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

MAR 27 2003

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

Memorandum

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To: Arthur-Jean Williams, Chief
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Subject: No Effect Determination for Dicamba for Pacific Anadromous Salmonids

I reviewed data and other information for dicamba and its potential effects on Pacific anadromous salmonids and their critical habitat. Dicamba was included as one of the pesticides in litigation brought by the Washington Toxics Coalition. "Dicamba" is a term that can be used for several related pesticides: dicamba acid (PC code 29801), dicamba dimethylamine salt (PC code 29802), dicamba diglycoamine salt (PC code 128931), dicamba isopropylamine (PC code 128944), sodium dicamba (PC code 29806) and potassium dicamba (PC code 129043). Other forms of dicamba apparently have had registered products in the past. Regardless of the specific dicamba compound, I conclude that dicamba compounds with currently registered uses will have "no effect" on listed Pacific salmon and steelhead and their critical habitat, and therefore consultation with the National Marine Fisheries Service is not necessary.

Dicamba compounds currently registered are all salts and amines, along with the acid form. Most of the registered products are for the dimethylamine dicamba. All of these compounds will dissociate rapidly in aquatic environments, and therefore, the active moiety of concern for aquatic risk would be the dicamba acid, or more properly the dicamba anion. Tables 1-5 indicate that aquatic toxicity is similar and very low. There are no data specific to the isopropylamine, but because of the dissociation of the various forms, data on the other forms (especially the dimethylamine and acid) would be applicable. All fish LC50 values except one are >100 ppm, which is considered practically non-toxic and which would result in a "no effect" determination without having to analyze the risks (toxicity plus exposure equals risk). One test on rainbow trout with the dicamba acid resulted in an LC50 for rainbow trout of 28 ppm. Normally, a fish toxicity of 28 ppm would be of rather low concern, but would still lead to an assessment of

exposure to determine risks. However, with 17 tests showing fish LC50 values in excess of 100 ppm, and no others showing a definitive LC50 less than 100 ppm, it appears that the single rainbow LC50 is an anomaly.

Even if it is not an anomaly, using our standard endangered species criterion of concern when the EEC exceeds 0.05 of the fish LC50 would mean that EECs would have to exceed 1.4 ppm to be above that criterion. But 1.4 ppm would be a very high aquatic residue to be found in any waters, and USGS monitoring has not indicated surface water residues above 1 ppb anywhere in the original 20 study areas across the country. In the Pacific states, residues below 1 ppb were found in the Puget Sound[1] and Willamette River[2] study areas, but no residues were found in the Columbia Plateau[3], Sacramento River[4], and San Joaquin-Tulare[5] study areas.

Regardless of which basis is used, I conclude that there will be no direct effect on listed fish, including Pacific salmon and steelhead.

I further note that aquatic invertebrates are not very sensitive to various forms of dicamba. One test on an amphipod indicated an EC50 of 3.8 ppm (Table 1), but this was for an unidentified formulated product. Another test showed a Daphnia EC50 of 38.1 ppm (Table 3). As with fish, all other definitive LC50 or EC50 values exceed 100 ppm. Therefore, there should be no effect on the aquatic invertebrate food supply of listed fish. In the only aquatic macrophyte test on any form dicamba, the 14-day EC50 for the duckweed, *Lemna gibba*, was greater than 3.25 ppm, indicating there will be no effects on cover for listed fish. Therefore, I conclude that there will be no effect on the critical habitat components of food and cover for listed Pacific salmon and steelhead.

Species	Scientific name	% a. i.	96-hour LC50 (ppm)	
Waterflea	*Daphnia magna*	88	110.7 (48 hr EC50)	Practically non-toxic
Waterflea	*Daphnia magna*	38P	750 (48 hr EC50)	Practically non-toxic
Waterflea	*Daphnia magna*	88	>100 (48 hr EC50)	Practically non-toxic
Scud	*Gammarus lacustris*.	“Form ”	3.9 (48 hr EC50)	Moderately toxic

Table 1. Acute toxicity of dicamba acid (PC Code 29801) to freshwater fish and invertebrates from EFED files.				
Scud	*Gammarus fasciatus*	88	>100	Practically non-toxic
Rainbow trout	*Oncorhynchus mykiss*	86.8	>180	Practically non-toxic
Rainbow trout	*Oncorhynchus mykiss*	10	153	Practically non-toxic
Rainbow trout	*Oncorhynchus mykiss*	38P	130	Practically non-toxic
Rainbow trout	*Oncorhynchus mykiss*	88	28	Slightly toxic
Bluegill sunfish	*Lepomis macrochirus*	86.8	135.3	Practically non-toxic
Bluegill sunfish	*Lepomis macrochirus*	38P	180	Practically non-toxic
Bluegill sunfish	*Lepomis macrochirus*	88	>50	NA
Spot	*Leiostomus xanthurus*	87	>1	NA
Sheepshead minnow	*Cyprinodon variegatus*	86.6	>180	Practically non-toxic
Glass shrimp	*Paleomonetes kadiakensis*	88	>56	NA
Grass shrimp	*Palaemonetes pugio*	86.2	>100	Practically non-toxic
Brown shrimp	*Penaeus aztecus*	87	>1	NA

Table 2. Acute toxicity of dicamba dimethylamine (PC code 29802) to freshwater fish and invertebrates from EFED files.				
Species	Scientific name	% a. i.	96-hour LC50 (ppm)	Toxicity Category
Rainbow trout	*Oncorhynchus mykiss*	48.2	>1000	Practically non-toxic

Table 2. Acute toxicity of dicamba dimethylamine (PC code 29802) to freshwater fish and invertebrates from EFED files.				
Rainbow trout	*Oncorhynchus mykiss*	11.5	>1000	Practically non-toxic
Bluegill sunfish	*Lepomis macrochirus*	48.3	>1000	Practically non-toxic
Bluegill sunfish	*Lepomis macrochirus*	11.5	>1000	Practically non-toxic
Waterflea	*Daphnia magna*	48.2	1600	Practically non-toxic

Table 3. Acute toxicity of dicamba sodium (PC code 29806) to freshwater fish and invertebrates from EFED files.				
Species	Scientific name	% a. i.	96-hour LC50 (ppm)	Toxicity Category
Waterflea	*Daphnia magna*	26.5	38.1 (48 hr EC50)	Slightly toxic
Rainbow trout	*Oncorhynchus mykiss*	22?	558	Practically non-toxic
Bluegill sunfish	*Lepomis macrochirus*	22	706	Practically non-toxic

Table 4. Acute toxicity of dicamba diglycoamine (PC Code 128931) to freshwater fish and invertebrates from EFED files.				
Species	Scientific name	% a. i.	96-hour LC50 (ppm)	Toxicity Category
Waterflea	*Daphnia magna*	40.15	>400	Practically non-toxic
Rainbow trout	*Oncorhynchus mykiss*	40.15	>400	Practically non-toxic
Bluegill sunfish	*Lepomis macrochirus*	40.15	>400	Practically non-toxic

Table 5. Acute toxicity of Dicamba potassium (PC Code 129043) to freshwater fish and invertebrates from EFED files.				
Species	Scientific name	% a. i.	96-hour LC50 (ppm)	Toxicity Category
Waterflea	*Daphnia magna*	38	750	Practically non-toxic
Rainbow trout	*Oncorhynchus mykiss*	38	130	Practically non-toxic
Bluegill sunfish	*Lepomis macrochirus*	38	180	Practically non-toxic

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