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To: William Miller
Product Manager 16
Registration Division (TS-767)

From: Carolyn K. Offutt *Carolyn K. Offutt*
Chief, Environmental Processes and Guidelines Section
Exposure Assessment Branch, HED (TS-769)

Attached, please find the estimated environmental concentration review of:

Reg./File No.: 100-599

Chemical: Profenofos

Type Product: Insecticide

Product Name: Curacorn

Company Name: Ciba-Geigy

Submission Purposes: 1984 Pond Monitor Survey study to
satisfy for full registration requirement

Action Code: 576

Date In: 1-28-85

EFB#: 5264

Date Completed: 1-28-85

TAIS (Level II) Days

403

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Deferrals to:

- XX Ecological Effects Branch
- Residue Chemistry Branch
- Toxicology Branch

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Review of Pond Monitoring Data

1. Chemical: Profenofos; O-(4-bromo-2-chlorophenyl) O-ethyl S-propyl phosphorothioate. [For detailed chemistry data see attached one-liner.]
2. Test material: Curacron® 6E Insecticide (1.0 lb a.i./A)
3. Study/Action Type: Request to upgrade Conditional registration to full registration of Curacron® 6E based upon pond monitoring, stability, and spike studies conducted by registrant (Ciba-Geigy) in 1984.
4. Study Identification: 1984 Monitoring Survey of Store Cut Pond. Mississippi, and Curacron® spiking study. Identification #100-599, Action Code 576, Accession #256284. Prepared by Environmental Research Technology; Fort Collins, Co., Nov. 1984 for Ciba-Geigy Corp; Greensboro, N.C. A monitoring survey of macroinvertebrates and physio-chemical parameters of concern at Store Cut Pond in Mississippi during June-July 1984 as follow-up to studies conducted in 1983. Stability of Curacron® 6E in aquatic (lab and field) systems using spiking technique was also conducted.
5. Reviewed by:
P. Datta, Chemist P. Datta Date 4/10/85
Environmental Processes and Guidelines Section,
EAB/HED.
6. Approved by:
Carolyn K. Offutt, Chief Carolyn K. Offutt Date 4/10/85
Environmental Processes and Guidelines Section,
EAB/HED.
7. Conclusions: The Store Cut Pond in Mississippi under study is not typical of ponds encountered in farmlands across United States. Little or no water enters this pond as runoff from the adjacent field; the pond receives water mostly from ground water sources.

Therefore, except for assessing spray drift, neither the study of 1983 nor the follow-up study of 1984 produces adequate results to state that Curacron® 6E used according to the label direction (a) does not adversely affect the water quality and (b) does not pose unreasonable risk to aquatic organisms.

The Exposure Assessment Branch defers an evaluation of biological studies to the Ecological Effects Branch.

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8. Recommendation:

It is recommended that the Registrant (Ciba-Geigy) be informed of the inadequacy of the data submitted to obtain full registration. Ciba-Geigy should submit a monitoring protocol of ponds and rivers typically found across the farmlands of the United States representative of proposed use patterns of Curacron®.

9. Background:

During the summer of 1983, a field study was conducted of Store Cut Pond in Mississippi before, during, and after six aerial applications of profenfos to an adjacent cotton field. (See May 23, 1984, review by Dr. Robert Holst of EPGS/EAB/HED.)

The purpose of the 1984 study of Store Cut Pond was to determine the long-term effects, if any, from the 1983 applications. No profenfos applications were made in 1984.

The reviewer of 1983 data, Dr. Holst, inquired and received information from Dr. Gary Dickson (Ciba-Geigy) that water in the Store Cut Pond was mainly supplied by ground water and runoff, and very little from runoff of the field in question. Dr. Holst concluded: "For purposes of measuring spray drift into a pond adjacent to a field being sprayed under these or similar conditions, this study is acceptable", with a general remark about the complexity of processes (spray drift, runoff, interflow, ground water, etc.), in a natural aquatic system (pond, river, etc.)

Dr. Holst also raised the issue in his May 24, 1984, review about sample stability during sampling, shipment, and analysis and recommended a spiking study.

10. Discussion of individual test or studies.

The report by Environmental Research Technology, Inc., (ERT) states that the values of physical-chemical parameters (pH, temperature, dissolved oxygen, conductivity, organophosphates, carbamates, pyrethroids, organochlorines and DDE) in June 1984 are similar to the values of in June 1983. The attached Table 3-1 from the ERT report indicates the physical-chemical data for 1984.

Environmental Research and Technology, Inc., has initially concluded in the report to Ciba-Geigy that the best explanation for macroinvertebrate declines observed in Store Cut Pond during the summer months of 1983 is probably due to falling water level.

The chemical studies showed the following:

- (a) The pH study indicated that values were considerably lower in 1984 than approximately the same time period in 1983.

But ERT concludes that the year-to-year variability of natural systems depends on random processes, such as weather. An exact duplication of pond conditions in July 1983 and July 1984 did not occur.

- (b) The field spike study showed that Curacron[®] did not degrade in near neutral pH pond water to undetectable limits after two days.

(Attached is a copy of Table 3-6 from page 26 of the ERT report). Similar shipment and preparation methods were employed in both years (1983 and 1984).

In the higher spike concentrations lower recoveries were noted.

- (c) The laboratory spike studies indicated that Curacron[®] did not degrade to undetectable limits after 15 days at two pH values (7.4 and 9.0) and at three log-spaced spike concentrations (0.5, 5.0, and 50.0 ppb). Attached are copies of Tables 3-8 and 3-9 from the ERT report.

- (d) A loss of <10.0 percent of Curacron[®] in a given sample may be due to adherence to apparatus used to collect and prepare samples.

- (e) It was concluded by ERT that Curacron[®], if present at detectable amounts in Store Cut Pond during the summer of 1983, would not have degraded to detection limits during sampling and shipment by ERT and analysis by California Analytical Laboratories, Inc, in Sacramento, California. Therefore, the results of the chemical studies summarized above suggested that the sample collection, shipping and analytical methods and the natural conditions (pH 9) of the pond did not contribute to the degradation of Curacron[®] 6E to the detection limit; the analytical results in 1983 should represent the actual pond concentrations in 1983.

11. Completion of One-liner.

See attached one-liner.

12. CBI Appendix

Attached in this report Tables 3-1, 3-6, 3-8,
and 3-9 of ERT report.

EXPOSURE ASSESSMENT BRANCH ONE LINER

SHAUGH. NO. 11401 TYPE PESTICIDE: Insecticide STRUCTURE

COMMON NAME: Profenofos

CHEMICAL NAME: 0-(4-bromo-2-chlorophenyl)-

0-ethyl s-propyl phosphorothioate

TYPICAL USES Cotton

CHEMICAL PROPERTIES:

<u>Molecular Wt</u>	<u>Aqueous Solubility</u>	<u>Vapor Pressure</u>	<u>K_{ow}</u>	<u>K_{oc}</u>
<u>373.65</u>	<u>20 (ppm)</u>	<u>1x10⁻⁵ (torr)</u>	<u>47,863</u>	

Soil Adsorption Coefficient

<u>Soil Type</u>	<u>pH</u>	<u>% Soil O.M.</u>	<u>K</u>	<u>K_{om}</u>	<u>Soil TLC R_f</u>	<u>Mobility Class</u>
<u>sand</u>		<u>6.3</u>	<u>20.2</u>			(1) Immobile
<u>sand</u>		<u>7.8</u>	<u>4.56</u>			(2) Low
<u>sandy loam</u>		<u>6.7</u>	<u>55.6</u>			(3) Low to Mod.
<u>silt loam</u>		<u>6.1</u>	<u>22.2</u>			(4) Moderate
						(5) Mobile

Degradation

<u>Lab Half-life</u>	<u>Field Half-Life</u>	<u>Hydrolysis (23°)</u>		<u>Photolysis</u>
<u>Soil</u>	<u>Soil</u>	<u>pH</u>	<u>T¹/₂</u>	<u>T¹/₂</u>
<u>Aerobic: 4-7 wks</u>	<u>Soil 4.5 d loam</u>	<u>5</u>	<u>93 d</u>	<u>Soil: _____</u>
<u>Anaerobic: _____</u>	<u>16.8 d sandy</u>	<u>7</u>	<u>15 d</u>	<u>Water: 27 hr</u>
<u>Aquatic</u>	<u>Aquatic: _____</u>	<u>9</u>	<u>6 hr</u>	
<u>Aerobic: _____</u>				
<u>Anaerobic: _____</u>				

ENVIRONMENTAL EXPOSURE

Found in Ground Water (Y/N)? _____

Reentry Interval Established _____

Site(s) _____ Level: _____

Rotational Crop Restrictions _____

Leaching Potential _____

Lab: Yes _____ No _____

Field: Yes _____ No _____

EAB Chemical One-Liner (Cont).

Chemical Profenofos

Fish Bioaccumulations Factors

Species	Tissue		Whole Fish	Duration (Half-life)
	Edible	Viscera		
_____	_____X	_____X	_____X	_____
_____	_____X	_____X	_____X	_____
_____	_____X	_____X	_____X	_____

DEGRADATION SUMARRY

REFERENCES:

From Registration Actions.

TABLE 3-1
 PHYSICAL - CHEMICAL DATA COLLECTED FROM
 STORE CUT POND, MISSISSIPPI ON JUNE 4, 1984

Parameter	Measurement
Dissolved oxygen	
surface	7.3 ppm
bottom	0.2 ppm
Temperature	
surface	26.0°C
bottom	20.0°C
Conductivity	70.0 μ mhos/cm
pH	6.95 units
Mean depth	2.09 m
Curacron® Station 1	<10.0 ppb
Curacron® Station 2	<10.0 ppb
Organophosphates	
Sediments	<0.5 ppm
Water	<1.0 ppb
Carbamates ¹	
Sediments	-
Water	-
Pyrethroids	
Sediments	<5.0 ppm
Water	<7.5 ppb
Organochlorines (other than DDT)	
Sediments	<0.5 ppm
Water	<0.3 ppb
DDT metabolite p, p'-DDE sediments	1.2 ppm

¹Analysis gave inconclusive results.

TABLE 3-6
 RECOVERY OF CURACRON® ON DAY 0 FROM POND WATER (ADJUSTED TO pH 9.0),
 UNADJUSTED POND WATER, AND DISTILLED WATER

Curacron® Spike Level (ppb)	Analysis Concentration (ppb)	Mean Percent Recovery for Each Level
0.5 (pH 9.0)	0.38	
0.5 (pH 9.0)	0.44	82
5.0 (pH 9.0)	4.4	
5.0 (pH 9.0)	3.4	78
0.5 (Unadjusted Pond Water)	0.35	
0.5 (Unadjusted Pond Water)	0.5	
0.5 (Unadjusted Pond Water)	0.49	90
5.0 (Unadjusted Pond Water)	3.8	
5.0 (Unadjusted Pond Water)	4.1	
5.0 (Unadjusted Pond Water)	4.4	82
50.0 (Unadjusted Pond Water)	36.0	
50.0 (Unadjusted Pond Water)	39.0	
50.0 (Unadjusted Pond Water)	35.0	74
5.0 (in distilled water)	4.8	96

TABLE 3-8
RESULTS OF CAL STORAGE STABILITY STUDY A ON CURACRON®
(Pond Water Adjusted to pH 9.0)

Day	Control	Concentrations Recovered From 0.5 ppb Spike (means)	Concentrations Recovered From 5.0 ppb Spike (means)
0	<0.1	0.41	3.90
2	<0.1	0.51	3.70
7	<0.1	0.43	3.20
15	<0.1	0.25	2.80

TABLE 3-9
 RESULTS OF CAL STORAGE STABILITY STUDY B ON CURACRON®
 (UNADJUSTED POND WATER AT pH 7.4)

Day	Control	Concentrations Recovered From 0.5 ppb Spike (means)	Concentrations Recovered From 5.0 ppb Spike (means)	Concentrations Recovered From 50.0 ppb Spike (means)	Concentrations Recovered From Distilled Water (5.0 ppb Spiked)
0.00	<0.1	0.45	4.10	37.00	4.80
2.00	<0.1	0.40	5.10	36.00	6.20
7.00	<0.1	0.33	3.70	31.00	5.00
15.0	<0.1	0.42	3.00	31.00	4.90