UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDE PROGRAMS
ENVIRONMENTAL CHEMISTRY LABORATORY
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January16, 2007

MEMORANDUM

SUBJECT: Flucarbazone sodium (EPA DP Barcode #332765)

FROM: Joseph B. Ferrario, Branch Chief
BEAD/Environmental Chemistry Laboratory

TO: Cara Dzubow ECM Gatekeeper
EISB 7507P

The Environmental Fate and Effects Division (EFED) has requested an Environmental Chemistry Method Review on Flucarbazone sodium (MKH 6562) in ground water using the method submitted by Arysta Life Science North America Corporation in accordance with the registration of the above mentioned analyte and its metabolites, MRID No. 469261-02. The method validation data was reviewed and the conclusions included in the attached Environmental Chemistry Method Review Report.

The following report includes an overview of the method and the method completeness, statements of adherence to EPA regulations, a presentation of results and a discussion of problems found in the registrant method. A statement of method acceptability is also included.

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

Attachments
cc: Christian Byrne, QA Officer
BEAD/Environmental Chemistry Laboratory

Charles Kennedy
BEAD/Environmental Chemistry Laboratory

FEBL

Flucarbazone sodium in Water/114009/Arysta Life Science/66330
ENVIRONMENTAL CHEMISTRY METHOD REVIEW REPORT

Data Requirement: PMRA Data Code: NA
EPA DP Barcode: - DP332765
OECD Data Point: NA
EPA Guideline: ECM Method Review

Test material:
Common name: Flucarbazone sodium (MKH 6562)

Chemical name: 4,5-dihydro-3-methoxy-4-methyl-5-oxo-N-[[2-(trifluoromethoxy) phenyl] sulfonyl]-1H-1,2,4-triazole-1-carboxamide, sodium salt

IUPAC: Sodium N-(trifluoromethohoxy-sulfonyl)-4,5-dihydro-3-methoxy-4-Methyl-5-oxo-1H-1,2,4-triazole-1-carboxamide

CAS No: 181274-17-9

Chemical Family: Sulfonylurea

Primary Evaluator: Charles Kennedy **Date:** 11/28/06
Charles Kennedy, Chemist, EPA/OPP/BEAD/ECB

Peer Reviewer: Shanda Bennett **Date:** 11/28/06
Shanda Bennett, Chemist, EPA/OPP/BEAD/ECB

QA Officer: Christian Byrne **Date:** 12/11/06
Dr. Christian Byrne, EPA/OPP/BEAD/ECB

ANALYTICAL METHOD: 469261-02, C. K. Lam, R. B. Morby and W. M. Leimkuehler, November 03, 1999, *"Analytical Method for the Determination of MKH 6562 and Three Metabolites in Ground Water by High-Performance Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS)"*. The unpublished study was conducted by Bayer Corporation Agriculture Division of Stilwell, Kansas and sponsored by Bayer Corporation Agriculture Division at P. O. Box 4913, Kansas City, Missouri. The document study is Bayer Corporation #108919.

EXECUTIVE SUMMARY

The method is applicable for the quantitative determination of residues of MKH 6562 and three of its three metabolites in ground water by LC/MS/MS. The metabolites measured included MKH 6562 sulfonic acid, MKH 6562 sulfonamide and N,O-dimethyltriazolinine (NODT).

The method was submitted to EPA to support studies performed to seek registration for Flucarbazone (MKH 5730) MKH 6562 acid. The method was created by Bayer Agriculture in Stilwell, Kansas and independently validated by ALS Laboratory Group, Environmental Division in Edmonton, Alberta T6E OP5 Canada in accordance with EPA's Good Laboratory Practice Standards, Title 40 Code of Federal Regulations Part 160. The independent laboratory validation that was submitted with this method was entitled, *Independent Laboratory Validation of Method 108919 – "Analytical Method for the Determination of MKH 6562 and Three Metabolites in Ground Water by High Performance Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS)"*. Based on the information and data which accompanied the method and ILV, ECB found this method to be acceptable.

Method Summary

An analytical method was developed to quantify MKH 6562 and three of its metabolites in ground water using high-performance liquid chromatography electrospray tandem mass spectrometry (LC/MS/MS). The metabolites measured included MKH 6562 sulfonic acid, MKH 6562 sulfonamide and N,O-dimethyltriazolinone (NODT). Deuterated internal standards of MKH 6562 and its metabolites are added to the water sample (50 mL). The water samples are acidified with hydrochloric acid and extracted with C_{18} solid phase extraction (SPE) cartridge. The extracts are concentrated to dryness, reconstituted with the mobile phase, filtered with 0.45-µm nylon Acrodisc® and analyzed by LC-ESI/MS/MS.

The method was evaluated by determining the average recoveries and relative standard deviation at the LOQ of 0.050 ng/mL (ppb). The range of recoveries was between 70 and 120 percent with acceptable precision of less than 20 percent RSD for all waters evaluated. The method was shown acceptable in quantifying MKH 6562 and its three metabolites in ground water at the targeted LOQ of 0.05 ppb.

METHOD ACCEPTABILITY/DEFICIENCIES/CLARIFICATIONS

The method gave acceptable results and was successfully validated by the registrant and independently by ALS Laboratory Group using isotopically labeled internal standards and comparison of peak areas with those of know standards. Based on the parameters set in the *Ecological Effects Test Guidelines, OPPTS 850.7100, Data Reporting for Environmental Chemistry Methods;* "Public Draft." (U.S. Environmental Protection Agency. Office of Prevention, Pesticides, and Toxic Substances (7101). U.S. Government Printing Office: Washington, DC, 1996, EPA-712-C-96-348), ECB finds this method acceptable for MKH 6562 and its three metabolites as submitted.

COMPLIANCE

Signed and dated statements that this method fulfills the requirements for Good Laboratory Practice Standards, 40 CFR 160 were present in the method. Also, a statement of non-confidentiality on the basis of the method falling within the scope of FIFRA Section 10 (d)(1)(A)(B), or (C) was signed and dated along with information on the certification of authenticity dates and signatures.

A. BACKGROUND INFORMATION

Flucarbazone-sodium (MKH 6562) is a member of the sulfonylurea chemical class of herbicides. It is used on spring wheat, including durum, and winter wheat.

TABLE A.1. Test Compound Nomenclature

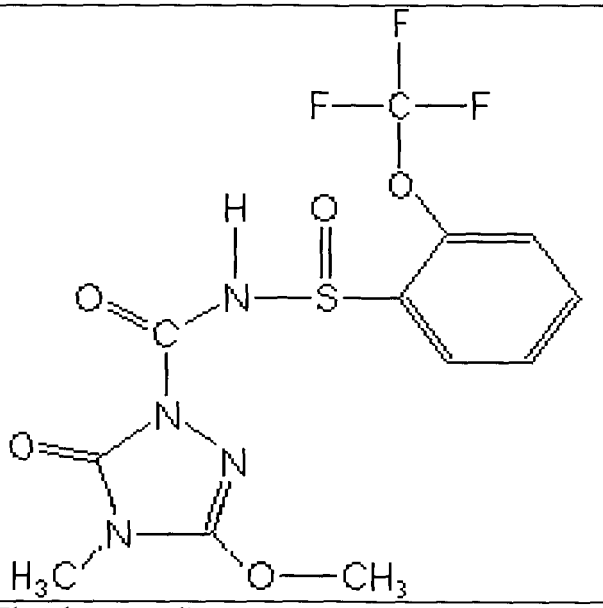
Compound: Flucarbazone-sodium	
Common name	Flucarbazone-sodium
Company experimental name	MKH 6562
IUPAC name	Sodium N-(trifluoromethohoxy-sulfonyl)-4,5-dihydro-3-methoxy-4-methyl-5-oxo-1H-1,2,4-triazole-1-carboxamide
CAS Name	4,5-dihydro-3-methoxy-4-methyl-5-oxo-N-[[2-(trifluoromethoxy) phenyl] sulfonyl]-1H-1,2,4-triazole-1-carboxamide, sodium salt
CAS #	181274-17-9

TABLE A.2. Physicochemical Properties of the Technical Grade Test Compound

Parameter	Value
Melting point/range	200°C (under decomposition)
Color and physical state	Colorless and crystalline power
Octanol/Water Partition Coefficient	Log K_{ow} = -0.89, -1.84 and -1.88 @ pH 4, 7 and 9, respectively.

pH	6.4 (1% solution)
Vapor pressure	<1 x10^{-9} mm Hg A @ 20°C
Solubility in water	44 g/L @ 20°C in neutral acid and alkaline conditions
Density	1.59 g/mL @ 20
Odor	Odorless

B. MATERIALS AND METHODS

B.1. Principle of Method

An analytical method was developed to quantify MKH 6562 and three metabolites (MKH 6562 sulfonic acid, MKH 6562 sulfonamide, N, O-dimethyltriazolinone) in water using high-performance liquid chromatography electrospray tandem mass spectrometry (LC-ESI/MS/MS). Deuterated internal standards of MKH 65662 and its metabolites are added to the water sample (50 mL). The water samples are acidified with hydrochloric acid and extracted with C_{18} solid phase extraction (SPE) cartridge. The extracts are concentrated to dryness, reconstituted with mobile phase, filtered with 0.45-µm nylon Acrodisc® and then analyzed.

TABLE B.1.1.	**Summary Parameters for the Analytical Method Used for the Quantitation of Chemical Residues in Matrices Studied**
Method ID	ECM0222W1-W4
Analyte(s)	MKH 6562, MKH 6562 sulfonic acid, MKH 6562 sulfonamide, N, O-dimetyltriazolinone (NODT).
Extraction solvent/technique	Water samples are acidified with hydrochloric acid and extracted with C_{18} SPE cartridge.
Cleanup strategies	0.45-µm nylon Acrodisc® filter
Detector	HPLC Electrospray Tandem Mass Spectrometry (LC-ESI/MS/MS).

C. RESULTS AND DISCUSSION

C.1. Recovery Results Summary

TABLE C.1.1. Recovery Regression Analysis Results from Method Validation of ground water.

Precision and Accuracy: Recoveries of MKH 6562, MKH 6562 sulfonic acid, MKH 6562 sulfonamide and N, O-dimethyltriazolinone from 0.05-ppb (LOQ)

MKH 6562–Mean = 106.3%, SD = (0.0017 ppb/0.05 ppb) x 100% = 3.4%, RSD = 3.2%
MKH 6562 sulfonic acid–Mean = 99.7%, SD = (0.0033 ppb/0.05 ppb x 100% = 6.6%, RSD = 6.7%
MKH 6562 sulfonamide–Mean = 89.4%, SD = (0.0069 ppb/0.05) x 100% = 13.8%, RSD = 15.5%
N, O-dimethyltriazolinone – Mean = 106.3%, SD = (0.0060 ppb/0.05 ppb) x 100% = 12.0%, RSD = 11.3 %

C.1.2. Method Characteristics

TABLE C.1.2. Method Characteristics	
Analytes	MKH 6562, MKH 6562 sulfonic acid, MKH 6562 sulfonamide, N,O-dimethyltriazolinone
Limit of Quantitation	0.05 ppb
Limit of Detection (LOD calculated)	0.03 ppb
Accuracy/Precision at LOQ (0.050 ppb)	See chart in Table C.1.1.
Reliability of the Method [ILV]	An independent laboratory method validation [ILV] was conducted by ALS Laboratory Group to verify the reliability of method for the determination of MKH 6562 and three metabolites in ground water. The values obtained indicated that the registrant method is acceptable according to *OPPT* and *S 850.7100 Guidelines*.
Linearity	The calibration curve for MKH 6562 and each of its metabolites in solvent were linear from 0.5 ng/mL to 25 ng/mL (equivalent to 0.01 ppb to 0.5 ppb in groundwater samples). The correlation coefficients (r^2) ranged from 0.9773 to 0.9989. No interferences were observed near the retention time of MKH 6562, its metabolites, or any of the internal standards used for these analyses.
Specificity	The method is specific for the determination of MKH 6562 and its metabolites by virtue of the chromatographic separation and selective detection system used (LC/MS/MS). Therefore a confirmatory method is not necessary.

C.2. Independent Laboratory Validation (ILV)

The ILV was conducted in accordance with the *OPPTS 850.7100 Guidelines*.

TABLE C.2.1. Mean Recovery Results Obtained by an Independent Laboratory Validation of the Method for the Determination of MKH 6562 and its metabolites in Ground Water by LC-MS/MS.

Compound	Spiking Level (ppb)	Average Recovery Obtained (%)	Relative Standard Deviation
MKH 6562	0.05	86.0	16.0
MKH 6562 Sulfonic Acid	0.05	103.0	15.0
MKH 6562 Sulfonamide	0.05	73.0	3.0
NODT	0.05	71.0	0.63
MKH 6562	0.50	96.0	13.0
MKH 6562 Sulfonic Acid	0.50	83.0	9.6
MKH 6562 Sulfonamide	0.50	74.0	4.9
NODT	0.50	73.0	3.6

D. CONCLUSION

From a review of the method, *"Analytical Method for the Determination of MKH 6562 and Three Metabolites in Ground Water by High-Performance Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS)"* and the ILV, ECB concludes that the method is acceptable for determining the residues of MKH 6562, MKH 6562 sulfonic acid, MKH 6562 sulfonamide and N, O-dimethyltriazolinone in ground water to support registration studies.