UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDE PROGRAMS
ENVIROMENTAL CHEMISTRY LABORATORY
BUILDING 1105—JOHN C. STENNIS SPACE CENTER
STENNIS SPACE CENTER, MISSISSIPPI 39529-6000
TELEPHONE (228) 688-3216 FACSIMILE (228) 688-3536

May 3 , 2002

MEMORANDUM DP Barcode: D269902

SUBJECT: Cyhalofop-butyl Method Review-Report No. ECM0198S1-5

FROM: Aubry E. Dupuy, Jr., Branch Chief Aubry E. Dupuy, Jr.
OPP/BEAD/Environmental Chemistry Laboratory

TO: Hardip Singh (7507C)
OPP/Environmental Fate and Effects Division
Environmental Risk Branch

The BEAD/Environmental Chemistry Laboratory has performed an Environmental Chemistry Method Review (ECMR) on Cyhalofop-butyl and its metabolites in soil using the method, "Validation Report for the Determination of Residues of Cyhalofop-butyl and Metabolites in Sediment and Soil by Liquid Chromatography with Mass Spectrometry Detection".

The attached method review report includes three parts:

Part I: Summary and Conclusions

In this section ECL's opinion of the acceptability and performance of the method is presented.

Part II: Discussion of Problems Found During Method Review

A discussion of minor deficiencies discovered during review or any modifications made by the independent lab.

Part III: Summary of Performance Data by Registrant and ILV

In this section the individual results of each sample at each spiking level of each analyte are listed. The arithmetical means and descriptive statistics for each spiking level are also presented here. A completed SEP check-list is attached.

If you have questions concerning this report, please contact Charles Kennedy at (228) 688-2443 or Aubry Dupuy at (228) 688-3212.

cc: Christian Byrne, QA Officer
BEAD/ECL

Charles Kennedy
BEAD/ECL

Environmental Chemistry Method Review Report

Validation Report for the Determination of Residues of Cyhalofop-butyl and Metabolites in Sediment and Soil by Liquid Chromatography with Mass Spectrometry Detection

Report Number ECM0198S1-5

Environmental Chemistry Laboratory
Biological and Economic Analysis Division

May 3, 2002

Prepared by: Charles Kennedy Charles Kennedy 05/03/02
ECL Chemist Signature Date

Reviewed by: Christian Byrne Christian Byrne 05/13/02
ECL/QA Officer Signature Date

TABLE of CONTENTS

Part 1

Summary and Conclusions

The Environmental Chemistry Laboratory (ECL) has completed the Environmental Chemistry Method Review (ECMR) for Cyhalofop-butyl and its metabolite in soil. The performing laboratory was Dow AgroSciences LLC of Indianapolis, Indiana. The independent laboratory validation (ILV) was performed by ABC Laboratories, Inc., Columbia, Missouri. The MRID number is #452040-04 and the method used for the ECMR is entitled - **Validation Report for the Determination of Residues of Cyhalofop-butyl and Metabolites in Sediment and Soil by Liquid Chromatography with Mass Spectrometry Detection.**

From the review of the registrant and the independent laboratory validation (ILV) data, ECL concludes that this method appears to be sound and reliable and can be used to determine Cyhalofop-butyl (as Cyhalofop-acid) and the metabolites Cyhalofop-amide and Cyhalofop-diacid in anaerobic sediment and aerobic soil with acceptable precision and accuracy. The anaerobic metabolite Cyhalofop-FHPBA accuracy for the registrant was 50.9% (LOQ) and the ILV laboratory had a lower average recovery of 6.2% (LOQ) for this same metabolite. Both laboratories produced average recoveries which were unacceptable within the protocol range of 70 to 120%. It was concluded that the Cyhalofop-acid, Cyhalofop-amide, and Cyhalofop-diacid can be successfully detected and quantitated by this method.

The limit of detection (LOD) for Cyhalofop-butyl and the metabolites in soil is 3.0 ng/g (3.0 ppb) from the data provided by the registrant. The registrant determined the limit of quantitation (LOQ) to be 10.0 ng/g (10.0 ppb). The accuracy and precision results between the registrant and ILV (ABC Laboratory) at various spiking concentrations were comparable. The AgroSciences LLC Company demonstrated average percent recoveries at 10.0 ng/g (LOQ) and 50 ng/g (5 x LOQ) for Cyhalofop-acid, Cyhalofop-amide, Cyhalofop-diacid, and Cyhalofop-FHPBA of 86.6, 87.6, 91.8, and 50.9%, respectively, at the LOQ and 90.2, 87.6, 81.6, and 52.1%, respectively, at the 5 x LOQ. The ABC laboratory demonstrated average percent recoveries at 10.0 ng/g (LOQ) and 100 ng/g (10 x LOQ) for Cyhalofop-acid, Cyhalofop-amide, Cyhalofop-diacid, and Cyhalofop-FHPBA of 82.4, 92.0, 73.0, and 6.2%, respectively, at the LOQ and 91.1, 94.0, 80.0, and 28.0%, respectively, at 10 x LOQ. The complete precision/accuracy data for Cyhalofop-butyl and its metabolites for the registrant and the independent validation laboratory are shown in Part III - Summary of Performance Data.

Residues of Cyhalofop-butyl and its major metabolites are extracted from soil using a 90% acetone/10% 1.0 N hydrochloric acid solution. An aliquot (8 mL) of extract is concentrated to remove the acetone and is then diluted with 0.1 N sodium hydroxide to hydrolyze any cyhalofop-butyl to cyhalofop-acid. Following hydrolysis, the sample is acidified with hydrochloric acid and then extracted with a 60% 1-chlorobutane/40% methy-tert-butyl ether (MTBE) solution. The 1-chlorobutane/MTBE solution is evaporated to dryness, and the residue reconstituted with an

89.5% hexane/10% acetone/0.5% formic acid solution. This solution is purified using a silica gel solid-phase extraction (SPE) and the column eluate is then evaporated to dryness. The residue is reconstituted with HPLC mobile phase containing compound X-460511 as an internal standard and then analyzed by HPLC with mass spectrometry detection (LC/MS).

Part II

Discussion of Problems Found During Method Review

There were no major problems with the method and the registrant is commended on the completeness of the validation. The registrant's method was validated over the concentration range of 10-1000 ng/g with validated limit of quantitation of 10 ng/g for Cyhalofop-acid, Cyhalofop-amide, and Cyhalofop-FHPBA, and 16 ng/g for Cyhalofop-diacid. The average recoveries were within the acceptable range of 70 to 120%, except for Chyhalofop-FHPBA, which had a average recovery of 50.9% (LOQ). Because of the low standard deviation for FHPBA, the registrant felt consistent and acceptable results could be obtained using this method.

The ILV laboratory report suggested the registrant should add specifications regarding what type of calibration is to be used, along with formulae to calculate residue values and recovery values. Recoveries for Chyhalofop-FHPBA were unacceptably low at both the 10 ppb and 100 ppb fortification levels. The ILV laboratory was informed by the registrant that Cyhalofop-FHPBA was an unimportant soil metabolite and the study could be terminated reporting the low recovery values already generated. It is also recommended that the LC-MSD section of the registrant's method describe the expected retention times and ions to be acquired for each compound. Also, an explanation of why a hydrolysis step (converting Cyhalofop-butyl to Cyhalofop-acid) was included in the method would be useful.

Part III

Summary of Performance Data

REGISTRANT AND ILV PERFORMANCE DATA FOR CYHALOFOP-BUTYL AND METABOLITES

Method: **Determination of Residues of Cyhalofop-butyl and Metabolites in Sediment and Soil by LC/MS**

Dow AgroScience LLC (Registrant)
Cyhalofop-butyl - **LOQ (10.0 ng/g)**

Analyte	Number	High Value	Low Value	Average	RSD
Cyhalofop-acid	49	103	62.0	83.6	10.0
Cyhalofop-amide	48	112	72.0	87.6	9.2
Cyhalofop-diacid	49	135	61.0	91.8	17.1
Cyhalofop-FHPBA	49	76.0	33.0	50.9	17.9

ILV - ABC Laboratory
Cyhalofop-butyl - **LOQ (10 ng/g)**

Analyte	Number	High Value	Low Value	Average	RSD
Cyhalofop-acid	5	90.7	74.0	82.4	7.99
Cyhalofop-amide	5	95.0	88.0	92.0	2.9
Cyhalofop-diacid	5	81.0	65.0	73.0	9.7
Cyhalofop-FHPBA	5	12.0	0.00	6.2	95.0

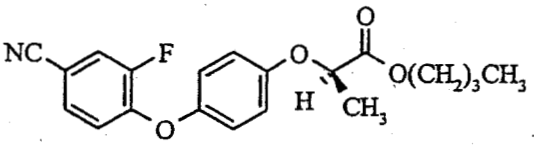
Dow AgroScience LLC (Registrant)
Cyhalofop-butyl - **5 x LOQ (50 ng/g)**

Analyte	Number	High Value	Low Value	Average	RSD
Cyhalofop-acid	25	109	79.0	90.2	7.7
Cyhalofop-amide	25	114	79.0	87.6	9.1
Cyhalofop-diacid	25	96.0	61.0	81.6	7.8
Cyhalofop-FHPBA	25	72.0	38.0	52.1	16.0

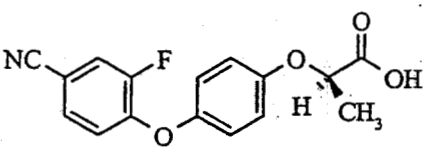
ILV - ABC Laboratory
Cyhalofop-butyl - **10 x LOQ (100 ng/g)**

Analyte	Number	High Value	Low Value	Average	RSD
Cyhalofop-acid	5	95.3	87.9	92.3	3.2
Cyhalofop-amide	5	94.0	90.0	92.0	2.0
Cyhalofop-diacid	5	94.0	74.0	73.0	9.7
Cyhalofop-FHPBA	5	28.0	21.0	25.0	11.0

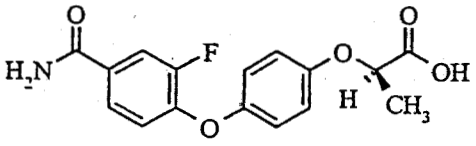
Appendix A: Chemical Structures



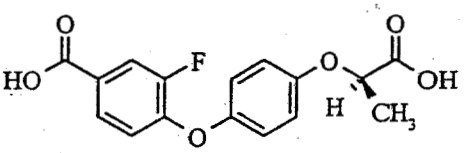
Cyhalofop-butyl
CAS No. 122008-85-9



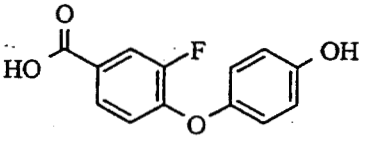
Cyhalofop-acid
CAS No. 122008-78-0



Cyhalofop-amide
CAS No. Unavailable



Cyhalofop-diacid
CAS No. Unavailable



Cyhalofop-FHPBA
CAS No. Unavailable

Appendix B: Checklist for Cyhalofop-butyl and its Metabolites in Soil

ENIVIRONMENTAL CHEMISTRY METHODS (ECMs) PROGRAM
STANDARD EVALUATION PROCEDURE (SEP) CHECKLIST
BACKGROUND AND INITIAL REVIEW INFORMATION

I. Background Information

A. Title of Method Validation Report for the Determination of Residues of Cyhalofop-butyl and Metabolites in Sediment and Soil by Liquid Chromatography with Mass Spectrometry Detection

B. ECS No. ECM 0198S1-S5

C. MID or TRID No. 450005-23

D. Matrix (es) Soil and Sediment

E. Analyte (es) detected Cyhalofop-butyl (acid equivalent Cyhalofop-acid), Cyhalofop-amide, Cyhalofop-diacid, Cyhalofop-FHPBA

II. Information About the Laboratory

A. Name Dow AgroSciences

B. Address 9330 Zionsville Road, Indianapolis, Indiana 46268-1054

C. Telephone No. (317) 337-3535

D. Name of the Study Director E. L. Olberding

E. Name of the Lead Chemists L.T. Yeh, D. O. Duebelbeis, D. R.Foster

F. Laboratory Validation: Primary X Secondary _____

III. Method Summary Information for Analyte (s) _____

A. Is the Method CLASSIFIED or CONFIDENTIAL No

B. Sample Preparation 5.0 grams soil or sediment weighed into 40 mL vial

C. Sample Extraction Cyhalofop-butyl and its metabolites are extracted using a 90% acetone/10% 1.0 N HCL solution. 8 mL aliquot is concentrated to remove the acetone and is then diluted with 0.1 N sodium hydroxide to hydrolyze any cyhalofop-butyl to cyhalofop-acid. The sample is then acidified with HCL and then extracted with a 60% 1-chlorobutane/40% methyl-tert-butyl ether (MTBE) solution. The 1-chlorobutane/MTBE solution is is evaporated to dryness and reconstituted with 89.5% hexane/10% acetone formic acid solution. This solution is purified using silica gel SPE and the column eluate is then evaporated to dryness. Residue is reconstituted with HPLC mobile phase containing compound X-460511 as an internal standard and analyzed by HPLC with LC/MS.

D. Sample Cleanup Silica gel solid-phase extraction (SPE)

E. Sample Derivatization (If Applicable) None

F. Sample Analysis

1. Instrumentation Hewlett Packard Mass Spectrometer-Model 1100

2. Primary Column ZORBAX RX C8 reversed-phase, 12.5 mm x 4.6 mm i.d.

3. Confirmatory Column N/A

4. Detector LC/MSD

5. Other Confirmatory Techniques MS/Model API2000, Perking Elmer/Sciex

6. Other Relevant Information N/A

G. Detection and Quantitation Limits

1. Limits of Quantitation (LOQ)

Claimed in Method 10.0 ng/g (ppb) Estimated 10.0 ng/g (ppb)

2. Method Detection Limit (MDL)

Claimed in Method 3.0 ng/g (ppb) Estimiated 3.0 ng/g (ppb)

H. Recovery (Accuracy) Data : The mean recoveries, SD, and RSD's

LOD- 3.0ng/g Cyhalofop-acid, SD-2.5
LOQ- 10.0 ng/g Cyhalofop-acid, 83.6%, SD-8.4, RSD-10.0
5 x LOQ- 50ng/g Cyhalofop-acid, 90.2%, SD-6.9, RSD-7.7
50 x LOQ- 500ng/g Cyhalofop-acid, 89.7 %, SD-5.4, RSD-6.0

LOD- 3.0ng/g Cyhalofop-amide, SD-2.4
LOQ- 10.0ng/g Cyhalofop-amide, 87.6%, SD-8.1, RSD-9.2
5 x LOQ- 50ng/g Cyhalofop-amide, 87.6%, SD-8.0, RSD-9.1
50 x LOQ-500ng/g Cyhalofop-amide, 85.9%, SD-8.8, RSD-10.2

LOD-3.0ng/g Cyhalofop-diacid, SD-4.7
LOQ-10ng/g Cyhalofop-diacid, 91.8%, SD-15.7, RSD-17.1
5 x LOQ- 50ng/g Cyhalofop-diacid, 81.6%, SD-6.4, RSD-7.8
50xLOQ-500ng/g Cyhalofop-diacid, 80.7%, SD-5.7, RSD-7.0

LOD-3.0ng/g Cyhalofop-FHPBA, SD-2.6
LOQ-10.0ng/g Cyhalofop-FHPBA, 50.9%, SD-8.8, RSD-17.2
5 x LOQ-50ng/g Cyhalofop-FHPBA, 52.1%, SD-8.3, RSD-16.0
50x LOQ-500ng/g Cyhalofop-FHPBA, 53.8%, SD-7.0, RSD-13.0

I. Precision Data See Recovery Data (H.) for Precision Data

Review

IV. Detailed Information about the Method	Yes	No	Review Futher
A. Is the Method marked CONFIDENTIAL?		X	

	Yes	No	Review Futher
B. Is it the most up-to-date method?	X	____	_____
C. Does the method require spiking with the analyte (s) of interest?	X	____	_____
D. If the method requires spiking explosive or carcinogenic reagents, are proper precautions explained?	X	____	_____
E. Is the following information supplied?			
1. Detailed stepwise description of			
a. The sample preparation procedure	X	____	_____
b. The sample spiking procedure	X	____	_____
c. The extraction procedure	X	____	_____
d. The derivatization procedure	X	____	_____
e. The cleanup procedure	X	____	_____
f. The analysis procedure	X	____	_____
2. Procedures for			
a. Preparation of standards	X	____	_____
b. Calibration of instrument	X	____	_____
3. List of glassware and chemicals			
a. Are sources recommended	X	____	_____
b. Are they commercially available?	X	____	_____
4. Name model, etc., of the instrument, column, detector, etc., used			
a. Are sources recommended?	X	____	_____
b. Are they commercially available?	X	____	_____

	Yes	No	Review Futher
5. MDL			
a. Is there an explanation of how it was calculated?	X		
b. Is it a scientifically accepted procedure?	X		
c. Is the matrix blank free of interference(s) at the retention time, wavelength, etc., of the analyte(s) of intrest?	X		
6. LOQ			
a. Is there an explanation of how it was calculated?	X		
b. Is it a scientifically accepted procedure?	X		
7. Precision and accuracy data			
a. Were there an adequate number of spiked samples analyzed?	X		
b. Are the mean recoveries between 70-120%? *Cyhalofop-FHPBA, 51-54%	*X		
c. Are the RSDs of the replicates 20% or less at the LOQ, or above?	X		
8. Description and/or explanation of			
a. Areas where problems may be encountered?	X		
b. Steps that are critical?	X		
c. Interferences that may be encountered?	X		
9. Characterization of the matrix(es)	X		

V. Respresentative Chromatograms

	Yes	No	Review Futher
A. Are there representative Chromatograms for			
1. Analyte(s) in each matrix at the MDL, LOQ, and 10 x LOQ?	*X	____	____
2. Method blanks?	X	____	____
3. Matrix blank?	X	____	____
4. Standard curves?	X	____	____
5. Standards that can be used to recalculate some of the values for analyte(s) in the sample chromatograms?	X	____	____
*LOQ only			
B. Can the responses of the analyte(s) in the chromatograms of the spiking level be accurately measured?	X	____	____
VI. Good Laboratory Practice Standards (GLP)			
A. Is there a statement of adherence to the FIFRA/GLP?	X	____	____
VII. Independent Lab Validation (ILV)			
A. Was an ILV performed?	X	____	____
B. Did the ILV's percision/accuracy data meet the criteria established on page 3 of the Data Reporting Guidelines (OPP-00405) FRL-4943-5)?	X	____	____
C. Were recommendations of major or min or modifications to the method made by the independent lab performing the ILV? If major modifications were suggested, what were they?	____	X	____

_____

_____

_____

VIII. Completeness	Yes	No	Review Further
A. Has enough information been supplied to do a proper review?	X		
B. Has enough information been supplied to do a laboratory evaluation, if requested?	X		
C. Are all steps in the method scientifically sound?	X		
D. Is a confirmatory method or technique provided?		X	
E. Check the category below which best describes this ECM.			
1. Satisfactory	X		
2. Major Deficiencies			
3. Minor Deficiencies			

Recommendations

This study provides a acceptable residue method for Cyhalofop-butyl and metabolites in sediment and soil. Overall, the method appears satisfactory with the data being used to support the original method "Determination of Residues of Cyhalofop-butyl and Metabolite in Sediment and Soil by Liquid Chromatography with Mass Spectrometry Detection". With the information available from the original method, it is felt a method review can be preformed.

Name (print) and Signature of Reviewer: Charles D. Kennedy / Charles D. Kennedy

Date Initial Review was Assigned: February 28, 2002

Date Initial Review was Completed: March 18, 2002

Date Final Review was Completed: _____

Signature of Laboratory Chief: _____

Name (s) (print) and Signature (s) of Other Reviewers: Henry Shoemaker, Henry Shoemaker,

_____