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

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OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

Memorandum

Subject: 86-NE-03. Proposed Section 18 for Sethoxydim (Poast®, EPA Reg. No. 7969-58) on potatoes. RCB #1210

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The Nebraska Department of Agriculture has recently issued a section 18 crisis exemption (7/8/86) and now requests a specific exemption for the use of the herbicide sethoxydim (Poast®, 20% emulsifiable concentrate, 1.5 lbs.a.i./gallon) on potatoes. Poast® will be used to control wild proso millet and volunteer corn on a total maximum area of approximately 10,000 acres of potatoes (estimated from 1981-1983 data in Agricultural Statistics).

Tolerances are established for residues of sethoxydim [2-[1-(ethoxyimino)butyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexene-1-one] and its metabolites containing the 2-cyclohexene-1-one moiety (calculated as the herbicide) in or on various raw agricultural commodities ranging from 0.05 (N) ppm for milk to 15 ppm for cottonseed soapstock; and include 0.2 ppm for the meat, fat and meat by-products of cattle, goats, hogs, horses, poultry and sheep; and 0.5 ppm for eggs. Numerous tolerances are pending (40 CFR 180.412). A Registration Standard has not been completed for sethoxydim.

The proposed use includes a maximum of two applications at 2 pts. (0.375 lbs.a.i.)/A/application. No interval between applications is specified. Applications could be made by ground or aerial equipment, and a 20-day PHI would be imposed. This use is similar to one granted in a similar section 18 requested by Nebraska in 1984 (see M.L. Loftus, 6/11/84).

This previous use called for a maximum of two applications at 0.2-0.4 lbs.a.i./A in total volumes of 5 gallons/A for aerial treatments and 10 gallons/A for ground treatments. A 28-day PHI was imposed for applications made under the authority of that section 18.

The metabolism of sethoxydim in plants is adequately understood for the purposes of this section 18 (see K. Arne, 6/26/86). The residue of concern consists of parent plus metabolites containing the 2-cyclohexene-1-one moiety.

Residue data for potatoes and other root crops were submitted in conjunction with several previous section 18 requests (see R. Loranger, 6/27/83 and 7/1/83). Residues were determined using BWC Agricultural Method No. 30 which was successfully tried out for soybeans, milk and liver (M. Nelson, 4/22/83). This method involves initial extraction with methanol followed by precipitation with calcium hydroxide, oxidation with hydrogen peroxide to form substituted pentanedioic acids, methylation, several clean-up steps using dichloromethane partitioning and silica gel columns, and analysis by GLC using a flame photometric detector operating in the sulfur-specific mode.

Available BASF data for root crops were summarized previously (M.L. Loftus, 6/11/84). This summary is reproduced below.

Crop	Lbs.a.i./A	PHI	Residue (ppm)
Shallots	0.5	19, 22	0.35, 0.09
Garlic	0.5	28-87	0.08-0.79
	1.0	28-87	0.12-0.68
Potatoes	0.5	11, 65	0.13, 0.06
Bulb onions	0.25 - 0.5	36, 87	$\leq$ 0.05
Carrots	0.2 - 0.5	28-76	$\leq$ 0.05

Based on this data, we estimate that total residues of sethoxydim and its metabolites containing the 2-cyclohexene-1-one moiety will not exceed 2 ppm in potatoes as a result of the proposed use.

Meat, Milk, Poultry and Eggs

The diets of beef cattle could consist of 3.7 ppm sethoxydim residues based on 25% cottonseed (5 ppm tolerance), 5% cottonseed soapstock (15 ppm), 10% soybeans (10 ppm), 20% sugar beet molasses (0.5 ppm), 10% sugar beet tops (0.2 ppm) and 30% cull potatoes (0.2 ppm). The diets of dairy cattle could consist of 4.9 ppm sethoxydim residues based on 20% cottonseed (0.5 ppm), 5% cottonseed soapstock (15 ppm),

25% soybeans (10 ppm), 10% sugar beet molasses (0.5 ppm), 10% sugar beet tops (0.2 ppm) and 30% cull potatoes (0.2 ppm). The diets of turkeys/broilers could consist of 2.9 ppm sethoxydim residues based on 5% cottonseed soapstock (15 ppm), 20% soybeans (10 ppm), 4% sugar beet molasses (0.5 ppm) and 7% cull potatoes (0.2 ppm). The diets of laying hens could consist of 6.2 ppm sethoxydim residues based on 5% cottonseed soapstock (15 ppm), 20% soybeans (10 ppm), 5% sugar beet molasses (0.5 ppm) and 50% cull potatoes (2 ppm). The diets of hogs could contain residues similar to the residues found in the diets of dairy cattle.

Animal feeding studies have been reviewed previously (K. Arne, 6/26/85). Cattle were dosed with BAS 9052H at 50 ppm for 30 days. Milk samples were obtained daily, and animals were sacrificed within one day after the final dose. Chickens were dosed with 25, 80 or 250 ppm MSO (sulfoxide metabolite) for 29 days. Eggs were collected daily, and chickens were sacrificed 1, 2 or 7 days following the final dose. Residues found are summarized below.

Sethoxydim residues in animals

Commodity	Residue (ppm) 50 ppm in Diet
Beef muscle	<0.03
" liver	<0.15 - 0.20
" kidney	<0.15 - 0.16
Milk	<0.05 - 0.06

Commodity	Residue (ppm) 25 ppm in Diet	80 ppm in Diet	250 ppm in diet
Chicken fat	<0.05	0.05	0.17
" kdney	0.75	1.04	1.46
" liver	0.40	0.42	1.26
" muscle	0.06	0.10	0.21
" skin	0.10	0.23	0.60
Eggs	0.31 - 1.08	1.04 - 3.9	2.15 - 11.9

Based on these data, we calculate that residues are not likely to exceed the tolerance of 0.2 ppm for the meat, fat and meat by-products of cattle, goats, hogs, horses, poultry and sheep; except in the kidney of poultry where residues could exceed the established tolerance of 0.2 ppm, but are not likely to exceed 0.5 ppm as a result of the proposed use. The Tolerances of 0.5 ppm for eggs and 0.05 ppm for milk are not likely to be exceeded as a result of the proposed use.

Conclusions

(1) The metabolism of sethoxydim in plants and animals is adequately understood for the purposes of this section 18. The residue of concern consists of parent plus metabolites containing the 2-cyclohexene-1-one moiety.

(2) Analytical Methods are available for enforcement (BWC Agricultural Chemicals Method No. 30, PP#2F2670, K. Kissler, 4/1/83).

(3) Total resides of sethoxydim and its metabolites are not likeley to exceed 2 ppm in potatoes (and cull potatoes) as a result of the proposed use. Residues in the meat, fat and meat by-products of cattle, goats, hogs, horses, poultry and sheep are not likely to exceed the established tolerance of 0.2 ppm except in poultry kidney where residues are not likely to exceed 0.5 ppm. The tolerances for milk (0.05 ppm) and eggs (0.5 ppm) are not likely to be exceeded as a result of the proposed use.

(4) Analytical reference standards for sethoxydim and 5-OH sethoxydim are available from the Pesticides and Industrial Chemicals Repository. Standards for the nor series of metabolites are not available (it was requested in a previous memo, M. Metzger, 6/25/86, that these be sent by the manufacturer to the Pesticides and Industrial Chemicals Repository). We reiterate that these should be forwarded to the repository for purposes of enforcement.

Recommendations

TOX considerations permitting, RCB has no objections to this section 18. Agreements should be made with the FDA and USDA regarding the legal status of the treated commodities in commerce since established tolerances could be exceeded in poultry kidney.

cc:sethoxydim (Poast®) S.F., R.F., Section 18 S.F., Circu, M. Metzger, PMSD/ISB
RDI:E.Zager:EZ:7/25/86:RDS:7/25/86
TS-769:RCB:M.Metzger:MM:Rm814a:CM#2:7/25/86