* 518.1→472.1 and *m/z* 518.1→444.1 for epyrifenacil (S-3100; V10456), *m/z* 490.2→249.9 and *m/z* 490.2→292.9 for S-3100-CA, and *m/z* 370.2→312.9 and *m/z* 370.2→351.7 for S-3100-CA-UR (p. 26 of MRID 51778715). The ILV monitored ion transitions were the same as those of the ECM for all analytes.

2 The ground water matrix source was an aquifer below pinewoods (accessed via borehole) in Harrogate Spring Water, Harrogate, United Kingdom (Harrogate Spa Water) and had the following characteristics: pH: 7.02; suspended solids: 1 mg/L; conductivity: 404 µS/cm; total hardness: 202 mg/L as $CaCO_3$; and dissolved organic carbon (DOC): 1.40 ppm. The surface water matrix source was The Lake, Studley Royal, Ripon, United Kingdom (Fountains Abbey) and had the following characteristics: pH: 9.53; suspended solids: 3 mg/L; conductivity: 296 µS/cm; total hardness: 169 as $CaCO_3$; and DOC: 10.1 ppm. The surface and ground water matrices were sourced by Smithers ERS Limited (p. 20 of MRID 51778715). The water characterization for the ground water and surface water was performed by Smithers ERS Limited in Harrogate, United Kingdom (Appendix 2, pp. 116-117 of MRID 51778715).

III. Method Characteristics

The Limit of Quantification (LOQ) for epyrifenacil (S-3100; V-10456) in the test matrices (dilute, filtered, natural sea water for the ECM; groundwater, and surface water for the ILV) was reported as 0.100 µg/L in the ECM and the ILV (pp. 12 and 25 of MRID 51778739; pp. 14 and 34 of MRID 51778715). The LOQ for S-3100-CA and S-3100-CA-UR was reported as 1.00 µg/L in the ECM and the ILV (pp. 12 and 25 of MRID 51778739 and pp. 15 and 34-39 of MRID 51778715) for the water matrices.

In the ECM and the ILV, the LOQ was defined as the lowest validated fortification level (p. 23 of MRID 51778739; p. 32 of MRID 51778715). The estimated LOQ was taken as 0.100 µg/L for epyrifenacil (S-3100; V-10456) and 1.00 µg/L for S-3100-CA and S-3100-CA-UR.

The LOD in the ECM and ILV was calculated using the following equation:

$$LOD = (3x(N_{ctl})/(Resp_{LS}) \times Conc_{LS} \times DF_{CNTL}$$

Where, LOD is the limit of detection of the analysis, N_{ctl} is the mean noise in height of the control samples (or blanks), $Resp_{LS}$ is the mean response in height of the two low calibration standards, $Conc_{LS}$ is the concentration of the low calibration standard, and DF_{CNTL} is the dilution factor of the control samples (smallest dilution factor used, i.e., 100 mL/g). The LOD calculation represented three times the signal-to-noise value of the control samples. (p. 27 of MRID 51778739; and p. 26, Tables 13-14, pp. 55-56 of MRID 51778715).

The LOD calculated in the ECM ranged from 0.007-0.008 µg/L for epyrifenacil (S-3100; V-10456), 0.008-0.01 µg/L for S-3100-CA, and 0.05-0.08 µg/L for S-3100-CA-UR (pp. 25 and 28-30 of MRID 51778739). In the ILV surface water and groundwater matrices, the LOD for epyrifenacil (S-3100; V-10456) ranged from 0.000715- 0.009316 µg/L; the LOD for S-3100-CA ranged from 0.011936-0.016084 µg/L; and the LOD for S-3100-CA-UR ranged from 0.025862 to 0.346997 µg/L (Tables 13-14, pp. 55-56 of MRID 51778715).

In the ECM and ILV, the MDL was calculated as 0.0500 µg/L for epyrifenacil (S-3100; V-10456) and 0.250 µg/L for S-3100-CA and S-3100-CA-UR in water using the following equation: $MDL = MDL_{LCAL} \times DF_{CNTL}$, where MDL_{LCAL} is the lowest concentration calibration standard, MDL is the method detection limit reported for the analysis, and DF_{CNTL} is the minimum dilution factor of 5 of the control samples (p. 24 of MRID 51778739 and p. 27 of MRID 51778715). The MDL was defined as the lowest concentration in test samples which can be detected by this method in test solution samples.

Since the LOQs were not based on scientifically acceptable procedures defined in 40 CFR Part 136, the reported LOQs are the lowest levels of method validation (LLMVs) rather than LOQs.

Table 4. Method Characteristics –Water[1,2]

		Epyrifenacil (S-3100)	S-3100-CA	S-3100-CA-UR
Limit of Quantitation (LOQ)*	ECM	0.100 µg/L	1.00 µg/L	
	ILV			
Limit of Detection (LOD)	ECM	0.007 µg/L (Q); 0.008 µg/L (C)	0.008 µg/L (Q); 0.01 µg/L (C)	0.05 µg/L (Q); 0.08 µg/L (C)
	ILV	[GW]: 0.009316 µg/L (Q); [GW]: 0.007295 µg/L (C) [SW]: 0.008460 µg/L (Q); [SW]: 0.007015 µg/L (C)	[GW]: 0.012676 µg/L (Q); [GW]: 0.011936 µg/L (C) [SW]: 0.013462 µg/L (Q); [SW]: 0.016084 µg/L (C)	[GW]: 0.034673 µg/L (Q); [GW]: 0.346997 µg/L (C) [SW]: 0.025862 µg/L (Q); [SW]: 0.331844 µg/L (C)

Linearity (calibration curve r and concentration range)	ECM[3]	r = 0.996 (Q);
		r = 0.995 (C)
			r = 0.998 (Q);
			r = 0.997 (C)
				r = 0.999 (Q);
				r = 0.997 (C);
				High-level: r = 0.997 (Q);
				High-level: r = 0.996 (C)

		Calibration Range: 0.005 to 0.0500 µg/L	Calibration Range: 0.0250 to 0.250 µg/L	
	ILV	[GW]: r = 0.9968 (Q); [GW]: r = 0.9963 (C); [SW]: r = 0.9958 (Q); [SW]: r = 0.9967 (C)	[GW]: r = 0.9977 (Q); [GW]: r = 0.9964 (C); [SW]: r = 0.9971(Q); [SW]: r = 0.9952 (C)	[GW]: r = 0.9990 (Q); [GW]: r = 0.9985 (C); [SW]: r = 0.9965 (Q); [SW]: r = 0.9972 (C)
		Calibration Range: 0.005 to 5 µg/L	Calibration Range: 0.0250 to 0.250 µg/L	
Repeatable	ECM	Yes for 0.100 µg/L (LOQ) and 1000 µg/L (High-level) in one uncharacterized dilute, natural, filtered sea water matrix where n = 5. **No** 10x LOQ (1.00 µg/L) samples were prepared.	Yes for 1.00 µg/L (LOQ) and 1000 µg/L (High-level) in one uncharacterized dilute, natural, filtered sea water matrix where n = 5. **No** 10x LOQ (10 µg/L) samples were prepared.	
	ILV[4]	Yes for 0.100 µg/L (LOQ), 1 µg/L (10x LOQ), and 1000 µg/L (High-level) in one characterized surface water and one characterized groundwater matrix where n = 5.	Yes for 1.00 µg/L (LOQ), 10 µg/L (10x LOQ), and 1000 µg/L (High-level) in one characterized surface water and one characterized groundwater matrix where n = 5.	
Reproducible		Yes for 0.100 µg/L (LLMV) and 1000 µg/L (10000x LLMV) in tested water matrices. **Could not be determined** for 1.00 µg/L (10x LLMV) since only one set of	Yes for 1.00 µg/L (LLMV) and 1000 µg/L (1000x LLMV) in tested water matrices. **Could not be determined** for 10 µg/L (10x LLMV) since only one set of performance data was submitted.	

		Epyrifenacil (S-3100)	S-3100-CA	S-3100-CA-UR
		performance data was submitted.		
Specific	ECM	Yes, matrix interferences were <20% of the LOQ (based on peak areas). Some minor tailing of the peak was noted at the LOQ. The tailing was greater in the C chromatogram, which was not present at the high level peak integration. This area was included in the integration.	Yes, matrix interferences were <2% of the LOQ (based on peak areas). Some minor baseline noise was noted at the LOQ which interfered with analyte peak integration.	Yes, matrix interferences were <7% of the LOQ (based on peak areas). Some minor baseline noise was noted at the LOQ which interfered with analyte peak integration.
	ILV	Yes, matrix interferences were <17% (Q; GW), <3% (C; GW) and <11% (Q; SW), <18% (C; SW) of the LOQ (based on peak areas).	Yes, matrix interferences were <10% (Q and C; GW) and <6% (Q and C; SW) of the LOQ (based on peak areas).	Yes, matrix interferences were <2% (Q and C; GW), <6% (Q; SW), and <19% (C; SW) and of the LOQ (based on peak areas).

Data obtained from pp. 25 and 28-30 (LOQ/LOD); Tables 1-6, pp. 33-38 (recovery data); pp. 28-30 and Tables 7-9, pp. 39-41 (matrix effects); pp. 19, 24, 28-30 and Figures 16-23, p. 57-64 (calibration curves); Figures 1-15, pp. 42-56 (chromatograms) of MRID 51778739; pp. 29-30, 32, and 34-39, Tables 13-14, pp. 55-56 (LOQ/LOD); pp. 13, 29-31, and Tables 1-12, pp. 43-54 (recovery data); Tables 15-20, pp. 57-59 (matrix effects); Figures 1-6, pp. 64-66 (calibration curves); and Figures 7-96, pp. 67-111 (chromatograms) of MRID 51778715.

Q = quantitative ion transition; C = confirmatory ion transition; SW = Surface water; GW = Ground water.

* Since the LOQs were not based on scientifically acceptable procedures defined in 40 CFR Part 136, the reported LOQs are the lowest levels of method validation (LLMVs) rather than LOQs. The lowest concentration tested with sufficiently accurate and precise recoveries is the LLMV.

1 In the ECM, the source of the surface water (dilute, natural, filtered seawater) was reported as Cape Cod Canal, Bourne, Massachusetts (p. 16 of MRID 51778739). The water was collected *ca.* 1-4 meters off shore at a depth of *ca.* 0.5 meters and diluted to a salinity of 20 ± 3% with on-site laboratory well water which was a mixture of unadulterated water from a 100-meter bedrock well and dechlorinated Town of Wareham well water. The water was filtered through 50-µm and 1-µm polypropylene bag filters and heated to the required test temperature. Water characteristics including pH, hardness, and conductivity were not reported.

2 In the ILV, the ground water matrix source was an aquifer below pinewoods (accessed via borehole) in Harrogate Spring Water, Harrogate, United Kingdom (Harrogate Spa Water) and had the following characteristics: pH: 7.02; suspended solids: 1 mg/L; conductivity: 404 µS/cm; total hardness: 202 mg/L as $CaCO_3$; and dissolved organic carbon (DOC): 1.40 ppm. The surface water matrix source was The Lake, Studley Royal, Ripon, United Kingdom (Fountains Abbey) and had the following characteristics: pH: 9.53; suspended solids: 3 mg/L; conductivity: 296 µS/cm; total hardness: 169 as $CaCO_3$; and DOC: 10.1 ppm. The surface and ground water matrices were sourced by Smithers ERS Limited (p. 20 of MRID 51778715). The water characterization for the ground water and surface water was performed by Smithers ERS Limited in Harrogate, United Kingdom (Appendix 2, pp. 116-117 of MRID 51778715).

3 Reported r values were reviewer-calculated from r^2 values reported in the study report (p. 26, Figures 16-23, pp. 57-64 of MRID 51778739; DER Excel Attachment). Values were reported to three significant figures.

4 The ILV validated the method, 12709.6509, in the first trial as written with minor modifications to the equipment and ion spray voltage settings used in the MS (pp. 25-26 of MRID 51778739). An updated ECM is not required.

IV. Method Deficiencies and Reviewer's Comments

1. Since the reported method LOQ of the ECM and ILV were not based on scientifically acceptable procedures defined in 40 CFR Part 136, the reported LOQ of the ECM and ILV are the lowest level of method validation (LLMV) rather than LOQs (pp. 25 of MRID 51778739; p. 32 of MRID 51778715). The lowest concentration tested with sufficiently accurate and precise recoveries is the LLMV.

   In the ECM and the ILV, the LOQ was defined as the lowest validated fortification level (p. 23 of MRID 51778739; p. 32 of MRID 51778715). The determinations of the LOD in the ECM and ILV were not based on scientifically acceptable procedures as defined in 40 CFR Part 136 (p. 24 of MRID 51778739; and p. 26, Tables 13-14, pp. 55-56 of MRID 51778715).In the ECM and the ILV, the LOQ was calculated using the following equation: $LOD = (3x(N_{ctl})/(Resp_{LS}) \times Conc_{LS} \times DF_{CNTL}$. Detection and quantitation limits should not be based on the arbitrarily selected lowest concentration in the spiked samples.

   In the ECM and ILV, the MDL was calculated as 0.0500 µg/L for epyrifenacil (S-3100; V-10456) and 0.250 µg/L for S-3100-CA and S-3100-CA-UR in water using the following equation: $MDL = MDL_{LCAL} \times DF_{CNTL}$, where MDL_{LCAL} is the lowest concentration calibration standard, MDL is the method detection limit reported for the analysis, and DF_{CNTL} is the minimum dilution factor of 5 of the control samples (p. 24 of MRID 51778739 and p. 27 of MRID 51778715). The MDL was defined as the lowest concentration in test samples which can be detected by this method in test solution samples.

   The reviewer noted that the MDL calculation provided in the ECM did not correspond to those detailed in USEPA Definition and Procedure for the Determination of the Method Detection Limit, Revision 2; 2016.

2. No 10×LOQ fortifications were prepared in the ECM for any analyte; therefore, the reproducibility of the method could not be assessed at the 10×LOQ fortification level since only one set of performance data was submitted. OCSPP guideline 850.6100 states that a minimally complete sample set includes a reagent blank, two matrix blanks, five samples spiked at the LOQ, and five samples spiked at 10× LOQ for each matrix.

3. The ECM method (Smithers Study No**.** 12709.6509) should be updated to include storage stability data for the stock solutions and final extracts of the analytes, since degradation in the S-3100-CA-UR stock solution was indicated in ECM MRID 51778739 and ILV MRID 51778715 by the following two results: 1) The ECM study report stated that the "original S-3100-CA-UR High-level results failed to meet acceptance criteria for the original analysis,… [and] the High-level samples for S-3100-CA-UR were prepared on a separate occasion" (p. 20 of MRID 51778739). Details and raw data for this failed experiment were not provided in the ECM study report. 2) In the ILV, the primary stock solutions of epyrifenacil (S-1300; V-10456) and S-3100-CA were determined to be stable over a period of 8 days (p. 33 and Tables 21-23, pp. 60-62 of MRID 51778715). The

stock solution of S-3100-CA-UR was not stable over this period; the difference between old stock solution (>1 week) and fresh stock solution was *ca*. -33%.

The reviewer noted that the ILV Protocol Amendments including the removal of the final extract refrigerated storage stability assessment and the addition of the stock solution stability (p. 16 of MRID 51778715). The reviewer also noted that the ILV study report did not include any suggested ECM modifications.

4. The water characteristics including pH, hardness, and conductivity for the ECM test matrix (dilute, natural, filtered seawater) were not reported (p. 16 of MRID 51778739). The reviewer noted that the ILV water matrices did not include the ECM test matrix (dilute, natural, filtered seawater).

5. The submitted ILV MRID 51778715 was conducted to independently validate the method (Smithers Study No**.** 12709.6509) for epyrifenacil (S-3100; V-10456), S-3100-CA, and S-3100-CA-UR analysis water matrices. The ILV was based on the ECM MRID 51778739 with some insignificant modifications. The use of surface water and groundwater was not addressed as a test matrix in Smithers Study No**.** 12709.6509; however, the ECM study was performed with dilute, natural, filtered sea water. The test matrix was diluted to a salinity 20 ± 3% (p. 16 of MRID 51778739) and considered to be a more complicated test matrix. However, the ECM reported that the test matrix was "heated to the required test temperature" (p. 16 of MRID 51778739), but the required test temperature was not clearly defined. The reviewer assumed that this referred to the process of bringing the temperature of the test water sample to ambient temperature, but the ECM should be updated to clarify this statement or include the required test temperature.

6. The ILV included a list of correspondence between the ILV and the Study Monitor (Sponsor; Appendix 7, p. 145 of MRID 51778715) which referenced six correspondences between July 1, 2021 and September 29, 2021: Protocol Amendments 1-4, an email to the Study Monitor of July 7, 2021, and note that a summary of the validation data was sent to the Study Monitor on August, 17, 2021. The Study Monitor is listed as Shari Long, Study Sponsor Monitor (p. 3 of MRID 51778739). The ILV presented the details of the Protocol Amendments (p. 16 of MRID 51778715). Protocol Amendments 1-2 were issued prior to the experimental start of the ILV. Protocol Amendment 3 included updating an addresses and removal of a section from the report "Final Extract Refrigerated Storage Stability Assessment" because it was not required under the scope of the ILV. Protocol Amendment 4 was the addition of the required stock solution stability assessment. The details of these correspondence were not included in the study report; however, it did not appear that this correspondence impacted the integrity of the ILV.

7. The ECM and ILV were each performed by laboratories owned by Smithers ERS LLC (Smithers). The ECM was performed by Smithers in Wareham, Massachusetts; the ILV was performed by Smithers in Harrogate, United Kingdom (p. 1 of MRID 51778739 and p. 1 of MRID 51778715). The ILV appeared to be independent of the ECM as required

by the OCSPP 850.6100 guidelines regarding independent laboratory verification. There was no crossover of equipment, reagents, or study personnel. The study personnel at each laboratory were as follows (p. 6 of MRID 51778739 and p. 6 of MRID 51778715).

ECM Personnel	ILV Personnel
Study Director: Stephen DeVellis	Study Director: J. Mumford
Chemists: Jacob T. Moore, Nicholas A. Ferrier	Chemists: S. Bluemink, P. Pearson-Davies
Technical Report Writer: Matthew C. Driscoll	Director of Quality Assurance: I. Morrison
Vice President, NA Operations: Ronald C. Biever	

8. The ECM included an incomplete set of chromatograms (Figure 1-15, pp. 42-56 of MRID 51778739). The ECM only included one chromatogram for calibration, one control sample for each analyte (epyrifenacil, S-3100, V-10456; S-3100-CA; and S-3100-CA-UR), and one LOQ-level chromatogram for each matrix. The ECM should be updated to include a complete set of chromatograms.

9. The ILV made the following modifications to the ECM (Smithers ID: 12709.6509): 1) The equipment used differed from the equipment in the ECM. A Shimadzu Nexera series HPLC system was used coupled with a Sciex API 500 mass spectrometer (p. 25 of MRID 51778715). The LC settings including column specifications, the column temperature, the injection volume, and flow rate were the same as used in the ECM. The ECM and ILV list a rinse solvent as acetonitrile:methanol:purified reagent water (30:30:40; v:v:v). 2) ion spray voltage was 4500 V. 3) Dwell times of the transitions of were 100 msec. The ECM did not specify dwell times.

   The analytical modifications included the following: 1) changing the LC instrumentation; 2) ion spray voltage and dwell time change for the analytes. Overall, the ILV method (Smithers ERS ID: 3203100) was a suitable version of the ECM. The ECM allows for use of different instrumentation and optimization of parameters other than those specified as long as separation and sensitivity requirements are met (p. 16 of MRID 51778739).

10. In the ILV, the primary stock solutions of epyrifenacil (S-1300; V-10456) and S-3100-CA were determined to be stable over a period of 8 days (p. 33 and Tables 21-23, pp. 60-62 of MRID 51778715). The stock solution of S-3100-CA-UR was not stable over this period; the difference between old stock solution (>1 week) and fresh stock solution was *ca*. -33%. This finding did not affect the study because the fortification and calibration stock solutions were prepared on the same day as each other and were both diluted on the

same day as batch extraction; therefore, any degradation would have occurred on both solutions. The ECM did not evaluate the stability of stock or fortification solutions.

11. The ECM and ILV mean recoveries, standard deviation, and relative standard deviation were within guideline criteria (Tables 1-6, pp. 33-38 of MRID 51778739 and Tables 1-6, pp. 43-48 of MRID 51778715). There were three instances for which individual recoveries were outside of the recovery range 70-120% for the confirmation ion transition. One of the 10xLOQ-level fortification sample of epyrifenacil (S-3100; V-10465) had a recovery of 125%. The 10xLOQ-level and high-level fortification samples of S-3100-CA-UR had individual replicate recoveries of 65.1% and 67.0%, respectively. The mean recoveries for these fortification levels were within the guideline recovery range and did not affect the repeatability of the ECM validation.

12. The ILV reported Batch Fail errors due to poor calibration lines and peak shape for the groundwater and surface water analyses (Appendix 6, p. 144 of MRID 51778715); the error was corrected by cleaning the instrument prior to re-injection. A subsequent batch analysis passed. The reviewer could not verify the sequencing of the calibration checks; the dates of the correlation analyses were not included in the ILV.

13. Three attempts to confirm the correlation between original calibration solutions and freshly prepares stock solutions in the ILV failed (p. 144 of MRID 51778715). The study author indicated a possible error in preparation of the fresh stock solutions. The correlation check passed on the fourth attempt. The reviewer could not verify the sequencing of the correlation checks; the dates of the correlation analyses were not included in the ILV.

14. In the ECM, no significant matrix effects (<20%) were observed (p. 25 of MRID 51778739). There were no significant matrix effects observed in the ILV (pp. 34-39 of MRID 51778715). Matrix-matched calibrations were used in the ECM and ILV (p. 25 of MRID 51778739; and p. 31 of MRID 51778715). The ECM stated there is a potential for matrix issues to become a concern during testing as the test vessels experience aging over the course of the exposure.

15. The ILV reported that analysis of a batch (batch size not reported) could be completed in one working day (8 hours; p. 24 of MRID 51778715). The ECM did not report the time required to complete analysis of a batch.

V. References

U.S. Environmental Protection Agency. 2012. Ecological Effects Test Guidelines, OCSPP 850.6100, Environmental Chemistry Methods and Associated Independent Laboratory Validation. Office of Chemical Safety and Pollution Prevention, Washington, DC. EPA 712-C-001.

USEPA. 2012. *Environmental Chemistry Method Guidance*. Memorandum From D. Brady to Environmental Fate and Effects Division. December 20, 2012. Environmental Fate and Effects Division. Office of Pesticide Programs. Office of Chemical Safety and Pollution Prevention. U.S. Environmental Protection Agency. Available at: https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/environmental-chemistry-methods-guidance-pesticides.

40 CFR Part 136. Appendix B. Definition and Procedure for the Determination of the Method Detection Limit-Revision 1.11, pp. 344-347, and Revision 2; 2015 and 2016.

Attachment 1: Chemical Names and Structures

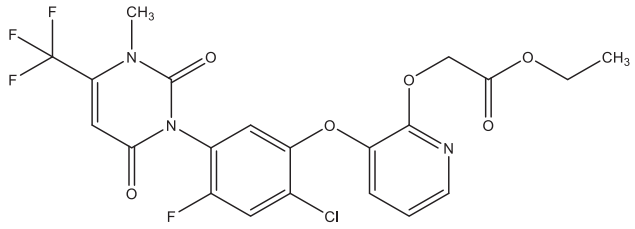
Epyrifenacil (S-3100; V-10456)

IUPAC Name: Ethyl [(3-{2-chloro-5-[3,6-dihydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)pyrimidin-1(2H)-yl]-4-fluorophenoxy}-2-pyridyl)oxy]acetate

CAS Name: Ethyl 2-[[3-[2-chloro-5-[3,6-dihydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)-1(2H)-pyrimidinyl]-4-fluorophenoxy]-2-pyridinyl]oxy]acetate

CAS Number: 353292-31-6

SMILES String: O=C(N1C2=CC(OC3=CC=CN=C3OCC(OCC)=O)=C(Cl)C=C2F)C=C(C(F)(F)F)N(C)C1=O



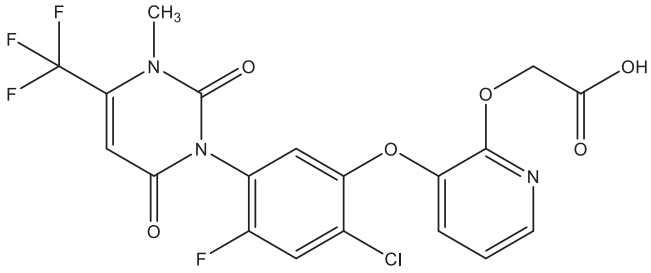
S-3100-CA

IUPAC Name: 2-((3-(2-Chloro-4-fluoro-5-(3-methyl-2,6-dioxo-4-(trifluoromethyl)-3,6-dihydropyrimidin-1(2H)-yl)phenoxy)pyridin-2-yl)oxy)acetic acid

CAS Name: Not reported

CAS Number: Not reported

SMILES String: O=C(N1C2=C(F)C=C(Cl)C(OC3=CC=CN=C3OCC(O)=O)=C2)C=C(C(F)(F)F)N(C)C1=O



S-3100-CA-UR

IUPAC Name:	2-((3-(2-Chloro-4-fluoro-5-(3-methylureido)phenoxy)pyridin-2-yl)oxy)acetic acid
CAS Name:	Not reported
CAS Number:	Not reported
SMILES String:	O=C(NC)NC1=C(F)C=C(Cl)C(OC2=CC=CN=C2OCC(O)=O)=C1