10/OPP#34211

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

(5PP)

OFFICE OF
PREVENTION, PESTICIDES, AND
TOXIC SUBSTANCES

PC Code: 083601
DP Barcode: D250265

MEMORANDUM

Feb 26,1999

SUBJECT: Tier I Estimated Environmental Concentrations for Triphenyltin Hydroxide

TO: Robert McNally, Product Manager
Angel Chiri, PM Team Reviewer
Registration Division

FROM: Dirk F. Young, Ph.D., Environmental Engineer
Jim Cowles, Ph.D., Chemist
ERB-IV/EFED (7507C)

THRU: Mah T. Shamin, Ph.D., Chief
ERB-IV/EFED (7507C)

This memo reports Tier I Estimated Environmental Concentrations (EECs) for triphenyltin hydoxide (TPTH) calculated using GENEEC (surface water) and SCIGROW (ground water). Inputs for the two models were based on the crop with the highest allowed application rate (pecans). For pecans, the maximum allowable single application of TPTH is 0.375 lb ai/acre. Single applications can be applied up to 10 times per year, at 2 to 4 week intervals, for a total yearly use of 3.75 lb ai/acre. This application scenario was used to calculate EECs for the human health risk assessment. For surface water, the acute (peak) value is **13 ppb** and the chronic (56-day) value is **4 ppb**. The ground water screening concentration is **0.03 ppb**. It should be noted that the K_{oc} for TPTH is out of range of the K_{oc}s used to generate the SCIGROW regression, and thus the groundwater screening concentration may be an underestimation. Should the results of this assessment indicate a need for further refinement, please contact us as soon as possible so that we may schedule a Tier II assessment.

Background Information on GENEEC

GENEEC is a semi-empirical ecological risk assessment tool designed to estimate pesticide upper-bound concentrations in surface water. GENEEC simulates pesticide concentrations in a 20,000-m^3 pond adjacent to a 10-ha pesticide-treated field. GENEEC assumes that there are no inlets to (other than runoff) or outlets from the pond, that runoff occurs only from the pesticide-treated land, and that a "standard" rainfall event occurs two days after final application of pesticide. Both runoff following the rain event and spray drift following each pesticide application are pesticide inputs to the pond. The runoff event moves a maximum of 10% (based on empirical evidence) of the total applied pesticide into the pond. This amount can be reduced by degradation on the field and by binding to the soil. Spray drift input to the pond is 1% of the applied pesticide for ground-spray application, and 5% for aerial application.

Though GENEEC was not originally designed for use in drinking water risk assessments, it can provide a reasonable upper-bound estimate for screening purposes. Using GENEEC as a model for a drinking-water basin implies that the basin has all the characteristics of the "standard" pesticide-application scenario described above. In actuality, drinking-water basin conditions may vary from these conditions. For example, runoff from land that is not treated with pesticide will dilute the actual pesticide concentrations. On the other hand, pesticide-contaminated inflow from upstream sources may serve to increase actual concentrations (while uncontaminated inflow will reduce concentrations). Hydrologic models can rarely reliably predict contaminant concentrations; however, EFED believes that with a conservative choice of input parameters (see below) pesticide-concentration estimates from GENEEC will be high for drinking water basins. If a risk assessment performed using GENEEC does not exceed the level of concern, then one can be reasonably confident that the actual risk will not be exceeded.

Background Information on SCIGROW

SCIGROW is an empirical model that provides a groundwater screening exposure value for use in determining the potential risk to human health from drinking groundwater contaminated with pesticides. SCIGROW estimates ground water concentrations for pesticides applied at the maximum allowable rate in areas where ground water is vulnerable to contamination. Actual concentrations observed in groundwater may be higher or lower than those derived using SCIGROW, and actual monitoring data should be used to estimate environmental concentrations when possible. EFED assumes that in a majority of cases ground water will be less vulnerable to contamination than the areas used to derive the empirical formula used in SCIGROW. It should be noted the K_{oc} for TPTH (K_{oc}: 5700 ml/g) is out of the range of K_{oc}s (K_{oc}s: 32-180) used to generate the SCIGROW regression.

Modeling Inputs and Results

The input values for GENEEC and SCIGROW are listed in Table 1. All parameters used came from EPA-accepted manufacture's reports, with the exception of the K_{oc} value, as described in the Appendix. Note that aerobic soil degradation half-lives reported by the manufacturer are low in comparison to literature values (see Appendix). Table 2 contains the estimated concentrations for the worst-case use of TPTH. The outputs from the GENEEC and SCIGROW models can be found in the Appendix.

Table 1. GENEEC and SCIGROW modeling parameters for TPTH

PC Code	083601
Solubility	8 ppm
Hydrolysis	stable
Photolysis	stable
Aerobic Soil Metabolism	$t_{1/2}$ = 21days
Soil-Water Partitioning (K_{oc})	5700 ml/g

Table 2. Worst case EECs for TPTH based on the application rate for pecans

App Method	App Rate (lbs ai/acre)	No. of Apps.	App. Int. (days)	GENEEC Peak EEC (ppb)	GENEEC 56-Day EEC (ppb)	SCIGROW conc. (ppb)
aerial spray	0.375	10	14	13	4	0.03

385

Appendix: K_{oc} Value and Aerobic Soil half lives

The previously accepted sorption/leaching study (MRID 0156006; accepted in 1987) was a thin layer chromatography study and did not give partitioning coefficients. A review of the TPTH file, uncovered one previous batch study (Soderquist, C.J., 1978. *The Environmental Chemistry of Triphenyltin Hydroxide*. Ph.D. dissertation, University of California, Davis). Soderquist (1978) performed single-point isotherms on four soils. Final aqueous concentrations for two of the batch studies were below the quantification limit of the concentration-detection device. Thus only two of the soils could be used for estimation of partitioning coefficients. Furthermore, Soderquist (1978) apparently did not run a control to determine losses and apparently assumed a complete mass balance without including losses. An assumption of a complete mass will overestimate the partitioning coefficient. Thus, the partitioning coefficients of Soderquist (1978) were recalculated assuming a 15 percent loss (e.g., losses due to sorption to laboratory apparati and to incorrect estimates of applied mass). The 15 percent value represents a conservative estimate with respect to reported losses ranging from 3 to 11 percent for batch studies conducted using meticulously precise techniques (see for example, Ball and Roberts, 1991, *Environ. Sci Technol.* 25, 1223-1237; Young and Ball, 1998, *Environ Sci and Technol.* 17, 2578-2584). Since it is likely that the techniques used in Soderquist (1978) were less sophisticated than the techniques used in the more recent citations given above, it is also likely that the losses could be greater than 11 percent, thus a value of 15 percent was chosen to be on the conservative side. With this correction, the K_{oc}s from Soderquist (1978) are 5700 mL/g (determined at an aqueous concentration of 56 µg/L) for a loamy sand and 30,000 mL/g (determined at an aqueous concentration of 13 µg/L) for a sandy clay loam. For the simulations, the lowest K_{oc} (5700 mL/g)value was used.

The aerobic soil half life used for these simulations (21 days) was taken from the accepted manufacturer's report (MRID: 00156004). This value was determined from a first-order degradation model fit to the data. Note that this value is lower than some literature-reported values. For example, Kannan and Lee (Kannan, K. and Lee, R.F., 1996. "Triphenyltin and Its Degradation Products in Foliage and Soils from Sprayed Pecan Orchards and in Fish from Adjacent ponds" *Environmental Toxicology and Chemistry*, 15(9), 1492-1499) reported that 87 to 90 % of TPTH remained in soil after 14 days of degradation. Other literature cited in Kannan and Lee (1996) reported half-lives ranging from 47 to 140 days.

495

Appendix: GENEEC Output

RUN No. 1 FOR TPTH INPUT VALUES

RATE (#/AC) ONE(MULT)	APPLICATIONS NO.-INTERVAL	SOIL KOC	SOLUBILITY (PPM)	% SPRAY DRIFT	INCORP DEPTH (IN)
.375(1.003)	10 14	5700.0	8.0	5.0	.0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
21.00	0	N/A	.00- .00	.00	*******

GENERIC EECs (IN PPB)

PEAK GEEC	AVERAGE 4 DAY GEEC	AVERAGE 21 DAY GEEC	AVERAGE 56 DAY GEEC
12.72	11.64	6.45	3.78

Appendix: SCIGROW Output

RUN No. 1 FOR TPTH INPUT VALUES

APPL (#/AC) RATE	APPL. NO.	URATE (#/AC/YR)	SOIL KOC	SOIL AEROBIC METABOLISM (DAYS)
0 .375	10	3.750	5700.0	21.0

GROUND-WATER SCREENING CONCENTRATIONS IN PPB

.032514

A= 16.000 B= 5705.000 C= 1.204 D= 3.756 RILP= .293
F= -2.062 G= .009 URATE= 3.750 GWSC= .032514