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

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

DP Barcodes: D308814
PC Code: 090601
Date: 10/28/2004

SUBJECT: Estimated Environmental Concentrations for Selected Carbofuran Use Scenarios

TO: Ronald Kendall
Environmental Field Branch
Field and External Affairs Division (7506C)

FROM: Kevin Costello, Geologist, RAPL
Environmental Risk Branch IV
Environmental Fate and Effects Division (7507C)

THRU: Dirk Young, Environmental Engineer
Environmental Risk Branch IV
Environmental Fate and Effects Division (7507C)

Elizabeth Behl, Branch Chief
Environmental Risk Branch IV
Environmental Fate and Effects Division (7507C)

This memo provides estimated environmental concentrations (EECs) from use of carbofuran according to use scenarios requested by the Field and External Affairs Division. These EECs were derived using simulation models PRZM (v. 3.12.0.0) and EXAMS (v. 2.98.04). The modeling scenarios used for the simulations are described below. The results of the modeling are presented in Table 1. The input parameters used in the modeling are reported in Table 2.

## Description of Modeling Scenarios

California Cotton: A single use scenario was simulated for California cotton, as requested. The standard scenario used for this simulation is “CaCotton.xls,” which was created on August 6, 2001. The soil properties in this scenario are those of the Twisselman clay, and the weather data is from Fresno, California (metfile W93193).

A single application of 1.0 lb ai/acre (1.12 kg/ha) was simulated at planting (April 22, two weeks before emergence). An in-furrow ground-spray application was simulated (CAM = 5 in PRZM) with an incorporation depth of 1.5 inches (3.8 cm).

**Table 1. Estimated Aquatic Exposure Concentrations Calculated with PRZM/EXAMS.**

| | | Surface Water | | |
|---|---|---|---|---|
| **Standard Scenario** | **Rate in lb ai/acre (application interval)** | **1-in-10 Year Acute (microgram/liter)** | **1-in-10 Year 21-day Chronic (microgram/liter)** | **1-in-10 Year 60-day Chronic (microgram/liter)** |
| CA Cotton (in furrow) | 1.0 x 1 (NA) | 0.8 | 0.6 | 0.4 |
| ID Potatoes (low rate foliar) | 0.5 x 1 (NA) | 2.5 | 1.9 | 1.2 |
| ID Potatoes (high rate foliar) | 1.0 x 2 (14 days) | 6.2 | 5.1 | 4.0 |
| ID Potatoes (at plant in-furrow) | 3.0 x 1 (NA) | 0.2 | 0.2 | 0.1 |
| ID Potatoes (high rate sprinkler irrigation) | 3.0 x 2 (14) | 10.4 | 8.0 | 6.2 |
| CA Artichokes (low rate) | 0.5 x 1 (NA) | 8.4 | 6.7 | 4.6 |
| CA Artichokes (high rate) | 1.0 x 2 (30) | 35 | 28 | 19 |

Idaho, Oregon and Washington Potatoes: Four use scenarios were simulated for northwest potato uses, as requested.The standard scenario for Idaho potatoes ("IDPotato.xls") was used for this simulation; this scenario was created on May 10, 2002. The soil properties in this scenario are those of the Eginbench Loamy Sand, and the weather data is from Bingham County, Idaho (metfile W24156).

Two foliar applications were simulated. The first scenario simulated a single application of carbofuran at 0.5 lb/ai./acre (0.56 kg/ha). The second simulated two applications at 1.0 lb ai/acre (1.12 kg/ha), with a 14-day interval between applications (no interval was specified on the product label). The USDA Crop Profile for Idaho potatoes reports that

carbofuran is applied as a foliar application from emergence up to the 4-leaf rosette stage (http://www.ipmcenters.org/cropprofiles/docs/IDpotatoes.html, last updated on June 1, 2000). Therefore, the first application for both scenarios was May 10, the date of emergence in the standard scenario.

The carbofuran SLN label indicates that the requested "high" potato application rate of 3.0 lb ai /acre can occur as an in-furrow application, shank-in application, a banded application, or sprinkler irrigation application. A single at-plant, in-furrow (CAM = 5 in PRZM) application of 3.0 lb ai/acre (3.36 kg/ha) was simulated. The incorporation depth for this scenario is 4 inches (10.2 cm); no spray drift was simulated. The application date for this scenario was April 10.

The scenario with two applications of 3 lb ai./acre was simulated for sprinkler irrigation, with drift of 1 %. EFED is currently working to improve the ability of PRZM to simulate irrigation. The current simulations do not reflect the results of this ongoing effort.

California Artichokes: Two use scenarios were simulated for California artichokes, as requested. The standard scenario used for these simulations is the Clifornia lettuce scenario ("CaLettuceC.xls"), which was created on August 12, 2004. There is currently no specific standard scenario for artichokes. However, lettuce and artichokes are grown in the same region of California, and on similar soils. The soil properties in this scenario are those of the Placentia sandy loam, and the weather data is from Monterey County, California (metfile W23273).

A single ground-spray application of 0.5 lb ai/acre (0.56 kg/ha) was simulated to correspond to the lower application rate on the SLN label #CA-860037. The "minimum application rate" of 0.25 lb ai./acre requested by FEAD does not appear on that label, and was not simulated. The other artichoke simulation included two ground-spray applications of 1.0 lb ai/acre (1.12 kg/ha), with an application interval of 30 days.

The USDA crop profile for California artichokes, which was last updated on May 25, 1999 (http://www.ipmcenters.org/cropprofiles/docs/caartichokes.html), suggests that the two-application scenario may not be realistic. This report notes that "(t)he product label allows two applications per season, but the 30-day PHI does not allow a second application during a period of critical need for artichoke (i.e., during summer peak infestation period). This restriction prevents carbofuran from being applied with the necessary frequency to eradicate cribrate weevil from the fields."

**Table 2 Carbofuran Fate Properties Used in the Surface Water Modeling.**

| Fate Property | Value | Source |
|---|---|---|
| Molecular weight | 221 | product chemistry |
| Aqueous solubility (mg/liter) | 700 | product chemistry |
| Hydrolysis half-life (days), pH 7 | 28 | MRID 421175-02 |
| Near Surface Aqueous Photolysis half-life (days), neutral pH | 6 | MRID 00092801 |

| | | |
|---|---|---|
| Aerobic Soil Metabolism half-life (days) | 321 | MRID 434372-01 |
| Aerobic Aquatic Metabolism half-life (days) | 642 | no data- twice the aerobic soil metabolism half-life |
| Vapor pressure (torrs) | $6 \times 10^{-7}$ | product chemistry |
| $K_{oc}$ (ml/g) | 30 | MRID 93687 |