UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C., 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

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3rd of March, 2004

MEMORANDUM

SUBJECT: Drinking Water Assessment for Mesosulfuron-Methyl and Its Major Metabolites
New Chemical- Uses on Winter Wheat (OSPREY; 4.5% mesosulfuron-methyl) and Spring Wheat, Including Durum (SILVERADO, 2.0% mesosulfuron-methyl)

Company Code(s) AE AE F130060; HOE 130060
CAS Registry Number 208465-21-8
IUPAC: Methyl 2-[3-(4,6-dimethoxypyrimidin-2-yl)ureido-sulfonyl]-4-methanesulfonamido-methylbenzoate;2-[(4,6-Dimethoxy-pyrimidin-2-lcarbam -oyl)sulfamoyl]-a-(methanesulfon-amido)-p-toluic acid
CAS: Methyl 2-[[[[(4,6-dimethoxy-2-pyrimidinyl)amino] carbonyl]amino]sulfonyl]-4-[[(methyl-sulfonyl)amino]methyl]benzoate

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Environmental Fate and Effects Division (7507C)

THRU: Ben Smith, Branch Chief
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TO: Kelly O'Rourke
Health and Effects Division (7509C)
and
Jim Tompkins
Registration Division (7505C)

This memo provides the estimated drinking water concentrations (EDWCs) associated with the proposed applications of OSPREY and SILVERADO, which are formulated with the active ingredient of Mesosulfuron-Methyl (Mesosulfuron). Mesosulfuron is a new active ingredient pending registration, for which no monitoring data are available. Therefore, the drinking water assessment is based solely on model-estimated exposure concentrations in ground and surface water. The Tier 1 screening model FIRST (FQPA Index Reservoir Screening Tool) was used in

predicting the surface water concentrations; and the tier 1 regression model SCIGROW (Screening Concentrations In Ground Water) was used in predicting ground water concentrations.

Chemical Species Modelled in Drinking Water Assessment

As per the request of the HED's MARC (Meeting of 01/28/04), three metabolites were modelled with parent mesosulfuron in the drinking water assessment: AEF154851, AEF160459, and AEF160460. While these metabolites are not included in the recommended tolerance expression, they were found in the aerobic soil and the aquatic metabolism (aerobic; anaerobic) studies, at levels ranging from 5% to 20% of the applied dose. These metabolites were of interest because they are mobile and predominantly partition into the water phase. Most importantly, the degradates are all bridge-intact products similar in structure to the parent and with similar toxicity and mobility. The chemical name and structures of AEF154851, AEF160459, and AEF160460 are provided in Attachment 1.

Background Information on Surface Water Model (FIRST)

FIRST has been developed by Environmental Fate and Effects Division (EFED) to provide a Tier 1 screening level of assessment. The scenario setting, which is called the index reservoir, is based on an actual reservoir located in Shipman, Illinois. Shipman City Lake is 13 acres in area, with an average depth of 9 feet, and has a watershed area of 427 acres. Its ratio of drainage area to capacity (volume of water in the lake) is approximately 12.

FIRST considers adsorption of the pesticide to soil or sediment, incorporation of the pesticide at application, direct deposition of spray drift into the water body, and degradation of the pesticide in soil before runoff and within the water body. Simulation results are adjusted to account for the percent crop area (PCA) in the watershed. FIRST is expected to be exceeded by measured pesticide concentrations in drinking water only very rarely due to the conservative nature of the model assumptions. It represents a small drinking water reservoir surrounded by a runoff-prone watershed, uses maximum pesticide application rates and assumes that no buffer exists between the reservoir and the treated fields. The simulation assumes runoff from a single, large rainfall event. When FIRST exposure estimates suggest potential for a human health or ecological level of concern exceedance, a refined estimate can be developed using the Tier 2 PRZM and EXAMS models.

Background Information on Ground Water Model (SCIGROW)

SCIGROW is a screening model which EFED uses to estimate pesticide concentrations in vulnerable ground water. The model provides an exposure value which is used to determine the potential risk to the environment and to human health from drinking water derived form ground water and contaminated with the pesticide. The SCIGROW estimate is based on environmental fate properties of the pesticide (aerobic soil degradation half-life and linear adsorption coefficient normalized for soil organic carbon content), the maximum application rate, and existing data from small-scale prospective ground-water monitoring studies at sites with sandy soils and shallow ground water.

Pesticide concentrations estimated by SCIGROW represent conservative or high-end exposure values because the model is based on ground-water monitoring studies which were conducted by applying pesticides at maximum allowed rates and frequency to vulnerable sites (i.e., shallow aquifers, sandy, permeable soils, and substantial rainfall and/or irrigation to maximize leaching). In most cases, a large majority of the use areas will have ground water that is less vulnerable to contamination than the areas used to derive the SCIGROW estimate. SCIGROW provides a groundwater screening exposure value to be used in determining the potential risk to human health from drinking water contaminated with the pesticide. SCIGROW estimates likely groundwater concentrations if the pesticide is used at the maximum allowable rate in areas where groundwater is exceptionally vulnerable to contamination. In most cases, a large majority of the use area will have groundwater that is less vulnerable to contamination than the areas used to derive the SCIGROW estimate.

These two models, their descriptions, and model input guidance can be found in the following web address: http://www.epa.gov/oppefed1/models/water/index.htm

Assumptions Used To Derive The Degradate Concentrations

EFED's FIRST modelling approach for drinking water assessment is designed to assess the parent compound only. To consider degradates, environmental fate properties of AEF154851, AEF160459, and AEF160460 would be needed. Lacking such information, EFED decided to use a conservative approach to generate the drinking water estimates of the total concentrations of parent plus the other three degradates. The parent concentrations were estimated based on FIRST and SCIGROW. To these results, the maximum fraction of each degradate observed at any timein the aerobic soil metabolism studies were added to the parent concentration to generate the total residue concentrations. The observed maximum fractions are 16%, 5%, and 7%, respectively, for AEF154851, AEF160459, and AEF160460.

Drinking Water Concentration Summaries

The appropriate FIRST and SCIGROW input parameters were selected from the environmental fate data submitted by the registrant and in accordance with US EPA/OPP/ EFED water model parameter selection guidelines - Guidance for Selecting Input Parameters in Modeling the Environmental Fate and Transport of Pesticides, Version II, February 28, 2002. The Guidance can also be found at the above website address.

The environmental fate data have been evaluated by the EFED as part of the review process and risk characterization of mesosulfuron and its end-use products. The needed information on application rates and methods were taken from the proposed label for the end-use products OSPREY and SILVERADO.

Table 1 summarizes the estimated exposure concentrations in drinking water drawn from surface water. The estimated concentrations in ground water are summarized in Table 2. In addition to

the parent concentrations, the total residues of parent and the bridge-intact metabolites AEF154851, AEF160459, and AEF160460 were also reported. The input and output of FIRST model for surface water estimates were presented in Attachment 2. The input screen and output of SCIGROW were included in Attachment 3.

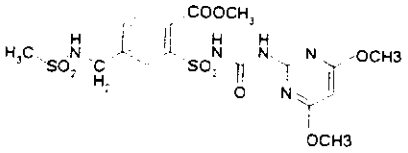
Table 1. **Estimated Drinking Water Concentrations from Surface Water Sources Based on Tier I FIRST Model.**

Product	Peak (Acute)		Annual Average (Chronic)	
	Parent Only	Total Residues	Parent Only	Total Residues
OSPREY. Winter Wheat	0.7 ug/L	0.9 ug/L	0.1 ug/L	0.2 ug/L
SILVERADO Spring Wheat (including durum)	0.3 ug/L	0.4 ug/L	0.05 ug/L	0.06 ug/L

Table 2. **Estimated Drinking Water Concentrations from Ground Water Sources Based on Tier I SCIGROW Model.**

Product	Acute		Chronic	
	Parent Only	Total Residues	Parent Only	Total Residues
OSPREY, Winter Wheat	0.01 ug/L	0.02 ug/L	0.01 ug/L	0.02 ug/L
SILVERADO Spring Wheat (including durum)	0.01 ug/L	0.007 ug/L	0.005 ug/L	0.007 ug/L

Attachment 1 - The chemical name and structures of the degradates considered in drinking water assessment

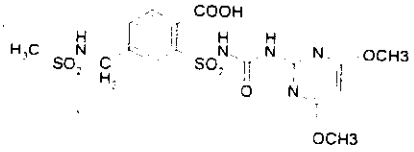


Parent: Mesosulfuron-methyl
Company Code: AE F130060

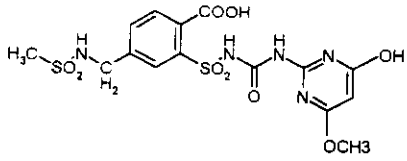
IUPAC name	Methyl 2-[3-(4,6-dimethoxypyrimidin-2-yl)ureido-sulfonyl]- 4-methanesulfonamido-methylbenzoate 2-[(4.6-Dimethoxy-pyrimidin-2-lcarbam -oyl)sulfamoyl]-a-(methanesulfon-amido)-p-toluic acid
CAS name	Methyl 2-[[[[(4,6-dimethoxy-2-pyrimidinyl)amino] carbonyl]amino]sulfonyl]-4-[[(methyl-sulfonyl)amino]methyl]benzoate
CAS #	208465-21-8
End-use formulation (EUP)	OSPREY Herbicide (Winter Wheat)4.5% Mesosulfuron Methyl. Water Dispersible Granule SILVERADO Herbicide for Uses on Spring Wheat, including Durum: 2.0% Mesosulfuron Methyl Water Dispersible Granule

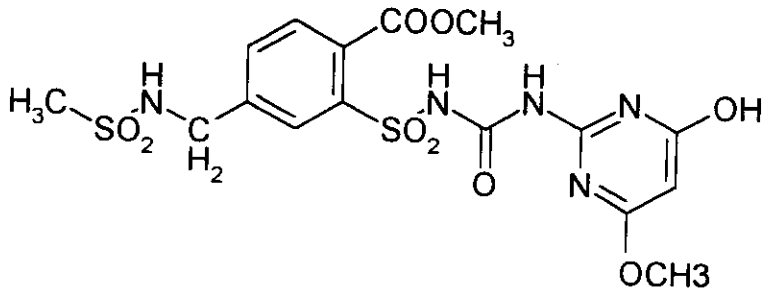
Bridge-intact Degradates:

AE F154851
2-[3-(4,6-dimethoxy pyrimidine-2-yl)ureidosulfonyl]-4-methanesulfonamidomethyl benzoic acid (IUPAC)



AE F160460
2-[3-(4-Hydroxy-6-methoxypyrimidine-2-yl)ureidosulfonyl]-4-methanesulfonamidomethyl benzoic acid (IUPAC)





AE F160459
IUPAC name: Methyl 2-[3-(4-hydroxy-6-methoxypyrimidine-2-yl)ureido-sulfonyl]-4-methanesulfonamido-methyl benzoate

Attachment 2 - Input and output of FIRST for surface water estimates

Chemical Name:	Mesosulfuron-methyl
End-use Product:	OSPREY
Crop:	Winter Wheat
Application Rate:	1 @ 0.013 lb ai/ac
Soil Koc:	36 mL/g (lowest non-sand Koc clay loam); MRID 45386432)
Solubility:	480 mg/L
Application type:	Aerial
PCA:	0.56 for wheat
Aerobic Soil Half-life:	52.8 days (based on 9 reported values, t90 of 16.7, 66.4, 71.5, 8.2, 74.2, 41.5, 15.1, 46.8, and 27.3) MRIDs: 45386422, 45386423, 45386424, 45386425, 45386426.
Hydrolysis:	Stable; MRID 45386418
Aquatic Photolysis:	Stable; MRID 45386419
Aerobic Aquatic Half-life:	57 days (MRIDs: 45386430, 45386431)

RUN No. 1 FOR OSPREY ON Winter Whe * INPUT VALUES *

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Koc	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	%CROPPED AREA	INCORP (IN)
.013(.013)	1 1	36.0	480.0	AERIAL(16.0)	56.0	.0

FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (RESERVOIR)	PHOTOLYSIS (RES.-EFF)	METABOLIC (RESER.)	COMBINED (RESER.)
52.80	2	N/A	.00- .00	57.00	57.00

UNTREATED WATER CONC (NANOGRAMS/LITER (PPTr)) Ver 1.0 AUG 1, 2001

PEAK DAY (ACUTE) CONCENTRATION	ANNUAL AVERAGE (CHRONIC) CONCENTRATION
709.884	109.807

Chemical Name:	Mesosulfuron-methyl
End-Use Product:	SILVERADO
Crop:	Wheat (Spring, including durum)
Application Rate:	2 @ 0.003 lb ai/ac w/ 14-day interval
Soil Koc:	36 mL/g (lowest non-sand Koc; clay loam); MRID 45386432
Solubility:	480 mg/L
Application type:	Aerial
PCA:	0.56 for wheat
Aerobic Soil Half-life:	52.8 days (based on 9 reported values, t90 of 16.7, 66.4, 71.5, 8.2, 74.2, 41.5, 15.1, 46.8, and 27.3days) MRIDs: 45386422, 45386423, 45386424, 45386425.
Hydrolysis:	Stable MRID 45386418
Aquatic Photolysis:	Stable MRID 45386419
Aerobic Aquatic Half-life:	57 days (MRIDs: 45386430, 45386431)

RUN No. 2 FOR SILVERDO ON Wheat * INPUT VALUES *

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Koc	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	%CROPPED AREA	INCORP (IN)
.003(.005)	2 14	36.0	480.0	AERIAL(16.0)	56.0	.0

FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (RESERVOIR)	PHOTOLYSIS (RES.-EFF)	METABOLIC (RESER.)	COMBINED (RESER.)
52.80	2	N/A	.00- .00	57.00	57.00

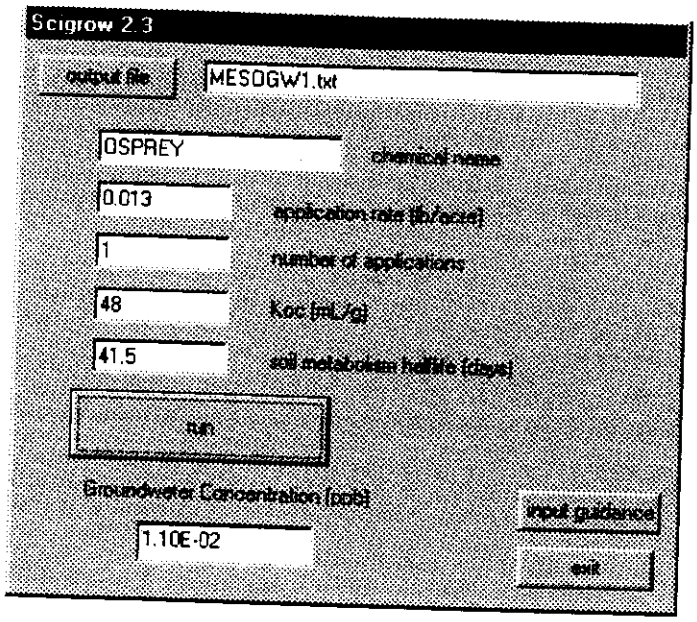
UNTREATED WATER CONC (NANOGRAMS/LITER (PPTr)) Ver 1.0 AUG 1, 2001

PEAK DAY (ACUTE) CONCENTRATION	ANNUAL AVERAGE (CHRONIC) CONCENTRATION
300.253	46.445

Attachment 3 - Input and output of SCIGROW for ground water estimates

Soil Koc — 48 mL/g (median value; 345, 137, 37, 31, 92, 26, 36, 85, 48) MRID 4538632

Soil Metabolism Half-life — 41.5 days (median value) MRIDs: 45386422, 45386423, 45386424, 45386425, 45386426.



SCIGROW
VERSION 2.3
ENVIRONMENTAL FATE AND EFFECTS DIVISION
OFFICE OF PESTICIDE PROGRAMS
U.S. ENVIRONMENTAL PROTECTION AGENCY
SCREENING MODEL
FOR AQUATIC PESTICIDE EXPOSURE

SciGrow version 2.3
chemical:OSPREY
time is 2/ 6/2004 10:51:16

Application rate (lb/acre)	Number of applications	Total Use (lb/acre/yr)	Koc (ml/g)	Soil Aerobic metabolism (days)
0.013	1.0	0.013	4.80E+01	41.5

groundwater screening cond (ppb) = 1.10E-02

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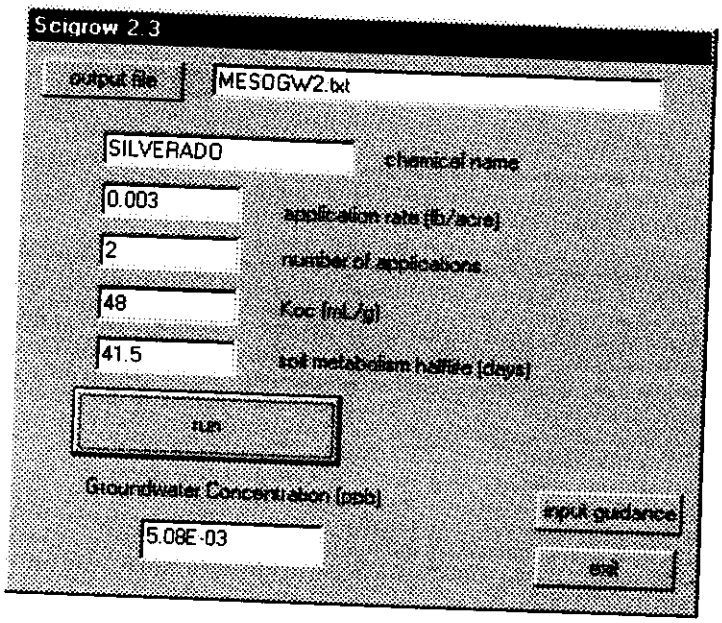

SCIGROW
VERSION 2.3
ENVIRONMENTAL FATE AND EFFECTS DIVISION
OFFICE OF PESTICIDE PROGRAMS
U.S. ENVIRONMENTAL PROTECTION AGENCY
SCREENING MODEL
FOR AQUATIC PESTICIDE EXPOSURE

SciGrow version 2.3
chemical:SILVERADO
time is 2/ 6/2004 10:52:49

Application rate (lb/acre)	Number of applications	Total Use (lb/acre/yr)	Koc (ml/g)	Soil Aerobic metabolism (days)
0.003	2.0	0.006	4.80E+01	41.5

groundwater screening cond (ppb) = 5.08E-03

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