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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
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OFFICE OF  
PREVENTION, PESTICIDES  
AND TOXIC SUBSTANCES

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MEMORANDUM

SUBJECT: Tier 1 Drinking Water Assessment for the New Use Registration on Turf and Aquatic Vegetation of Penoxsulam, and Six Degradation Products Identified to Be of Toxicological Concern

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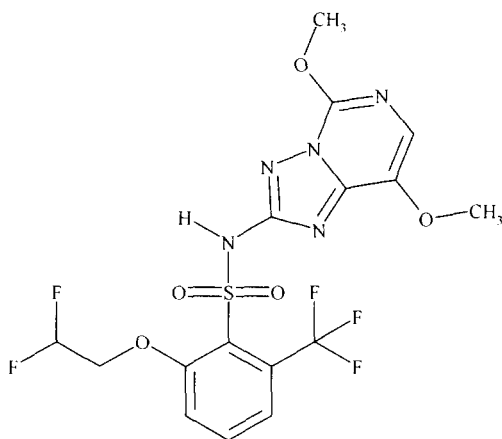
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A screening level, upper bound, Tier 1 drinking water assessment for the proposed new uses on established turf and aquatic vegetation of the herbicide, penoxsulam, and six degradation products previously identified by HED to be of toxicological concern has been conducted. The penoxsulam degradation products included in this assessment are: BSTCA, 2-amino TCA, 5-OH-XDE-638, SFA, sulfonamide, and 5,8-di OH (molecular structures for degradates of toxicological concern appear in **Table 5**). Estimated drinking water concentrations (EDWCs) for these combined toxic residues resulting from the proposed new uses are not expected to exceed 150 ppb in the environment.

### Environmental Fate Summary

Penoxsulam is stable to hydrolysis, and is expected to be somewhat persistent in non-aquatic environments. The major route of dissipation for penoxsulam in clear and shallow surface water under favorable light conditions is through direct aqueous photolysis ( $t_{1/2} = 1.5-14$  days). Penoxsulam is slightly more persistent in aerobic aquatic ( $t_{1/2} = 12-38$  days) and anaerobic environments ( $t_{1/2} = 5-11$  days), and even more persistent in aerobic soil environments ( $t_{1/2} = 34-118$  days). Penoxsulam is also very mobile ( $K_d = 0.13-1.96$ ), and does have the potential to leach to ground water. The low vapor pressure and Henry's Law constant, limits the potential of penoxsulam to volatilization from soil and water.



**Penoxsulam**

Eleven major degradation products have been identified for penoxsulam (BSTCA, 2-amino-TCA, 5-OH-penoxsulam, SFA, sulfonamide, 5,8-di-OH-penoxsulam, BSA, 2-amino-TP, TPSA, BSTCA methyl, and 5-OH 2 amino TP). Data are not available to fully characterize these degradates and their respective degradation pathways. As stated earlier, six of these degradation products have been identified by HED as being of toxicological concern. These toxic residues are: BSTCA, 2-amino TCA, 5-OH-penoxsulam, SFA, sulfonamide, and 5,8-di OH. Specific data concerning the proper chemical names, molecular structure, and the formation and concentrations of these degradates can be found in **Table 5**.

Penoxsulam is expected to be very mobile in the environment. Environmental fate data submitted for the degradation products of toxicological concern indicate that they are even more mobile than the parent compound. However, EFED does not currently have a method for estimating a model input value for the mobility of combined toxic residues. Therefore, as a simplifying assumption, the lowest mobility values for one of the degradation product was used for this Tier 1 assessment.

**Use Information**

Penoxsulam has previously been registered as a herbicide for use on rice crops. The proposed new uses for penoxsulam are for established turf grass and aquatic uses. For turf use, areas including: residential lawns, golf courses, sports fields, sod farms, around commercial buildings and other commercial turf areas, and for the management of aquatic vegetation in: lakes, reservoirs, ponds, canals, seeps, rivers, streams, swamps, marshes, bogs, transition areas between terrestrial and aquatic sites, and seasonal wet areas. On turf penoxsulam can be applied as liquid ground spray, or in a granular form. The maximum proposed single application rate for both forms is 0.06 lbs. a.i./acre, with the maximum proposed annual application rate for both forms is 0.09 lbs. a.i./acre.

Application of liquid penoxsulam to aquatic sites can be injected under the surface of water to achieve a target concentration not to exceed 150 ppb, ground sprayed to exposed sediment after drawdown, or applied either aerially or by ground spray to floating or emerged aquatic vegetation.

Application rates and methods for aquatic uses are listed in **Table 1**. The proposed labels do not clearly specify the number of applications, the application intervals, or water depth (when applicable) for aquatic uses. In the absence of explicit instructions, conservative assumptions were made, for modeling purposes, that used one application of maximum rates to minimum water depth. Directions for sub-surface injection specify a target concentration, but are not clear concerning how to determine if that concentration had been achieved. For penoxsulam use on exposed or floating weeds it has been assumed that naturally occurring perennial water sources would not have a water depth less than 6 inches.

**Table 1. Application Rates and Practices for Proposed New Aquatic Uses**

| Application Type   | Application Method                                  | Number of Applications         | Application Rate or Target Concentration | Application Interval                       |
|--|---|--------------------------------|--|--|
| In-Water Application (submerged or floating aquatic weeds) | sub-surface injection to $\geq 10\%$ of target zone | single application             | 5 – 150 ppb                              | NA   |
|  |   | split or multiple applications | 5 – 75 ppb (150 ppb annual maximum)      | as needed to maintain $\geq 5$ ppb minimum |

|  |  |                        |                               |                        |
|--|--|------------------------|-------------------------------|------------------------|
|  |  |                        |                               | concentration          |
| Foliar Application (floating and emergent weeds)                                 | aerial (coarse droplets)   | proposed label unclear | 0.0313 – 0.0875 lb.a.i./acre  | proposed label unclear |
|  | boat or ground (boom-type backpack or hydraulic handgun; coarse or coarser droplets) | proposed label unclear | 0.0313 – 0.0875 lb. a.i./acre | proposed label unclear |
| Exposes Sediment Application (pre- and post- emergence control of aquatic weeds) | spray from boat or truck   | proposed label unclear | 0.0875 – 0.175 lb. a.i./acre  | proposed label unclear |

Application rates and methods for turf uses are listed in **Table 2**. In order to better gauge the effects of differing application practices, several application rates were modeled. Included as an upper bound acute estimate, was a single application of the maximum annual application rate. This does exceed the proposed single application rate, but model limitations prohibit accepting differing application rates. It was necessary to run each application scenario in order to determine the maximum EDWCs from turf uses, so the results are all presented here.

**Table 2. Modeled Application Rates for Proposed Turf Uses**

| Application Method | Application Rate (lbs. a.i./acre) | Number of Applications | Application Interval (days) |
|--------------------|-----------------------------------|------------------------|-----------------------------|
| ground spray       | 0.060                             | 1                      | --                          |
| ground spray       | 0.045                             | 2                      | 30                          |
| ground spray       | 0.090*                            | 1                      | --                          |
| ground spray       | 0.030                             | 3                      | 30                          |

\* 0.09 lbs. a.i./acre exceeds proposed single application rate. however, due to limitations prohibiting the model accepting differing application rates, the maximum annual application rate was modeled as a single application

### Estimated Drinking Water Concentrations (EDWCs)

Estimated drinking water concentrations (EDWCs) for penoxsulam and the combined toxic residues resulting from the proposed new uses are not expected to exceed 150 ppb in the environment. The upper bound of a Tier 1 estimate for the proposed new uses of penoxsulam, established turf and aquatic water bodies, have been calculated. The six identified residues of concern, along with maximum application rates, have been included to make the most conservative, upper bound estimates presented here.

#### Surface Water

Based upon results of the Tier 1, surface model, FIRST, the upper bound peak EDWC value resulting from the use of penoxsulam on turf is 9.4 ppb. The upper bound, Tier 1 chronic

The upper bound peak and chronic EDWC value resulting from the subsurface injection of penoxsulam to control submerged aquatic vegetation is 150 ppb. This value was taken directly from the maximum target concentration listed on the proposed labels.

The average, peak EDWC value resulting from the use of penoxsulam on floating or emergent aquatic vegetation is 64 ppb per application, *per one foot water depth*. This concentration is not an EDWC, but is a factor that has been derived by direct calculation using the application rate per acre and the volume of water covering one acre at a depth of one foot. This value is inversely proportional to water depth. At deeper water depths, aquatic concentrations would be lower, at shallower water depths, aquatic concentrations would be higher. EFED does not expect concentrations resulting from spray application to floating or emergent weeds to exceed the target injection concentration 150 ppb. The water depth would need to be less than 6 inches to exceed the 150 ppb concentration value. Such a shallow water depth is not expected to be found in naturally occurring, perennial water bodies. In situations where such shallow water depths might be encountered, such as irrigation or drainage ditches, it is reasonable to expect that the most efficient application of penoxsulam would involve interrupting the water flow, "drawing down", and making the application directly to the exposed sediment. Based upon results of the Tier 1, surface model, FIRST, the upper bound, peak and chronic EDWC values resulting from the use of penoxsulam on exposed sediment after drawdown are 18.2 ppb and 1.8 ppb, respectively.

#### Ground Water

The SCI-GROW, Tier I EDWC value for penoxsulam evaluated at the maximum annual application to turf is 12.0 ppb. The SCI-GROW, Tier I EDWC value for penoxsulam evaluated at the maximum single application to exposed sediment after drawdown is 23.3 ppb. While SCI-GROW was developed for estimating ground water concentrations resulting from agricultural uses, EFED currently has no other method for estimating ground water EDWCs from exposed sediments, and these results are expected to be adequately conservative. In the absence of an approved method for calculating ground water concentrations resulting from use of penoxsulam on submerged, floating or emergent aquatic vegetation EFED can only assume that ground water concentration would not exceed the maximum estimated peak surface water concentration of 150 ppb. EFED expects that the actual concentration found in ground water from these aquatic uses will be less than 150 ppb.

#### **Water Modeling Parameters and Estimation Calculations**

The EDWCs (Estimated Drinking Water Concentrations) in a perennial surface water body were calculated using the EPA Tier I FIRST (FQPA Index Reservoir Screening Tool; version 1.1.0, December 12, 2005) using the EFED Index Reservoir environment. FIRST is used to simulate pesticide transport as a result of runoff and erosion from an agricultural field, and the environmental fate and transport of pesticides in surface water. All modeled metabolism input

values were based upon total toxic residues. Values for the parent alone would be expected to be lower than these upper bound estimates. Modeling output files are appended to this document.

**Table 3** contains the upper bound model predictions for the total toxic residues are based on maximum annual application rates of penoxsulam for the proposed new uses. In the case of turf uses, the maximum annual application rate modeled exceeds the proposed single application rate, but, due to limitations prohibiting the model accepting differing application rates, was modeled as a single application as an upper bound estimate. The exposure concentrations of drinking water were estimated for ground application to turf, and both ground and aerial applications to aquatic vegetation.

| Targeted Use   | Application Method       | Application Rate or Target Concentration | Number of Applications / Application Interval | Ground Water                                | Surface Water        |                       |
|--|--------------------------|--|---|---|----------------------|-----------------------|
|  |                          |  |   | acute <sup>1</sup> and chronic <sup>2</sup> | acute <sup>1</sup>   | chronic <sup>2</sup>  |
| Submerged or Floating Aquatic Vegetation                       | sub-surface injection    | 150 ppb annual maximum (5 ppb minimum)   | 1 / --  | 150 ppb                                     | 150 ppb              | 150 ppb               |
| Emerged or Floating Aquatic Vegetation                         | aerial application       | 0.0875 lb./acre                          | 1 / --  | 150 ppb <sup>3</sup>                        | 150 ppb <sup>3</sup> | 150 ppb <sup>3</sup>  |
| Pre- and Post-Emergence Aquatic Vegetation on Exposed Sediment | spray from boat or truck | 0.175 lb./acre                           | 1 / --  | 23.3 ppb                                    | 18.2 ppb             | 1.8 ppb               |
| Established Turf   | ground spray             | 0.060                                    | 1 / --  | 8.0 ppb                                     | 6.2 ppb              | 0.61 ppb              |
| Established Turf   | ground spray             | 0.090                                    | 1 / --  | 12.0 ppb                                    | 9.4 ppb <sup>4</sup> | 0.92 ppb <sup>4</sup> |
| Established Turf   | ground spray             | 0.030                                    | 3 / 30 days                                   | 12.0 ppb                                    | 8.9 ppb              | 0.87 ppb              |
| Established Turf   | ground spray             | 0.045                                    | 2 / 30 days                                   | 12.0 ppb                                    | 9.1 ppb              | 0.89 ppb              |

1 maximum peak daily concentration

2 maximum annual average concentration

3 at 64 ppb for a one foot water depth, the depth would need to be <6 inches to exceed a 150 ppb concentration

4 0.09 lbs./acre exceeds proposed single application rate, however, due to limitations prohibiting the model accepting differing application rates, the maximum annual application rate was modeled as a single application

**Table 4** contains input parameters for the Tier 1 modeling conducted for this assessment. Degradation parameters were calculated for total toxic residues. At each sampling interval, concentrations of the residues that were identified to be of concern were added, in terms of parent equivalents. These concentrations were converted to natural logarithms, and plotted against time. The slope of the resulting regression line was used to calculate the total toxic half-lives. All modeling degradation parameters for penoxsulam had more than one half-life available. Modeling inputs were calculated as the 90<sup>th</sup> % tile for each value using the equations presented in the table. The solubility value for the parent compound, and the lowest mobility value (from a degradation product) were used in this Tier 1 screening assessment.

| <b>Table 4. Summary of Environmental Fate Data Used in Tier 1 Aquatic Drinking Water Modeling Input Values for Total Toxic Residues of Penoxsulam</b> |   |  |                         |
|---|---|--|-------------------------|
| <b>Fate Property</b>  | <b>Input Parameters for Surface Water Modeling</b>  | <b>Input Parameters for Ground Water Modeling</b>  | <b>MRID (or source)</b> |
| Aqueous Solubility  | <b>408 mg/L at pH 7</b>                             | --   | 45830726 (parent)       |
| Aqueous Photolysis  | <b>4.3 days</b> (1.33 + (1.886*1.51)/sqrt 3)        | --   | 45834801<br>45830722    |
| Aerobic Soil Metabolism Half-life   | <b>467 days</b> (410 + (1.886*80)/sqrt 3)           | <b>410 days</b> (average value)                    | 45830724                |
| Anaerobic Aquatic Metabolism Half-life  | <b>88.3 days</b> (70 + (3.078* 8.4)/sqrt 2)         | --   | 45830725                |
| Hydrolysis  | <b>stable @ pH = 7</b>                              | --   | 45830721                |
| Aerobic Aquatic Metabolism  | <b>36.6 days</b> (26.0 + (1.886*9.7)/sqrt 3)        | --   | 45830726                |
| Mobility in Soil  | <b>K<sub>d</sub> = 0.13</b> (lowest non-sand value) | <b>K<sub>oc</sub> = 13</b> (lowest non-sand value) | 45830802                |

The complete chemical names, molecular structures, maximum amount formed in terms of parent equivalents, and the type of study where the degradates of toxicological concern have been captured in **Table 5**. In some cases, maximum concentrations were reported at study termination. It is not possible to determine if concentrations would have increased if the study had been conducted for a longer duration. Those values are marked with an asterisk in the table below.



**Table 5 Maximum Reported Amounts of Degradation Products Identified to Be of Toxicological Concern**

| Degradate Name   | Structure | Maximum % Applied | Study Type                   |
|--|-----------|-------------------|------------------------------|
| <b>BSTCA</b><br>3-[[[2-(2,2-Difluoroethoxy)-6-(trifluoromethyl)phenyl]-sulfonyl]amino]-1H-1,2,4-triazole-5-carboxylic acid                                 |           | 11.1%             | soil photolysis              |
|  |           | 7.2%              | aqueous photolysis           |
|  |           | 39.4%*            | aerobic aquatic metabolism   |
|  |           | 37.2%*            | aerobic soil metabolism      |
|  |           | 25.4%             | anaerobic aquatic metabolism |
| <b>2-Amino TCA</b><br>2-amino-1,2,4-triazole carboxylic acid   |           | 85%*              | aqueous photolysis           |
| <b>5-OH-penoxsulam</b><br>2-(2,2-Difluoroethoxy)-N-(5,6-dihydro-8-methoxy-5-oxo[1,2,4]triazolo[1,5-c]pyrimidin-2-yl)-6-(trifluoromethyl)benzenesulfonamide |           | 40.3%             | aerobic aquatic metabolism   |
|  |           | 62.6%             | aerobic soil metabolism      |
|  |           | 41.6%             | anaerobic aquatic metabolism |
| <b>SFA</b><br>2-(2,2-Difluoroethoxy)-N-(iminomethyl)-6-(trifluoromethyl)benzenesulfonamide   |           | 14.7%*            | aerobic soil metabolism      |
| <b>Sulfonamide</b><br>2-(2,2-Difluoroethoxy)-6-(trifluoromethyl)benzenesulfonamide   |           | 33.0%*            | aerobic soil metabolism      |
| <b>5,8-diOH</b><br>2-(2,2-Difluoroethoxy)-6-trifluoromethyl-N-(5,8-dihydroxy-[1,2,4]triazolo[1,5-c]pyrimidin-2-yl)benzenesulfonamide                       |           | 11.0%*            | anaerobic aquatic metabolism |

\*Maximum % of applied reported at study termination indicating that amounts may have continued to increase with time

**FIRST Output Files**

**RUN No. 1 FOR penoxsulam ON aquatic we \* INPUT VALUES \***

| RATE (#/AC) | No.APPS & ONE(MULT) | SOIL SOLUBIL INTERVAL | APPL TYPE    | %CROPPED | INCORP AREA (IN) |
|-------------|---------------------|-----------------------|--------------|----------|------------------|
| .175( .175) | 1 1                 | .1 408.0              | GROUND( 6.4) | 100.0    | .0               |

**FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)**

| METABOLIC DAYS UNTIL HYDROLYSIS (FIELD) | PHOTOLYSIS RAIN/RUNOFF (RESERVOIR) | METABOLIC COMBINED (RES.-EFF) | (RESER.)     | (RESER.)    |
|---|------------------------------------|-------------------------------|--------------|-------------|
| 467.00                                  | 2                                  | N/A                           | 4.30- 533.20 | 36.60 34.25 |

**UNTREATED WATER CONC (MICROGRAMS/LITER (PPB)) Ver 1.1.0 DEC 12, 2005**

| PEAK DAY (ACUTE) CONCENTRATION | ANNUAL AVERAGE (CHRONIC) CONCENTRATION |
|--------------------------------|--|
| 18.211                         | 1.781                                  |

**RUN No. 2 FOR penoxsulam ON turf \* INPUT VALUES \***

| RATE (#/AC) | No.APPS & ONE(MULT) | SOIL SOLUBIL INTERVAL | APPL TYPE    | %CROPPED | INCORP AREA (IN) |
|-------------|---------------------|-----------------------|--------------|----------|------------------|
| .060( .060) | 1 1                 | .1 408.0              | GROUND( 6.4) | 100.0    | .0               |

**FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)**

| METABOLIC DAYS UNTIL HYDROLYSIS (FIELD) | PHOTOLYSIS RAIN/RUNOFF (RESERVOIR) | METABOLIC COMBINED (RES.-EFF) | (RESER.)     | (RESER.)    |
|---|------------------------------------|-------------------------------|--------------|-------------|
| 467.00                                  | 2                                  | N/A                           | 4.30- 533.20 | 36.60 34.25 |

UNTREATED WATER CONC (MICROGRAMS/LITER (PPB)) Ver 1.1.0 DEC 12, 2005

-----  
PEAK DAY (ACUTE)    ANNUAL AVERAGE (CHRONIC)  
CONCENTRATION        CONCENTRATION  
-----

6.244                    .611

RUN No. 3 FOR penoxsulam    ON turf    \* INPUT VALUES \*

-----  
RATE (#/AC) No.APPS & SOIL SOLUBIL APPL TYPE %CROPPED INCORP  
ONE(MULT) INTERVAL Kd (PPM) (%DRIFT) AREA (IN)  
-----

.045( .088) 2 30    .1 408.0 GROUND( 6.4) 100.0    .0

FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)

-----  
METABOLIC DAYS UNTIL HYDROLYSIS PHOTOLYSIS METABOLIC  
COMBINED

(FIELD) RAIN/RUNOFF (RESERVOIR) (RES.-EFF) (RESER.) (RESER.)

-----  
467.00    2    N/A    4.30- 533.20    36.60    34.25

UNTREATED WATER CONC (MICROGRAMS/LITER (PPB)) Ver 1.1.0 DEC 12, 2005

-----  
PEAK DAY (ACUTE)    ANNUAL AVERAGE (CHRONIC)  
CONCENTRATION        CONCENTRATION  
-----

9.117                    .892

RUN No. 4 FOR penoxsulam    ON turf    \* INPUT VALUES \*

-----  
RATE (#/AC) No.APPS & SOIL SOLUBIL APPL TYPE %CROPPED INCORP  
ONE(MULT) INTERVAL Kd (PPM) (%DRIFT) AREA (IN)  
-----

.090( .090) 1 1    .1 408.0 GROUND( 6.4) 100.0    .0

**FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)**

-----  
**METABOLIC DAYS UNTIL HYDROLYSIS    PHOTOLYSIS    METABOLIC  
 COMBINED**  
**(FIELD) RAIN/RUNOFF (RESERVOIR) (RES.-EFF) (RESER.) (RESER.)**

-----  
 467.00    2    N/A    4.30- 533.20    36.60    34.25

UNTREATED WATER CONC (MICROGRAMS/LITER (PPB)) Ver 1.1.0 DEC 12, 2005

-----  
**PEAK DAY (ACUTE)    ANNUAL AVERAGE (CHRONIC)  
 CONCENTRATION                  CONCENTRATION**

-----  
 9.366                          .916

**RUN No. 5 FOR penoxsulam    ON turf    \* INPUT VALUES \***

-----  
**RATE (#/AC) No.APPS & SOIL SOLUBIL    APPL TYPE    %CROPPED INCORP  
 ONE(MULT) INTERVAL    Kd (PPM)    (%DRIFT)    AREA (IN)**

-----  
 .030( .086) 3 30    .1 408.0    GROUND( 6.4) 100.0    .0

**FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)**

-----  
**METABOLIC DAYS UNTIL HYDROLYSIS    PHOTOLYSIS    METABOLIC  
 COMBINED**  
**(FIELD) RAIN/RUNOFF (RESERVOIR) (RES.-EFF) (RESER.) (RESER.)**

-----  
 467.00    2    N/A    4.30- 533.20    36.60    34.25

UNTREATED WATER CONC (MICROGRAMS/LITER (PPB)) Ver 1.1.0 DEC 12, 2005

-----  
**PEAK DAY (ACUTE)    ANNUAL AVERAGE (CHRONIC)  
 CONCENTRATION                  CONCENTRATION**

-----  
 8.889                          .869

SCI-GROW Output Files

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  
 exposed aquatic vegetation  
 chemical:penoxsulam  
 time is 8/ 2/2006 16:32:12

---

| Application rate (lb/acre) | Number of applications | Total Use (lb/acre/yr) | Koc (ml/g) | Soil Aerobic metabolism (days) |
|----------------------------|------------------------|------------------------|------------|--------------------------------|
| 0.175                      | 1.0                    | 0.175                  | 1.30E+01   | 410.0                          |

---

groundwater screening cond (ppb) = 2.33E+01  
 \*\*\*\*\*

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:penoxsulam  
 time is 8/ 1/2006 16:55:20

---

| Application rate (lb/acre) | Number of applications | Total Use (lb/acre/yr) | Koc (ml/g) | Soil Aerobic metabolism (days) |
|----------------------------|------------------------|------------------------|------------|--------------------------------|
| 0.030                      | 3.0                    | 0.090                  | 1.30E+01   | 410.0                          |

---

groundwater screening cond (ppb) = 1.20E+01  
 \*\*\*\*\*

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:penoxsulam  
time is 8/ 1/2006 16:54:44

| Application rate (lb/acre) | Number of applications | Total Use (lb/acre/yr) | Koc (ml/g) | Soil Aerobic metabolism (days) |
|----------------------------|------------------------|------------------------|------------|--------------------------------|
| 0.060                      | 1.0                    | 0.060                  | 1.30E+01   | 410.0                          |

groundwater screening cond (ppb) = 7.99E+00

\*\*\*\*\*

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:penoxsulam  
time is 8/ 1/2006 16:54:31

| Application rate (lb/acre) | Number of applications | Total Use (lb/acre/yr) | Koc (ml/g) | Soil Aerobic metabolism (days) |
|----------------------------|------------------------|------------------------|------------|--------------------------------|
| 0.090                      | 1.0                    | 0.090                  | 1.30E+01   | 410.0                          |

groundwater screening cond (ppb) = 1.20E+01

\*\*\*\*\*

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:penoxsulam  
time is 8/ 1/2006 16:55: 8

---

| Application<br>rate (lb/acre) | Number of<br>applications | Total Use<br>(lb/acre/yr) | Koc<br>(ml/g) | Soil Aerobic<br>metabolism (days) |
|-------------------------------|---------------------------|---------------------------|---------------|-----------------------------------|
| 0.045                         | 2.0                       | 0.090                     | 1.30E+01      | 410.0                             |

---

groundwater screening cond (ppb) = 1.20E+01

\*\*\*\*\*