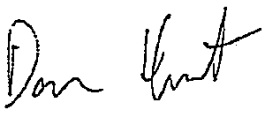
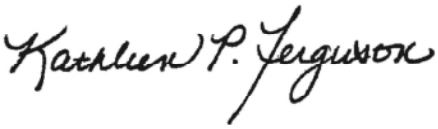
Test Material:	Fenoxaprop-P-ethyl
MRID:	48790002
Title:	An analytical method for the determination of fenoxaprop P-ethyl, AE F088406 and AE F054014 in water using LC/MS/MS.
MRID:	48800001
Title:	Independent laboratory validation of Bayer method FP-003-W11-01, "An analytical method for the determination of fenoxaprop P-ethyl, AE F088406, and AE F054014 in water using LC/MS/MS".
EPA PC Code:	129092
OCSPP Guideline:	850.6100

For Cambridge Environmental

Primary Reviewer: Dan Hunt **Signature:** 

Date: 1/11/13

Secondary Reviewer: Kathleen Ferguson **Signature:** 

Date: 1/11/13

QC/QA Manager: Joan Gaidos **Signature:** 

Date: 1/11/13

Data Requirement: EPA Guideline: 850.6100
OECD Data Point:

Page citations refer to MRID 48790002 (ECM) unless otherwise noted.
For MRID 48800001, the pages cited below appear in the bottom left corner of each page of the MRID.

Test material:
Common name: Fenoxaprop-P-ethyl
Chemical name:
IUPAC:

Primary Reviewer: _____ **Date: 9/24/2013**
[*Chuck Peck, Environmental Engineer, EFED, ERB 4*]

ANALYTICAL METHOD: EPA MRID No. 48790002. Netzband, D. 2012. An analytical method for the determination of fenoxaprop P-ethyl, AE F088406 and AE F054014 in water using LC/MS/MS. Report prepared by Bayer CropScience, Stilwell, Kansas, sponsored and submitted by Bayer CropScience, Research Triangle Park, North Carolina; 17 pages. Final report issued January 9, 2012.

INDEPENDENT LABORATORY VALIDATION: EPA MRID No. 48800001. Tauber, R. 2012. Independent laboratory validation of Bayer method FP-003-W11-01, "An analytical method for the determination of fenoxaprop P-ethyl, AE F088406, and AE F054014 in water using LC/MS/MS". Report prepared by ALS Environmental, Edmonton, Alberta, Canada, sponsored and submitted by Bayer CropScience, Stilwell, Kansas; 129 pages. Final report issued April 10, 2012.

EXECUTIVE SUMMARY

This environmental chemistry method (ECM) is designed for the quantitative determination of residues of fenoxaprop-P-ethyl and its metabolites AE F088406 and AE F054014 in water using an external standardization method. The method was developed by Bayer CropScience. An independent laboratory validation (ILV), performed by ALS Environmental in accordance with USEPA GLP requirements, was submitted with the method.

Method Summary: Water is diluted with methanol and analyzed directly for fenoxaprop-P-ethyl, AE F088406 and AE F054014 by liquid chromatography/mass spectrometry/mass spectrometry (LC/MS/MS, pp. 12-14). The ECM and ILV defined a limit of quantitation (LOQ) of 0.5 ng/mL for all analytes in water (p. 7; MRID 48800001, p. 8); a limit of detection (LOD) was not reported.

METHOD ACCEPTABILITY/DEFICIENCIES/CLARIFICATIONS

While the ECM outlined the method for analysis, it did not provide any method validation data, a limit of detection (LOD), justification for selection of the LOQ concentration, or representative chromatograms.

For the ILV, the LOD was also not reported, the matrix was not characterized (other than reporting the source), calibration curves and equations were not provided, and representative chromatograms of reagent blanks were not provided.

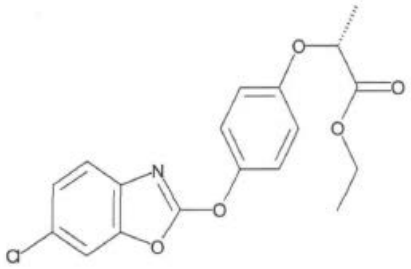
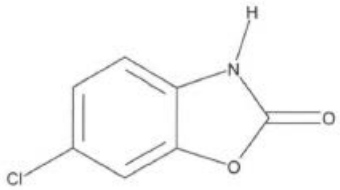
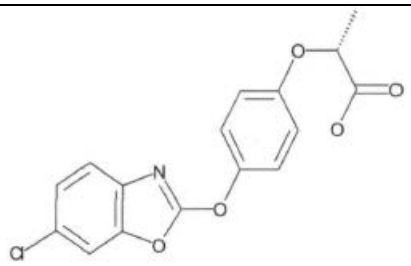
The Agency finds that this method meets the criteria for a scientifically valid method. The study is **unacceptable but upgradeable** for residues of fenoxaprop-P-ethyl and its products AE F088406 and AE F054014 in water. If the deficiencies noted above are corrected, the study may be upgraded.

COMPLIANCE

This method was conducted according to OPPTS 860.1340 and is not an experimental study, therefore, USEPA GLP Standards 40 CFR, Part 160 do not apply (pp. 1, 3). Signed and dated statements of Data Confidentiality, GLP and Certificate of Authenticity were provided (pp. 2-4).

A. BACKGROUND INFORMATION

No background information was provided.

TABLE A.1. Test Compound Nomenclature	
Parameter	**Value**
Common name	**Fenoxaprop-P-ethyl**
Company experimental name	
IUPAC name	Not reported.
CAS Name	Ethyl (2R)-2-[4-[(6-chloro-2-benzoxazolyl)oxy]phenoxy]propanoate.
CAS #	71283-80-2.
Structure	
Common name	**AE F054014**
Company experimental name	6-Chloro-1,3-benzoxazolone.
IUPAC name	Not reported.
CAS Name	6-Chloro-2(3H)-benzoxazolone.
CAS #	19932-84-4.
Structure	
Common name	**AE F088406**
Company experimental name	Fenoxaprop-P.
IUPAC name	Not reported.
CAS Name	(2R)-2-[4-[(6-chloro-2-benzoxazolyl)oxy]phenoxy]propanoic acid.
CAS #	113158-40-0.
Structure	

Information obtained from Appendix 2, pp. 15-16 of the study report and MRID 48800001, p. 9.

TABLE A.2. Physicochemical Properties of the Technical Grade Test Compound	
Parameter	**Value**
Melting point/range (ºC)	Not reported.
pH	Not reported.
Density (g/cm^3)	Not reported.
Water solubility at 20ºC (mg/L)	Not reported.
Solvent solubility at 20ºC (mg/L)	Not reported.
Vapor pressure at __ºC (torr)	Not reported.
Dissociation constant (pK_a)	Not reported.
Octanol/water partition coefficient	Not reported.
UV/visible absorption spectrum (nm)	Not reported.

B. MATERIALS AND METHODS

B.1. Principle of Method

Water is analyzed directly for fenoxaprop-P-ethyl, AE F088406 and AE F054014, following dilution with methanol, by liquid chromatography/mass spectrometry/mass spectrometry (LC/MS/MS) with electrospray ionization (pp. 7, 9, 12-14). For each analyte, two ion transitions are monitored for quantitation (primary) and confirmation (secondary, pp. 12-14).

TABLE B.1. Summary Parameters for the Analytical Method Used for the Quantitation of Chemical Residues in Matrices Studied

<table>
<tr><th>Parameter</th><th>Value</th></tr>
<tr><td>Method ID</td><td>Bayer Method FP-003-W11-01 (p. 1)</td></tr>
<tr><td>Analyte(s)</td><td>Fenoxaprop-P-ethyl, AE F088406 and AE F054014 (p. 7).</td></tr>
<tr><td>Extraction solvent/technique</td><td>Transfer 30 ± 0.1 mL of water into a stoppered 100 mL measuring cylinder. Dilute to 100 mL with methanol, cap and shake measuring cylinder.</td></tr>
<tr><td>Cleanup strategies</td><td>None.</td></tr>
<tr><td>Instrument/Detector</td><td>Applied Biosystems API 4000 LC/MS/MS with a Phenomenex® Luna C18(2)-HST column (50 x 2.00 mm) and electrospray ionization (p. 7; Appendix 1, p. 12). HPLC retention times of ca. 5.2 minutes for fenoxaprop-P-ethyl, ca. 5.1 minutes for AE F088406 and ca. 3.4 minutes for AE F054014 (Appendix 1, pp. 12-13).
Mobile Phase A: Water/Methanol 90:10 (v/v) with 10mmol/L ammonium formate and 120µL formic acid/L
Mobile Phase B: Methanol/Water 90:10 (v/v) with 10mmol/L ammonium formate and 120µL formic acid/L
<table>
<tr><th>Time (min)</th><th>Flowrate (mL/min)</th><th>A (%)</th><th>B (%)</th></tr>
<tr><td>0</td><td>0.5</td><td>95</td><td>5</td></tr>
<tr><td>0.5</td><td>0.5</td><td>95</td><td>5</td></tr>
<tr><td>2.5</td><td>0.5</td><td>5</td><td>95</td></tr>
<tr><td>6.0</td><td>0.5</td><td>5</td><td>95</td></tr>
<tr><td>7.0</td><td>0.5</td><td>5</td><td>95</td></tr>
<tr><td>7.1</td><td>0.5</td><td>95</td><td>5</td></tr>
<tr><td>8.0</td><td>Stop</td><td></td><td></td></tr>
</table>
ILV: Same as ECM, except with slight modifications of instrument operating conditions (MRID 48800001, pp. 11, 14). HPLC retention times of ca. 3.8 minutes for fenoxaprop-P-ethyl, ca. 3.8 minutes for AE F088406 and ca. 2.95 minutes for AE F054014 (MRID 48800001, pp. 12-13).
Mobile Phase A: Water/Methanol 90:10 (v/v) with 10mmol/L ammonium formate and 120µL formic acid/L
Mobile Phase B: Methanol/Water 90:10 (v/v) with 10mmol/L ammonium formate and 120µL formic acid/L
<table>
<tr><th>Time (min)</th><th>Flowrate (mL/min)</th><th>A (%)</th><th>B (%)</th></tr>
<tr><td>0</td><td>0.5</td><td>95</td><td>5</td></tr>
<tr><td>2.5</td><td>0.5</td><td>5</td><td>95</td></tr>
<tr><td>6.0</td><td>0.5</td><td>5</td><td>95</td></tr>
<tr><td>7.0</td><td>0.5</td><td>5</td><td>95</td></tr>
<tr><td>7.1</td><td>0.5</td><td>95</td><td>5</td></tr>
<tr><td>8.0</td><td>Stop</td><td></td><td></td></tr>
</table></td></tr>
</table>

Information obtained from pp. 1, 7; Appendix 1, pp. 12-13 of the study report and MRID 48800001, pp. 11-14.

C. RESULTS AND DISCUSSION

C.1. Recovery Results Summary

TABLE C.1. Recovery Results from Method Validation for the Determination of Fenoxaprop-P-ethyl, AE F088406 and AE F054014 in Water

Analyte	Spiking Level (µg a.i.)	Mean Recoveries Obtained (%)	Relative Standard Deviation
Fenoxaprop-P-ethyl	--	--	--
	--	--	--
AE F088406	--	--	--
	--	--	--
AE F054014	--	--	--
	--	--	--

-- = Not reported.

C.1.1. Method Characteristics

TABLE C.2. Method Characteristics

Parameter	Value
Analyte(s)	Fenoxaprop-P-ethyl, AE F088406 and AE F054014 (p. 7).
Limit of Quantitation (LOQ)	0.5 ng/mL (p. 7)
Limit of Detection (LOD)	Not reported.
Accuracy/Precision at LOQ	ECM: Performance data were not reported.
Reliability of the Method/[ILV]	Acceptance criteria were met at the LOQ and 10 x LOQ for all analytes in water (both primary and confirmation ions), with matrix spike recoveries ranging between 70% to 120% and relative standard deviation of ≤20% (MRID 48800001, Tables 1-3, pp. 15-17). Time required per validation sample set was reported as 8 hours (MRID 48800001, p. 19).
Linearity	ECM: No information provided. ILV: Linear regression; $r^2 = 1.0$ for fenoxaprop-P-ethyl; $r^2 = 1.0$ for AE F088406; $r^2 = 1.0$ for AE F054014 (developed by reviewer and included as DER Attachment 1).
Specificity	ECM: Could not be evaluated because only an example chromatogram was provided (Appendix 3, p. 17). ILV: Matrix blank controls showed no significant interferences at the retention times of the three analytes (MRID 48800001, Appendix 1, pp. 57, 60, 63, 66, 69 and 72). Method (reagent) controls were not provided.

Information obtained from p. 7; Appendix 3, p. 17 of the study report; MRID 48800001, p. 19; Tables 1-3, pp. 15-17; Appendix 1, pp. 57, 60, 63, 66, 69 and 72; and DER Attachment 1.

C.2. Independent Laboratory Validation (ILV)

The ILV was conducted according to OPPTS 850.7100 and 860.1340 (MRID 48800001, p. 1). Signed and dated statements of Data Confidentiality, GLP (40 CFR, Part 160), Quality Assurance and Certification of Authenticity were provided (MRID 48800001, pp. 2-5).

TABLE C.3. Recovery Results of the Method Obtained by an Independent Laboratory Validation for the Determination of Fenoxaprop-P-ethyl in River Water (n = 5)[1]

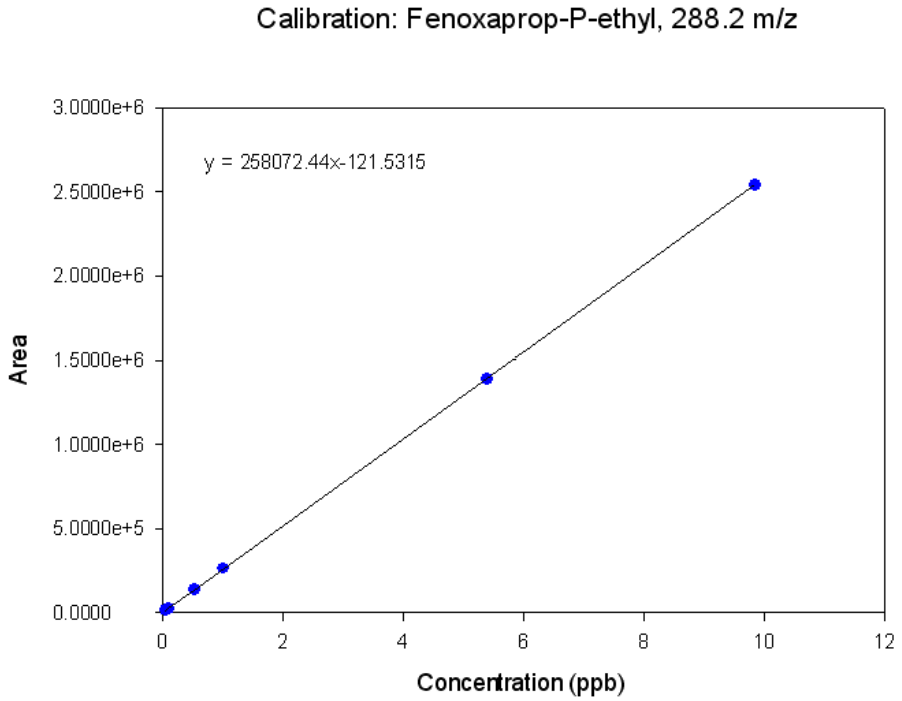
Analyte	Spiking Level (µg a.i./kg)	Ion Monitored	Mean Recoveries Obtained (%)	Relative Standard Deviation
Fenoxaprop-P-ethyl	0.500 (LOQ)	288.2	98.4	4.38
		77.0	94.2	9.62
	5	288.2	93.6	4.31
		77.0	94.4	4.92
AE F088406	0.500 (LOQ)	259.9	108	5.67
		152.0	114	4.67
	5	259.9	101	2.26
		152.0	99.2	3.55
AE F054014	0.500 (LOQ)	131.8	104	5.43
		76.0	100	6.13
	5	131.8	100	1.87
		76.0	101	1.73

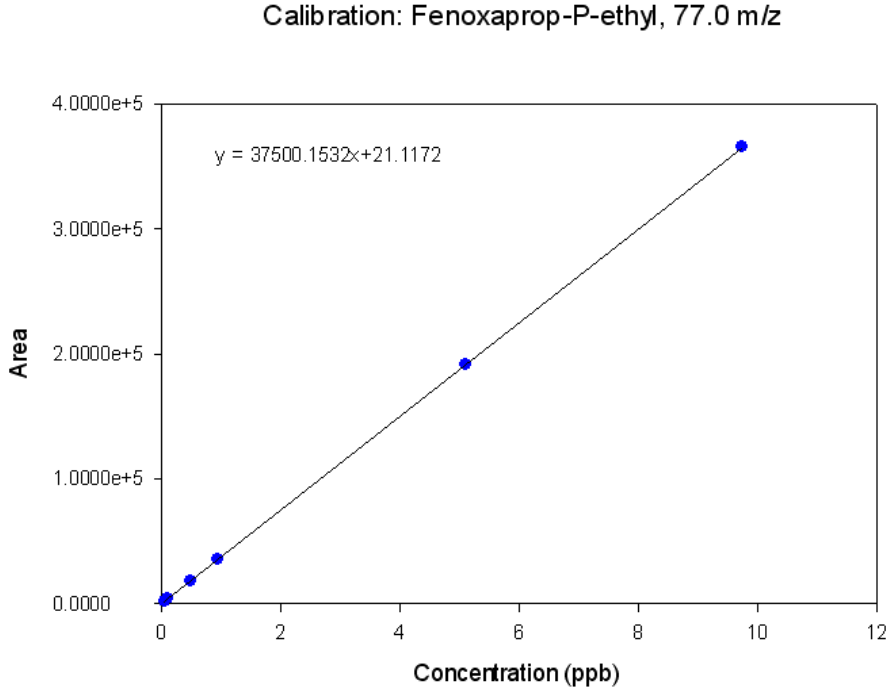
Information obtained from MRID 48800001, Tables 1-3, pp. 15-17.
1 Surface river water sample obtained from Speed River in Guelph, Ontario, Canada (MRID 48800001, p. 8).

D. CONCLUSION

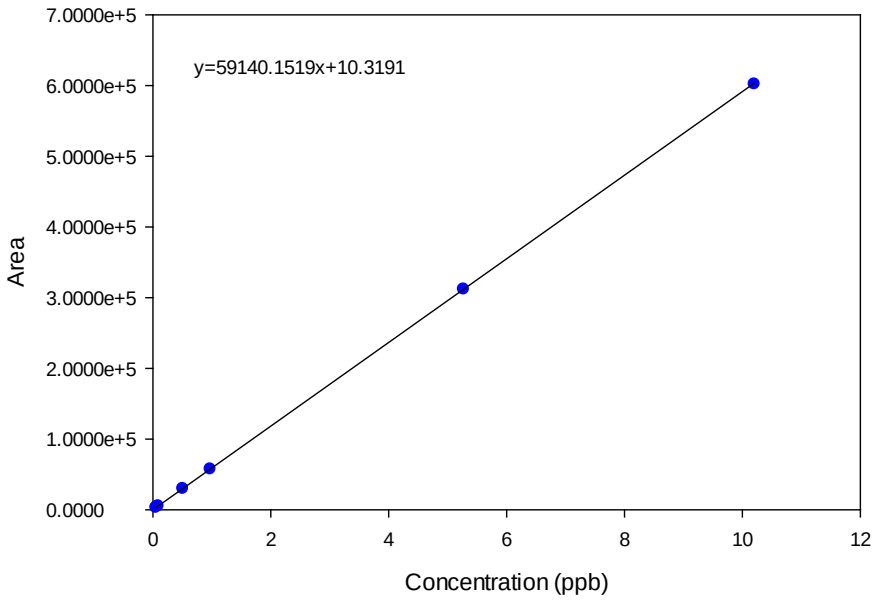
This method is designed for the quantitative determination of residues of fenoxaprop-P-ethyl and its products AE F088406 and AE F054014 in water. The Agency finds that this method meets the criteria for a scientifically valid method. The study is classified as **unacceptable but upgradeable** for residues of fenoxaprop-P-ethyl and its products AE F088406 and AE F054014 in water. The ILV demonstrated acceptable performance data at the LOQ and 10 x LOQ. The matrix was not characterized.

Attachment 1. Linearity estimates from ILV (developed by reviewer)

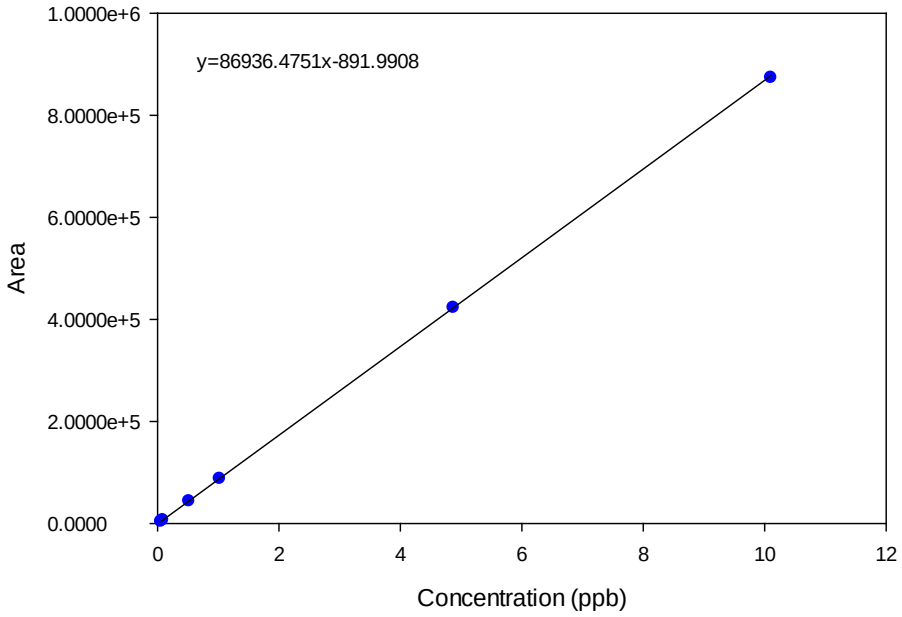




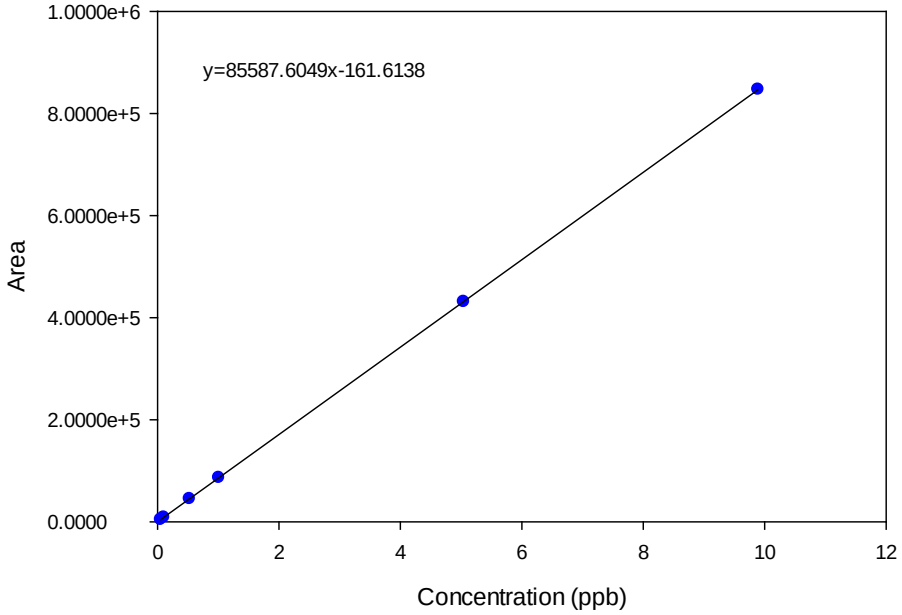
Calibration: AE F088406 259.9 m/z



Calibration: AE F088406 152.0 m/z



Calibration: AE F05401 131.8 m/z



Calibration: AE F054014 76.0 m/z