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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: 87-CA-03. Chlorothalonil (Bravo® 500, EPA Reg. No. 50534-8) on Mushrooms. Section 18 Request. No Acc. Number RCB #1718

From: Michael S. Metzger, Chemist  
Residue Chemistry Branch  
Hazard Evaluation Division (TS-769) *Michael S Metzger*

Thru: Edward Zager, Section Head, SRS 2  
Residue Chemistry Branch  
Hazard Evaluation Division (TS-769)

To: Emergency Response and Minor Use Section  
Registration Division (TS-767C)

The California Department of Food and Agriculture requests a Section 18 specific exemption authorizing the use of chlorothalonil on mushrooms to control Verticillium fungicola. The formulation to be used is Bravo® 500, a dispersible suspension containing 4.17 lbs.a.i./gallon (40.4% a.i.). Applications will be made to approximately 25 million ft<sup>2</sup> of mushrooms.

Tolerances are established for combined residues of chlorothalonil (tetrachloroisophthalonitrile) and its metabolite 4-hydroxy-2,5,6-trichloroisophthalonitrile (SDS-3701) in or on numerous commodities ranging from 0.05 ppm for bananas (edible pulp) to 15 ppm for celery and papayas. Several tolerances are pending (40 CFR 180.275; 21 CFR 193.84). A Registration Standard has been completed for chlorothalonil (Residue Chemistry Chapter, 11/4/83).

The proposed use includes a maximum of 6 applications to the soil surface as follows:

- (1) 8 fl oz (0.26 lbs.a.i.)/1000 ft<sup>2</sup> as soon as possible after casing.
- (2) 4 fl oz (0.13 lbs.a.i.)/1000 ft<sup>2</sup> at pinning (emergence).
- (3) 4 fl oz (0.13 lbs.a.i.)/1000 ft<sup>2</sup>, 2-4 applications at breaks.

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A maximum of 28 fl oz (0.91 lbs.a.i.)/1000 ft<sup>2</sup>/crop cycle could be applied. Applications would be made in a minimum of 20 gallons of water per 1000 ft<sup>2</sup> of bed, and a 48 hour PHI would be imposed. Applications to mature mushrooms would be prohibited.

The Chlorothalonil Registration Standard identified several data gaps in the area of plant metabolism including the need for translocation studies involving ring-labeled [<sup>14</sup>C]-chlorothalonil, and identification of water-soluble compounds which constitute a major portion of the [<sup>14</sup>C]-chlorothalonil residues taken up from treated soils by plants. These have not yet been received. For the purposes of this Section 18 only, we consider the residue of concern to consist of parent chlorothalonil, SDS-3701, and 2 impurities found in technical chlorothalonil, hexachlorobenzene (HCB) and pentachlorobenzonitrile (PCBN).

No new residue data were submitted with this Section 18.

Residue data were submitted with PP#6E3410 (Acc. No. 262766). Two analytical methods were used to generate these data, Methods #702-3CR-84-0074-000 and #632-3CR-83-0043-000.

Both methods quantify residues of chlorothalonil per se, SDS-3701, HCB and PCBN. The first method involves extraction with H<sub>2</sub>SO<sub>4</sub>-acidified acetone followed by partitioning with petroleum ether affecting separation of SDS-3701 from the other 3 compounds. Following additional clean-up steps and derivitization of SDS-3701 to the methyl ether, analysis is accomplished by GLC using an electron capture detector. Recoveries of the 4 components ranged from 70-130% at fortification levels of 0.01-10.0 ppm. Reported sensitivities are 0.01 ppm for chlorothalonil and SDS-3701, 0.003 for HCB and 0.005 for PCBN.

The second method utilizes various extraction solvents and clean-up procedures. Analysis is accomplished by GLC using an electron capture detector. Details can be found for both procedures in PP#6E3410 (Acc. No. 262766). Recoveries for the 4 components ranged from 60-112% at fortification levels of 0.01-10.0 ppm. Reported sensitivities are 0.03 ppm for chlorothalonil and SDS-3701, 0.004 ppm for HCB and 0.008 ppm for PCBN.

Residue data submitted with PP#6E3410 were reviewed previously (N. Dodd, 11/12/86). This review is repeated in part below.

West Winfield, PA

Bravo® 500 was applied at 0.26 lbs.a.i./1000 ft<sup>2</sup> at casing, and at 0.13 lbs.a.i./1000 ft<sup>2</sup> at pinning and after breaks. Applications were made in 19-31 gallons of water per 1000 ft<sup>2</sup>. PHI values are given in the summary tables in parentheses. Residues in these tables are given in ppm.

	<u>1'st Break</u> (120 hrs) (2 apps.)	<u>2'nd Break</u> (72 hrs) (3 apps.)	<u>2'nd Break</u> (96 hrs)	<u>3'rd Break</u> (48 hrs) (4 apps.)	<u>4'th Break</u> (72 hrs) (5 apps.)
Chlorothalonil	0.05-0.17	0.14-0.58	0.16-0.24	1.57-1.91	0.64-1.15
SDS-3701	ND -0.03	0.01-0.06	0.02-0.03	0.03-0.04	0.06-0.11
HCB	ND	ND	ND	ND	ND
PCBN	ND-0.006	ND -0.016	ND -0.005	0.014-0.017	0.006-0.015

Avondale, PA

Bravo® 500 was applied at the same rate as in West Winfield, PA (above) in 25 gallons of water per 1000 ft<sup>2</sup>.

	<u>1'st Break</u> (48 hrs) (2 apps.)	<u>2'nd Break</u> (48 hrs) (3 apps.)	<u>3'rd Break</u> (48 hrs) (4 apps.)	<u>4'th Break</u> (48 hrs) (5 apps.)
Chlorothalonil	1.31-1.94	1.86-2.55	2.66-3.07 *	3.05-3.28
SDS-3701	0.06-0.07	0.02	0.02	0.03-0.04
HCB	ND	ND	ND	ND
PCBN	0.013-0.015	0.019-0.021	0.026-0.030	0.019-0.022

State College, PA

Bravo® 500 was applied at the same rates as discussed above in 19-31 gallons of water per 1000 ft<sup>2</sup>.

	<u>1'st Break</u> (48 hrs) (2 apps.)	<u>2'nd Break</u> (48 hrs) (3 apps.)	<u>3'rd Break</u> (48 hrs) (4 apps.)	<u>4'th Break</u> (48 hrs) (5 apps.)	<u>5'th Break</u> (48 hrs) (6 apps.)
Chlorothalonil	0.21-0.44	0.26-0.71	0.31-0.75	0.35-0.50	0.70-1.79
SDS-3701	ND	0.02	0.01-0.02	0.01-0.02	0.04
HCB	ND	ND	ND -0.003	ND	ND
PCBN	ND -0.007	ND-0.012	0.006-0.012	ND-0.008	0.008-0.015

Bravo® 500 was also applied at 0.15-0.24 lbs.a.i./1000 ft<sup>2</sup> at casing and 0.07-0.12 lbs.a.i./1000 ft<sup>2</sup> at pinning and at breaks.

	1'st Break (48 hrs) (2 apps.)	2'nd Break (48 hrs) (3 apps.)	3'rd Break (48 hrs) (4 apps.)	4'th Break (48 hrs) (5 apps.)	5'th Break (48 hrs) (6 apps.)
Chlorothalonil	0.40-0.54	0.51-0.85	0.56-1.00	0.47-1.03	0.70-1.73
SDS-3701	ND -0.01	ND-0.02	0.02	0.01-0.02	0.03-0.05
HCB	ND	ND	ND	ND	ND -0.003
PCBN	0.005-0.007	0.007-0.013	ND-0.006	0.006-0.011	0.011-0.029

Connecticut

Bravo® 500 was applied at a rate of 0.14 or 0.28 lbs.a.i./1000 ft<sup>2</sup>. Four scenarios were followed: One application at 0.14 lbs.a.i./1000 ft<sup>2</sup> and a PHI of 5 days (1'st break); 2 applications at 0.14 lbs.a.i./1000 ft<sup>2</sup> and a PHI of 6 days (2'nd break); 2 applications at rates of 0.14 lbs.a.i./1000 ft<sup>2</sup> and 1 application at 0.28 lbs.a.i./1000 ft<sup>2</sup> and a PHI of 4 days (3'rd break); and 2 applications at 0.14 lbs.a.i./1000 ft<sup>2</sup> and 2 applications at 0.28 lbs.a.i./1000 ft<sup>2</sup> and a PHI of 3 days (4'th break). Applications were made at pinning and prior to formation of caps. The only detectable residues found were at the two highest application rates (i.e. 4 apps.) in which chlorothalonil only was found at <0.03-0.08 ppm.

Oregon

Bravo® 75W was applied at 0.23 lbs.a.i./1000 ft<sup>2</sup> followed by 1-5 applications at 0.12 lbs.a.i./1000 ft<sup>2</sup>. Applications were made in 19 or 31 gallons of water per 1000/ft<sup>2</sup>.

	(38 hrs.) (2 apps.)	(48 hrs.) (2 apps.)	(36 hrs.)** (3 apps.)	(38 hrs.) (4 apps.)	(48 hrs.)** (4 apps.)
Chlorothalonil	5.88-6.68	3.64-6.20	6.74-7.38	2.04-6.00	4.16-5.52
SDS-3701	ND	ND	ND	ND	ND
HCB	ND-0.005	ND -0.04	0.005	ND -0.004	0.004
PCBN	0.069-0.092	0.046-0.079	0.086-0.105	0.046-0.066	0.041-0.061

	(38 hrs.) (5 apps.)	(48 hrs.)* (3 apps.)	(48 hrs.)* (5 apps.)
Chlorothalonil	1.62-3.10	2.98-3.22	2.80
SDS-3701	ND	ND	ND
HCB	ND	ND	ND
PCBN	0.017-0.041	0.032-0.039	0.025-0.030

\*Data for 31 gallons water per 1000 ft<sup>2</sup> only  
 \*\*Data for 19 gallons water per 1000 ft<sup>2</sup> only

Based on these data, and for the purposes of this Section 18 only, we conclude that residues are not likely to exceed the following values in or on mushrooms as a result of the proposed use:

Chlorothalonil + SDS-3701	8 ppm
PCBN	0.1 ppm
HCB	0.005 ppm

#### Meat, Milk, Poultry and Eggs

No animal feed items are involved with this use. Therefore, secondary residues in eggs, milk, and in the meat, fat and meat by-products of cattle, goats, hogs, horses, poultry and sheep are not likely to occur as a result of the proposed use.

#### Conclusions

- (1) For the purposes of this Section 18 only, we will consider the residue of concern for chlorothalonil use on mushrooms to consist of parent chlorothalonil, SDS-3701, HCB and PCBN.
- (2) For the purposes of this Section 18 only, we estimate that residues are not likely to exceed the following values in mushrooms as a result of the proposed use:

Chlorothalonil + SDS-3701	8 ppm
PCBN	0.1 ppm
HCB	0.005 ppm
- (3) No animal feed items are involved in this use. Therefore, secondary residues are not expected in milk, eggs or in the meat, fat and meat by-products of cattle, goats, hogs, horses, poultry and sheep as a result of the proposed use.
- (4) For the purposes of this Section 18 only, we consider Method #702-3CR-84-0074-000 to be adequate for enforcement purposes (see PP#6E3410, Acc. No. 262766).
- (5) Analytical reference standards are available from the Pesticides and Industrial Chemicals Repository.

Recommendations

TOX considerations permitting, RCB has no objections to this Section 18. An agreement should be made with the FDA regarding the legal status of the treated commodities in commerce.

cc:Chlorothalonil (Bravo®) S.F., R.F., Section 18 S.F., Circu,  
M.Metzger, PMSD/ISB  
RDI:E.Zager:EZ:12/22/86:RDS:12/22/86  
TS-769:RCB:M.Metzger:MM:Rm803a:CM#2:12/22/86