(2-12-96)

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Priester, T.M. 1991. Fish Accumulation Potential for Chlorsulfuron. Study performed and submitted by E.I. du Pont de Nemours & Company, Wilmington, Delaware. MRID No. 422142-04.

TYPE OF STUDY: Fish Bioaccumulation (165-4)

REVIEWED BY:

George Tompkins, Entomologist
Review Section 1, EFGWB, EFED

Signature: George Tompkins
Date: 1/21/1996

APPROVED BY:

Paul J. Mastradone, Section Chief
Review Section 1, EFGWB, EFED

Signature: Paul J Mastradone
Date: 12 FEB 1996

CONCLUSIONS:

1. This was not a submitted study but rather a document summarizing supporting data and scientific rationale to support the fish bioaccumulation study waiver request. This request was based on chlorsulfuron's low use rate, environmental degradation rate, physical/chemical properties, and preliminary fish bioaccumulation study results indicating a low potential to bioaccumulate. At this time it can be concluded that the information provided in the two preliminary studies and the low Octanol/Water Partition Coefficient are sufficient to satisfy the accumulation in fish data requirement (165-4).

2. The provided information indicated that the Octanol/Water Partition Coefficient of ^{14}C-labeled chlorsulfuron at 25^{0}C was 2.13 at pH 5, 0.10 at pH 7, and 0.04 at pH 9. The water solubility of chlorsulfuron was 587 ppm in pH 5 water, and 31,800 ppm in pH 7 water.

3. The information in the preliminary studies indicated that the bioaccumulation of chlorsulfuron was approximately 4X in the viscera and 6X in the liver in one study with bluegill sunfish and in the depuration phase the residue levels declined by 70-90%. The residues were not characterized because of the low levels, small sample weights, and the detection limits.

4. Three Appendices were included:

Hoffman, R.M. 1988. Determination of the Water Solubility of Chlorsulfuron, W4189. Study performed and submitted by Du Pont's Agricultural Products Department Experimental Station Laboratory, Wilmington, Delaware. Report No. W4189 B.

Han, J.C-Y. 1981. Residue Studies with [^{14}C]-DPX-4189 in Bluegill Sunfish. Study performed by the Biochemicals Department, E.I. Du Pont de Nemours & Co., Wilmington, Delaware. Report No. AMR 32-81.

Han, J.C-Y. 1981. Residue Studies with Glean Weed Killer in Channel Catfish. Study performed by the Biochemicals Department, E.I. Du Pont de Nemours & Co., Wilmington, Delaware. Report No. AMR 45-81.

MATERIALS AND METHODS:

Report No. AMR 45-81:

Fifty kg of Fallsington sandy loam soil (from Glasgow, Delaware: 49% sand, 42% silt, 9% clay, 1% organic matter, pH 6.4, and CEC 5.80 meq/100 g) was air dried, and treated with 25 mg of ^{14}C-phenyl labeled DPX-W4189 (3756 uCi, 99% radiochemical purity). The soil was aerobically aged for 29 days under greenhouse conditions (16-25^{0}C). After aging, the soil was placed in a 2 meter diameter circular polyvinyl chloride pool and 1570 L water was gently poured to cover the soil. The water used was a "soft" water with a pH of 7.0, a total hardness and alkalinity of 32 mg/L as $CaCO_3$ and a specific conductance of 150 umhos/cm. The flooded system was left undisturbed for two weeks.

One hundred and fifty channel catfish (Ictaluras punctatus) of mean length 8 cm and mean weight approximately 5 g were transferred to the pool. The sampling schedule consisted of removal of 4 fish, 100 ml water, and 100 g soil after 0, 1, 3, 7, 14, 21, and 28 days exposure. After the 4 weeks exposure period, the remaining fish were transferred to a "clean" aquarium for depuration. Fish were sampled 7 and 14 days into the depuration period. Fish were dissected into muscle, viscera, and liver and separate samples were frozen until analysis. Samples were weighed and analyzed by combustion analysis. Aliquots of water samples were counted for total ^{14}C activity by LSC. Water samples, after 100X concentration by rotary evaporation, were applied to TLC plates and developed for 15 cm with 1:1 (v/v) toluene and acetone.

Report No. AMR 32-81

One 50 L glass aquarium was filled with 30 L fresh water fortified with 1.0 ppm ^{14}C-phenyl labeled DPX-4189 (specific activity 0.15 uCi/mg; >99% radiochemical purity) and another with 0.01 ppm ^{14}C-DPX-4189 (specific activity 6.01 uCi/mg) and a third aquarium served as a control. The water temperature was maintained 22^{0}C, the water pH was 7.0, and the water was constantly aerated. Freshly prepared water, at the above conditions, was constantly added to the aquariums at 125 ml/min for a water turnover rate every four hours. ^{14}C-phenyl labeled chlorsulfuron radioactivity with water averaged 333 dpm/ml for the 1 ppm tank and 133 dpm/ml

for the 0.01 ppm tank.

One hundred bluegill sunfish (Lepomis macrochirus), 2-3 g each and 4-5 cm in length were transferred to each aquarium. The sampling schedule consisted of removing 4 fish and 20 ml water from each tank after 0, 1, 3 days and 1, 2, 3, and 4 weeks exposure. The remaining fish which had been exposed to chlorsulfuron were transferred to two aquariums containing fresh water. Fish samples were taken after 1, 3, 7, 10, and 14 days into the depuration period. Fish were dissected and separated into carcass, viscera, and liver and kept frozen until analysis. The radioactivity in the tissue samples was determined by combustion analysis followed by LSC. The water samples, which were taken at the same time as the fish, were analyzed for total radioactivity by LSC. Aliquots of the water samples were also applied directly to TLC plates and developed for 15 cm in toluene and acetone (1:1, v/v) for determination of radioactive species.

REPORTED RESULTS:

Report No. AMR 45-81:

1. The highest accumulation factors were 1.5X in edible tissue, 12X in viscera, and 7X in liver. Residues in all portions of fish declined by 90-95% during the depuration phase.

2. After the 4 week aging period, 52% of the total soil residue was intact DPX-4189, 30% was 2-chlorobenzenesulfonamide, and 18% was unextractable material.

3. After the two week flooding period approximately 0.19 ppm of the original 0.5 ppm ^{14}C-DPX-4189 remained in the soil. The balance (0.3 ppm, or ~60%) was found in the water.

Report No. AMR 32-81:

1. The bioaccumulation of chlorsulfuron was approximately 4X in the viscera and 6X in the liver. During the depuration phase the residue levels declined by 70-90%.

2. The residues were not characterized because of the low levels, small sample weights, and the detection limits.

DISCUSSION:

Although neither of the two preliminary fish bioaccumulation studies by themselves are acceptable, the information gained from them is adequate to indicate that chlorsulfuron does not appear to bioaccumulate in fish. The residues were not identified because of the detection limits available.