Shaughnessy No.: 081901

Date Out of EAB: APR 22 1986

Signature: _____

To: Henry M. Jacoby
Product Manager #21
Registration Division (TS-767)

From: Emil Regelman, Supervisory Chemist
Review Section #3
Exposure Assessment Branch
Hazard Evaluation Division (TS-769)

Attached, please find the EAB review of...

Reg./File # : 50534-7

Chemical Name: Chlorothalonil

Type Product : Fungicide

Product Name : BRAVO 500

Company Name : SDS Biotech Corp.

Purpose : In support of data requirements identified by the registration standard.

Date Received: 7-26-85

Date Completed: 4-22-86

Monitoring Requested: _____

Monitoring Voluntarily Done: _____

Action Code(s): 660

EAB #(s) : 5811 & 5812

TAIS Code: 44

Total Reviewing Time: 2 days

Deferrals to:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

(HED PROVIDE) CASWELL NO.:

REGISTRATION DIVISION DATA REVIEW RECORD
—TO BE USED FOR REVIEW OF STUDIES PPA ONLY—

Confidential Business Information—
Does Not Contain National Security Info. (E.O. 12065)

(HED PROVIDE) PACK No.: 11336
7-26-85

CHEMICAL NAME: Chlorothalonil

(RD PROVIDE) SHAUGNESSY NO. 081901

Identifying Number	Action Code	Reference Number	Record Number	Study Guideline or Narrative Description	Reg. Std. Review Submission Criteria (SEE BELOW)	Accession Number	(RSERB Provide) MRID Number	(HED/BUD/TSS Complete) Review Results: Acceptable (A)/ Unacceptable(U)
50534-7	660	10	155544	EAM. (2 mth)	2	255774		
50534-7	660	"	155650		"	255756		

PRODUCT MANAGER (PM) OR REVIEW MANAGER (RM) AND NUMBER: Jacoby 91 557-1900

PM/RM TEAM MEMBER AND NUMBER: Doris 557-1900

DATE RECEIVED (EPA): 7-23-85

RD BRANCH CHIEF INITIALS:

CHECK APPLICABLE BOX:

- ☐ Adverse 6(a)(2) Data (405,406)
- ☐ Suspect Data (415,416)
- ☐ IBT Data (485,486)
- ☐ Groundwater Data (495,496)
- ☐ Data Waiver Request (Reregistration) (650,651)
- ☐ Formulation Data and Labeling (Reregistration) (655,656)
- ☒ Generic Data (Reregistration) (660,661)
- ☐ Special Review Data (870,871)

FH

NUMBER OF INDIVIDUAL STUDIES SUBMITTED: 2

RELATED ACTIONS:

INSTRUCTIONS: Review Data For Acceptability

TO BE COMPLETED BY RSERB

DATE SENT TO HED/BUD/TSS: 7-26-85

PRIORITY NUMBER: 50

PROJECTED RETURN DATE: 9-23-85

DATE RETURNED TO RD (HED/BUD/TSS PROVIDE):

REVIEWS SENT TO:

HED: ☐ SIS ☐ TB ☐ RCB ☐ EAB ☐ EEB RD: ☐ TSS BUD: ☐ EAB ☐ SSB

TO:		TYPE OF REVIEW	NUMBER OF ACTIONS: Reregistration	Special Review	Other
HED		Toxicology			
		Ecological Effects			
		Residue Chemistry			
	V	Exposure Assessment	✓		
RD/TSS		Product Chemistry			
		Efficacy			
		Precautionary Labeling/Acute Tox.			
BUD		Science Support			
		Economic Analysis			

FOR DATA SUBMITTED UNDER A REGISTRATION STANDARD: Review Submission Criteria

Policy Note #31

1 = data which meet 6(a)(2) or meet 3(c)(2)(B) flagging criteria.

(2) = data of particular concern

3 = data necessary to determine tiered testing requirements

NOTE TO TSS: Return 1 Copy To RSERB

INCLUDE AN ORIGINAL AND FOUR (4) COPIES OF THIS COMPLETED FORM FOR EACH BRANCH CHECKED FOR REVIEW.

2

1. CHEMICAL:

Common Name Chlorothalonil

Chemical Name Tetrachloroisophthalonitrile
2,4,5,6-tetrachloro-1,3-benzenedicarbonitrile

Trade Name Bravo; Exotherm Termil; Daconil 2787

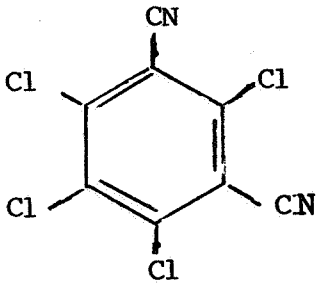
Action Fungicide

FORMULATIONS: 75% w.p.; 500g/l flowable.

1. Chemical/physical properties (Martin)

At 25°C solubility in H_2O = 0.6 ppm
At 40°C v.p. <0.01 mm Hg
At 170°C v.p. <9.2 mm Hg

Structure



2.0 TEST MATERIAL:

2.1 [^{14}C]3-Cyano-2, 4, 5, 6-tetrachloro benzamide (SDS-19221, 97.7% pure, specific activity ~5600 dpm/ug. ICN Pharmaceuticals.

2.2 [^{14}C]-Chlorothalonil, uniformly ring labeled 98.8% pure, specific activity ~2500 dpm/ug. ICN Chemical & Radioisotope Division.

3.0 STUDY/ACTION TYPE:

3.1 Hydrolysis study for DS-19221 (3-cyano-2, 4, 5, 6-tetrachloro-benzamide) a hydrolytic product of chlorothalonil.

3.2 Anaerobic aquatic metabolism of chlorothalonil.

4.0 STUDY IDENTIFICATION:

4.1 Fiche/Master ID No MRID

Nelsen, I.R. 1985a. A hydrolysis study with ^{14}C-3-cyano-2,4,5,6-tetrachlorobenzamide. Document No. 721-3EF-85-0002-001. Unpublished study received July 23, 1985, under 50543-7. In response to Chlorothalonil Registration Standard: Submission of Rat Oncogenicity Study and Supporting Chlorothalonil Registration Data, 04. Environmental Chemistry. Submitted by SDS Biotech Corporation, Painesville, OH. Accession No. 258779.

MRID 147974
147975

FICHE/MASTER ID NO MRID:

4.2 Nelsen, T.R. 1985b. Anaerobic aquatic soil metabolism study with ^{14}C-Chlorothalonil. Document No. 680-3EF-0026-001. Unpublished study received July 23, 1985, under 50534-7. In response to Chlorothalonil Registration Standard: Submission of Rat Oncogenicity Study and Supporting Chlorothalonil Registration Data, 04. Environmental Chemistry. Submitted by SDS Biotech Corporation, Painesville, OH. Accession No. 258779.

5.0 REVIEWED BY:

Hudson L. Boyd
Chemist, EAB/HED/OPP

Signature: Hudson L Boyd

Date: 4/22/86

6.0 APPROVED BY:

Emil Regelman, Supervisory Chemist
Review Section #3, EAB/HED/OPP

Signature: APR 22 1986

Date: / /86

7.0 CONCLUSIONS:

7.1 DS-19221, viz, 3-Cyno-2,4,5,6-tetrachlorobenzamide is stable to hydrolysis for at least 30 days at pH 5.0 and 7.0. In alklaine conditions, e.g., pH 9.0, about 10% of the applied material will further degrade to 2,4,5, 6-tetrachloroisophthalamide within 30 days.

The data for this study satisfies the EPA Guideline Requirements (161-1) for registering chlorothalonil.

7.2 The half-life of chlorothalonil in flooded sandy loam silt or loam soils is expected to be about 5-15 days. Degradates will include 4-hydroxy-2,5,6-trichloroisophthalonitrile; 3-cyano-2, 4,5,6-techrachlorobenzamide; 2-hydroxy-5-cyano-3,4,6-trichlorobenzamide; and 3-carboxy-2,5,6-trichlorobenzamide. Only a minute fraction of the residues are expected to volatilize in anaerobic aquatic environments.

The data for this study satisfies the EPA Guideline Requirements (162-3) for registering chlorothalonil.

8. 0 RECOMMENDATIONS:

8.1 Accept the data submitted for hydrolysis of chlorothalonil as meeting EPA Guidelines Requirements § 161-1.

8.2 Accept the data submitted for anaerobic aquatic metabolism as meeting EPA Guidelines Requirements § 162-3 and in lieu of requirements for anaerobic soil metabolism studies per § 162-2.

9.0 BACKGROUND:

9.1 The registration standard for chlorothalonil idendifies data from hydrolysis studies as being lacking. The registrant submitted data from a hydrolysis study to fill the data gap.

9.2 The registration standard for chlorothalonil identified data from anaerobic soil metabolism studies as being lacking. The registrant submitted acceptable data from anaerobic aquatic metabolism studies to fill the data gap. (See 40 CFR 158.130 for justification of the substitution).

1.0 DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

10.1 Hydrolysis

[^{14}C] 3-cyano-2,4,5,6-tetrachlorobenzamide was added to sterile aqueous buffer solutions at pH 5,7, and 9, incubated in the dark at 24° ± 1°C, and sampled at 1,5,10,15, and 30 days subsequently.

Aliquots of each solution were analyzed for total radioactivity by LSC and by HPLC.

The compound was shown to be stable to hydrolysis for at least 30 days at pH 5 and 7; at pH 9, about 10% of the applied had degraded to 2,4,5,6-tetrachloroisophthalamide.

10.2 Anaerobic aquatic metabolism

Anaerobic conditions were established over samples of silt loam and sandy loam. After 30 days of incubation in this condition and at 25° + 3°C the samples were treated with ^{14}C labeled chlorothalonil and anaerobic conditions again established. Incubation under dark conditions was continued (25°C, time unspecified) and samples of flooding water and soils were taken at intervels over 60 or 120 days.

Soil and water samples were extracted and examined for radioactivity.

Chlorothalonil degraded with a half-life of 5-15 days in flooded silt loam and sandy loam soils.

10.3 For details, refer to attached reports, Task 1 and 2, Chlorothalonil Addendum.

11. COMPLETION OF ONE-LINER:

The current one-liner was amended.

12. CBI APPEND:

There is no CBI appended.

DYNAMAC
CORPORATION

CHLOROTHALONIL ADDENDUM

Final Report

Task 1: Review and Evaluation of Individual Studies

Contract No. 68-01-6679

OCTOBER 23, 1985

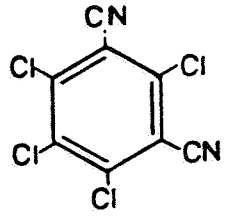
Submitted to:
Environmental Protection Agency
Arlington, VA 22202

Submitted by:
Dynamac Corporation
Enviro Control Division
The Dynamac Building
11140 Rockville Pike
Rockville, MD 20852

7

CHLOROTHALONIL ADDENDUM

CHLOROTHALONIL, BRAVO, DACONIL 2787,
EXOTHERM TERMIL, FORTURF



Tetrachloroisophthalonitrile

Table of Contents

Study

CASE GS0097 CHLOROTHALONIL STUDY 1 PM 400 08/03/82

CHEM 081901 Chlorothalonil

BRANCH EFB DISC --

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID No MRID CONTENT CAT 01

Nelsen, T.R. 1985a. A hydrolysis study with ^{14}C-3-cyano-2,4,5,6-tetrachlorobenzamide. Document No. 721-3EF-85-0002-001. 4,5,6-tetrachlorobenzamide. Document No. 721-3EF-85-0002-001. Unpublished study received July 23, 1985, under 50534-7. In Response to Chlorothalonil Registration Standard: Submission of Rat Oncogenicity Study and Supporting Chlorothalonil Registration Data, 04. Environmental Chemistry. Submitted by SDS Biotech Corporation, Painesville, OH. Accession No. 258779.

SUBST. CLASS = S.

DIRECT RVW TIME = 4 (MH) START-DATE END DATE

REVIEWED BY: K. Patten
TITLE: Staff Scientist
ORG: Dynamac Corp., Enviro Control Division, Rockville, MD
TEL: 468-2500

SIGNATURE: K. Patten DATE: Aug. 29, 1985

APPROVED BY: HUDSON L BOYD
TITLE: CHEMIST
ORG: EFB - HED - OPTS
TEL: 557-7463

SIGNATURE: Hudson Boyd DATE: 4-22-86

CONCLUSIONS:

Degradation - Hydrolysis

1. This study is scientifically valid.

2. [^{14}C]3-Cyano-2,4,5,6-tetrachlorobenzamide (97.7% pure), a degradate of chlorothalonil, at 22.6 ppm, was stable to hydrolysis for 30 days in sterile aqueous buffered solutions of pH 5 and 7 maintained at 24 ± 1 C. In solutions of pH 9, ~10% of the applied amount degraded during 30 days of incubation; 2,4,5,6-tetrachloroisophthalamide was the sole degradate.

3. This study partially fulfills EPA Data Requirements for Registering Pesticides by providing information on the hydrolysis of 3-cyano-2,4,5,6-tetrachlorobenzamide, a chlorothalonil degradate, at pH 5, 7, and 9.

MATERIALS AND METHODS:

[^{14}C]3-Cyano-2,4,5,6-tetrachlorobenzamide (SDS-19221, 97.7% pure, specific activity ~5600 dpm/µg, ICN Pharmaceuticals) was added at ~22.6 ppm to duplicate flasks of sterile aqueous buffer solution (pH 5, 7, and 9). The flasks were incubated in the dark at 24 ± 1 C. Samples were taken from each flask at 1, 5, 10, 15, and 30 days after treatment.

Aliquots of each solution were analyzed for total radioactivity using LSC. The remaining solutions were acidified with hydrochloric acid to ~pH 2, then extracted two (pH 5 and 7) or three (pH 9) times with diethyl ether. Both phases were analyzed by LSC. The diethyl ether extract was dried by evaporation, redissolved in acetonitrile, and analyzed using HPLC equipped with a UV detector. [^{14}C]Residues were identified by comparison to standards. The limit of detection was 0.1% of the recovered.

REPORTED RESULTS:

[^{14}C]3-Cyano-2,4,5,6-tetrachlorobenzamide was stable to hydrolysis at pH 5 and 7 for 30 days. At pH 9, ~10% of the applied had degraded to 2,4, 5,6-tetrachloroisophthalamide (SDS-3133) during 30 days of incubation (Table 1).

DISCUSSION:

Recovery from fortified samples was not reported.

Table 1. Distribution of radioactivity (ppm) in a sterile aqueous pH 9 buffer solution treated with [^{14}C]3-cyano-2,4,5,6-tetrachlorobenzamide (97.7% pure) at 22.6 ppm and incubated in the dark at 24 ± 1 C.

Sampling interval (days)	3-Cyano-2,4,5,6-tetrachlorobenzamide	2,4,5,6-Tetrachloroisophthalamide	Polar compounds	Total ^{14}C
0	22.6	--	--	22.6
1	21.9	ND[a]	0.07	22.3
5	21.7	0.4	0.1	22.0
10	21.2	0.8	0.1	22.0
15	20.9	1.1	0.1	22.3
30	19.9	1.9	0.2	22.1

[a] Not detected; detection limit is 0.1% of the recovered.

//

CASE GS0097 CHLOROTHALONIL STUDY 2 PM 400 08/03/82

CHEM 081901 Chlorothalonil

BRANCH EFB DISC --

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID No MRID CONTENT CAT 01

Nelsen, T.R. 1985b. An anaerobic aquatic soil metabolism study with ^{14}C-Chlorothalonil. Document No. 680-3EF-84-0026-001. Unpublished study received July 23, 1985, under 50534-7. In Response to Chlorothalonil Registration Standard: Submission of Rat Oncogenicity Study and Supporting Chlorothalonil Registration Data, 04. Environmental Chemistry. Submitted by SDS Biotech Corporation, Painesville, OH. Accession No. 258779.

SUBST. CLASS = S.

DIRECT RVW TIME = 7 (MH) START-DATE END DATE

REVIEWED BY: K. Patten
TITLE: Staff Scientist
ORG: Dynamac Corp., Enviro Control Division, Rockville, MD
TEL: 468-2500

SIGNATURE: K. Patten DATE: Aug. 30, 1985

APPROVED BY:
TITLE HUDSON L BOYD
ORG CHEMIST
TEL EFB - HED - OPTS

SIGNATURE: Hudson Boyd DATE: 9-18-86

CONCLUSIONS:

Metabolism - Anaerobic Aquatic

1. This study is scientifically valid.

2. Ring-labeled [^{14}C]chlorothalonil (98.8% pure), at 10 ppm, degraded with a half-life of 5-15 days in flooded silt loam and sandy loam soils incubated in the dark at 25 C under a nitrogen atmosphere. Degradates included 4-hydroxy-2,5,6-trichloroisophthalonitrile (42.8 and 17.7% of the recovered in the silt loam and sandy loam soils, respectively), 3-cyano-2,4,5,6-tetrachlorobenzamide (6.7 and 5.9%), 2-hydroxy-5-cyano-3,4,6-trichlorobenzamide (3.5 and 4.4%), and 3-carboxy-2,5,6-trichlorobenzamide (1.2 and 2.6%). Less than 0.1% of the [^{14}C]residues volatilized during the study.

3. This study fulfills EPA Data Requirements for Registering Pesticides by providing information on the anaerobic aquatic metabolism of chlorothalonil.

MATERIALS AND METHODS:

Duplicate samples (800 g) of silt loam (9.4% sand, 76.4% silt, 14.2% clay, 0.9% organic matter, pH 7.9, CEC 9.4 meq/100 g) and sandy loam (60.4% sand, 20.4% silt, 19.2% clay, 3.5% organic matter, pH 5.8, CEC 12.3 meq/100 g) soils in bottles were flooded with water (800 ml), the air in the bottles was replaced with nitrogen gas, and the samples were incubated in the dark at 25 ± 3 C. After 30 days of aging, the soils were treated with uniformly ring-labeled [^{14}C]-chlorothalonil (98.8% pure, specific activity ~25,000 dpm/µg, ICN Chemical and Radioisotope Division) at 10 ppm and mixed vigorously for 30 minutes. The bottles were then connected to a continuous air-flow system (15 ml/minute). Water-saturated high purity nitrogen gas was passed over the flooded soil, then through an XAD resin tube to trap volatiles and a 1 N sodium hydroxide solution to trap CO_2. The soils were again incubated in the dark at 25 ± 3 C. Water and soil samples were taken from both soils at 1, 3, 5, 10, 15, 30, and 60 days posttreatment; the silty loam soil was also sampled at 90 and 120 days posttreatment. Samples of the trapping solution were analyzed at each sampling interval.

The soil and water fractions were separated by filtering. The soil was extracted twice with acetone:0.3 N hydrochloric acid (80:20), and radioactivity remaining in the extracted soil was determined using LSC following combustion. The extracts were combined and an aliquot was analyzed by LSC. The acetone was removed from the extracts by evaporation and the remaining aqueous solution was partitioned twice with diethyl ether; aliquots of each phase were analyzed by LSC. The ether was evaporated, and the remaining residues were dissolved in acetonitrile and analyzed by HPLC; the water phase was not further analyzed. Aliquots of the filtered treated water samples were analyzed for total radioactivity by LSC. The remaining samples were acidified to ~pH 2 with hydrochloric acid, then partitioned twice with diethyl ether. The water and ether phases were analyzed by LSC and HPLC as previously described. The detection limit for the HPLC method was 0.1% of the recovered. The XAD traps were extracted with methylene chloride and analyzed by LSC. The sodium hydroxide traps were analyzed directly by LSC.

REPORTED RESULTS:

[^{14}C]Chlorothalonil degraded with a half-life of 5-15 days in flooded sandy loam silt and loam soils (Tables 1 and 2). At all intervals the majority of the [^{14}C]residues were associated with the soil rather than water matrix. Less than 0.1% of the radioactive residues were volatilized. The major degradate was 4-hydroxy-2,5, 6-trichloro-isophthalonitrile; other degradates were 3-cyano-2,4,5,6-tetrachlorobenzamide, 2-hydroxy-5-cyano-3,4,6-trichlorobenzamide, and 3-carboxy-

2,5,6-trichlorobenzamide. The material balance was ~100% for the silt loam soil, and 74-96% for the sandy loam soil (Table 3).

DISCUSSION:

1. The material balance for the sandy loam soil failed to account for up to 26% of the applied. No explanation was provided for the poor recovery balance; however, the problem did not appear to be either leakage of the incubation flask or methodology since the material balance for the silt loam was satisfactory.

2. By the first sampling interval (day 1), ~20% of the radioactivity in the silt loam and ~47% of the radioactivity in the sandy loam was not chlorthalonil. Day 0 samples should have been analyzed to confirm the chlorothalonil application rate; it was possible some degradation occurred before the pesticide was applied to the soil. Therefore, half-lives are based on degradation from actual day 1 rather then theoretical day 0 concentrations.

3. Recovery from fortified samples was not reported.

Table 1. [^{14}C]Chlorothalonil and its degradates (% of recovered in soil plus water matrices) in flooded silt loam soil treated with [^{14}C]chlorothalonil (98.8% pure) and incubated in the dark at 25 ± 3 C.

Sampling interval (days)	Matrix	SDS Compound					Chlorothalonil	Soil bound	Polar
		46851[a]	47525[b]	3701[c]	47524[d]	19221[e]			
1	Soil	ND[f]	1.1	2.9	ND	0.7	74.9	10.1	1.0
1	Water	ND	ND	1.8	ND	0.5	3.5	--	0.5
3	Soil	ND	1.2	6.2	ND	1.3	60.2	16.1	1.5
3	Water	0.2	0.5	4.5	ND	0.8	2.4	--	0.8
5	Soil	ND	0.9	7.4	ND	1.7	57.1	18.3	1.7
5	Water	0.2	0.5	5.9	ND	1.0	1.4	--	0.7
10	Soil	ND	1.1	10.0	ND	2.4	43.3	23.8	1.7
10	Water	0.1	0.6	9.6	ND	1.3	1.4	--	1.2
15	Soil	0.5	1.9	12.7	ND	2.9	29.1	29.3	1.7
15	Water	0.1	0.5	12.8	ND	1.7	1.9	--	0.6
30	Soil	0.2	1.5	19.3	0.7	4.8	9.0	35.2	3.1
30	Water	0.3	0.4	18.1	ND	1.9	0.4	--	0.8
60	Soil	0.3	2.1	16.9	4.1	4.0	3.7	37.2	2.9
60	Water	0.5	1.4	17.3	1.2	1.5	1.1	--	1.4
90	Soil	0.7	1.5	20.2	0.6	2.6	2.4	37.4	3.0
90	Water	0.5	1.4	22.6	0.4	0.7	0.2	--	1.4
120	Soil	0.5	0.9	16.7	1.5	2.2	2.0	37.4	3.4
120	Water	0.5	0.5	17.6	2.0	1.3	2.5	--	1.7

a 3-Carboxy-2,5,6-trichlorobenzamide (SDS-46851).

b 2-Hydroxy-5-cyano-3,4,6-trichlorobenzamide (SDS-47525).

c 4-Hydroxy-2,5,6-trichloroisophthalonitrile (SDS-3701).

d 3-Cyano-2,5,6-trichlorobenzamide (SDS-47524) plus its isomer, 3-cyano-2,4,5-trichlorobenzamide (SDS-47523).

e 3-Cyano-2,4,5,6-tetrachlorobenzamide (SDS-19221).

f Not detected; detection limit was 0.1% of the recovered.

Table 2. [^{14}C]Chlorothalonil and its degradates (% of recovered in soil plus water matrices) in flooded sandy loam soil treated with [^{14}C]chlorothalonil (98.8% pure) and incubated in the dark at 25 ± 3 C.

Sampling interval (days)	Matrix	SDS Compound					Chlorothalonil	Soil bound	Polar
		46851[a]	47525[b]	3701[c]	47524[d]	19221[e]			
1	Soil	0.3	1.1	5.1	ND[f]	0.6	51.4	25.8	8.5
1	Water	0.1	0.1	1.3	ND	0.1	1.9	--	0.6
3	Soil	0.5	2.1	9.4	ND	1.0	47.1	21.5	7.6
3	Water	0.1	0.3	3.0	0.1	0.2	1.6	--	0.8
5	Soil	0.3	1.9	11.2	0.7	1.2	36.5	24.0	11.8
5	Water	0.1	0.3	4.5	0.3	0.3	1.3	--	0.9
10	Soil	0.8	1.9	12.8	0.9	1.4	25.4	28.7	9.8
10	Water	0.3	2.4	3.3	1.2	0.6	1.7	--	1.7
15	Soil	2.4	3.1	12.0	4.1	2.4	11.9	28.7	14.2
15	Water	0.2	0.4	3.1	1.3	0.7	2.7	--	1.5
30	Soil	0.3	3.8	13.3	7.5	5.3	10.1	31.5	10.5
30	Water	0.3	0.6	3.6	1.4	0.6	1.6	--	1.8
60	Soil	0.4	3.7	14.8	4.3	3.5	10.0	35.9	6.3
60	Water	0.3	0.7	2.9	1.0	0.6	2.8	--	1.9

[a] 3-Carboxy-2,5,6-trichlorobenzamide (SDS-46851).

[b] 2-Hydroxy-5-cyano-3,4,6-trichlorobenzamide (SDS-47525).

[c] 4-Hydroxy-2,5,6-trichloroisophthalonitrile (SDS-3701).

[d] 3-Cyano-2,5,6-trichlorobenzamide (SDS-47524) plus its isomer, 3-cyano-2,4,5-trichlorobenzamide (SDS-47523).

[e] 3-Cyano-2,4,5,6-tetrachlorobenzamide (SDS-19221).

[f] Not detected; detection limit was 0.1% of the recovered.

Table 3. Total radioactive residues (ppm) in flooded silt loam and sandy loam soils treated with [^{14}C]chlorothalonil (98.8% pure) and incubated in the dark under nitrogen gas at 25 ± 3 C.[a]

Sampling interval (days)	Silt loam	Sandy loam
1	9.8	9.6
3	9.9	8.3
5	10.1	8.8
10	10.1	7.4
15	10.2	8.1
30	9.8	9.0
60	10.0	9.3
90	10.0	--
120	10.3	--

[a] Less than 0.1% of the applied was volatilized during the study.

DYNAMAC CORPORATION

CHLOROTHALONIL ADDENDUM

Final Report

Task 2: Environmental Fate and Exposure Assessment

Contract No. 68-01-6679

NOVEMBER 26, 1985

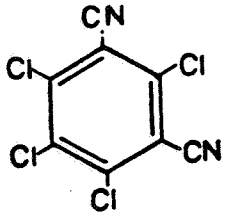
Submitted to:
Environmental Protection Agency
Arlington, VA 22202

Submitted by:
Dynamac Corporation
Enviro Control Division
The Dynamac Building
11140 Rockville Pike
Rockville, MD 20852

Environmental Fate and Exposure Assessment

Chlorothalonil

CHLOROTHALONIL, BRAVO, DACONIL 2787
EXOTHERM TERMIL, FORTURF



Tetrachloroisophthalonitrile

The data summarized here are scientifically valid and meet registration requirements.

[^{14}C]3-Cyano-2,4,5,6-tetrachlorobenzamide (97.7% pure), a degradate of chlorothalonil, at 22.6 ppm, was stable to hydrolysis for 30 days in sterile aqueous buffered solutions of pH 5 and 7 maintained at 24 ± 1 C (Nelson, 1985a; No MRID). In solutions of pH 9, ~10% of the applied degraded during 30 days of incubation; 2,4,5,6-tetrachloroisophthalamide was the sole degradate.

Ring-labeled [^{14}C]chlorothalonil (98.8% pure), at 10 ppm, degraded with a half-life of 5-15 days in flooded silt loam and sandy loam soils incubated in the dark at 25 C under a nitrogen atmosphere (Nelson, 1985b; No MRID). Degradates included 4-hydroxy-2,5,6-trichloroisophthalonitrile (42.8 and 17.7% of the recovered in the silt loam and sandy loam soils, respectively), 3-cyano-2,4,5,6-tetrachlorobenzamide (6.7 and 5.9%), 2-hydroxy-5-cyano-3,4,6-trichlorobenzamide (3.5 and 4.4%), and 3-carboxy-2,5,6-trichlorobenzamide (1.2 and 2.6%). Less than 0.1% of the [^{14}C]residues volatilized during the study.

The following represents the data currently required to fully assess the environmental fate and transport of, and the potential exposure to chlorothalonil based on the data previously reviewed by Dynamac for the Chlorothalonil Standard and data submitted for this addendum: photodegradation studies in water, on soil, and in air; leaching and adsorption/desorption studies; laboratory and field volatility studies; terrestrial and long-term field dissipation studies; accumulation studies on rotational crops (field) and fish; reentry studies; and studies on specialized aquatic uses.

Hydrolysis studies: One study (Nelson, 1985a; No MRID) was reviewed and is scientifically valid. This study partially fulfills data requirements by providing information on the hydrolysis of 3-cyano-2,4,5,6-tetrachlorobenzamide, a chlorothalonil degradate, at pH 5, 7, and 9. Based on data submitted for the Chlorothalonil Registration Standard and this addendum, all data requirements have been fulfilled.

Photodegradation studies in water: No data were submitted for this addendum; however, all data are required.

Photodegradation studies on soil: No data were submitted for this addendum; however, all data are required.

Photodegradation studies in air: No data were submitted for this addendum; however, all data are required.

Aerobic soil metabolism studies: No data were submitted for this addendum. Based on data submitted for the Chlorothalonil Registration Standard, all data requirements have been fulfilled.

Anaerobic soil metabolism studies: No data were submitted for this addendum. Based on anaerobic aquatic metabolism data submitted for this addendum, all data requirements have been fulfilled.

Anaerobic aquatic metabolism studies: One study (Nelson, 1985b; No MRID) was submitted and is scientifically valid. This study fulfills data requirements by providing information on the anaerobic aquatic metabolism of chlorothalonil.

Aerobic aquatic metabolism studies: No data were submitted for this addendum; however, all data are required depending upon the results from the specialized aquatic uses studies.

Leaching and adsorption/desorption studies: No data were submitted for this addendum. To fully satisfy the mobility data requirements, a study is needed providing data on the mobility of chlorothalonil and DAC-3701 aged individually in a sandy loam soil for 30 days using appropriate laboratory conditions, soil sampling protocols, and analyses. This will satisfy the mobility data requirements for the terrestrial food crop and nonfood use patterns. A batch equilibrium (adsorption/desorption) study is required to satisfy the mobility data requirements for the greenhouse and domestic outdoor use patterns.

The Agency is concerned about the contamination of ground water by chlorothalonil and its metabolites. Data required for the evaluation of the potential for contamination of ground water are being required on an accelerated basis.

Laboratory volatility studies: No data were submitted for this addendum; however, all data are required.

Field volatility studies: No data were submitted for this addendum; however, all data are required.

Terrestrial field dissipation studies: No data were submitted for this addendum. Based on data submitted in the Chlorothalonil Registration Standard, an additional study is needed providing terrestrial field dissipation data for chlorothalonil at one additional site for the WP formulation (utilizing the highest rate recommended and the greatest number of multiple applications) and at two additional sites for the D, P/T, Impr, and FlC formulations.

Aquatic field dissipation studies: No data were submitted for this addendum; however, all data may be required depending upon the results from the specialized aquatic use studies.

Forestry dissipation studies: No data were submitted for this addendum; however, no data are required because currently chlorothalonil has no registered forestry uses.

Dissipation studies for combination products and tank mix uses: No data were submitted for this addendum; however, no data are required because data requirements for combination products and tank mix uses are currently not being imposed for this Standard.

Long-term field dissipation studies: No data were submitted for this addendum. The data requirements for the long-term field dissipation studies will be based on the results of the field dissipation studies utilizing the highest rate recommended and the greatest number of multiple applications.

Confined accumulation studies on rotational crops: No data were submitted for this addendum. Based on data submitted for the Chlorothalonil Registration Standard, all data requirements have been fulfilled.

Field accumulation studies on rotational crops: No data were submitted for this addendum; however, based on confined accumulation studies submitted for the Chlorothalonil Registration Standard, all data are required.

Accumulation studies on irrigated crops: No data were submitted for this addendum; however, no data are required because water containing chlorothalonil residues is not expected to be used to irrigate crops.

Laboratory studies of pesticide accumulation in fish: No data were submitted for this addendum; however, all data may be required depending upon the octanol/water partition coefficient data.

Field accumulation studies on aquatic nontarget organisms: No data were submitted for this addendum; however, all data may be required depending upon the results from the specialized aquatic uses studies.

Reentry studies: No data were submitted for this addendum. The Agency is imposing a 24 hour reentry interval pending the receipt and evaluation of reentry data.

Specialized aquatic use studies: No data were submitted for this addendum. For antifouling paints on ships and related protective or preservative uses, a laboratory study employing nonradioisotopic analytical techniques is required for the determination of movement of residues from treated surfaces into water. When any movement is detected, the data requirements for aquatic noncrop uses apply.

Label Restrictions

Do not enter treated area within 24 hours of application unless protective clothing is worn.

References

Nelsen, T.R. 1985a. A hydrolysis study with ^{14}C-3-cyano-2,4,5,6-tetrachlorobenzamide. Document No. 721-3EF-85-0002-001. 4,5,6-tetrachlorobenzamide. Document No. 721-3EF-85-0002-001. Unpublished study received July 23, 1985, under 50534-7. In Response to Chlorothalonil Registration Standard: Submission of Rat Oncogenicity Study and Supporting Chlorothalonil Registration Data, 04. Environmental Chemistry. Submitted by SDS Biotech Corporation, Painesville, OH. Accession No. 258779. (No MRID)

Nelsen, T.R. 1985b. An anaerobic aquatic soil metabolism study with ^{14}C-Chlorothalonil. Document No. 680-3EF-84-0026-001. Unpublished study received July 23, 1985, under 50534-7. In Response to Chlorothalonil Registration Standard: Submission of Rat Oncogenicity Study and Supporting Chlorothalonil Registration Data, 04: Environmental Chemistry. Submitted by SDS Biotech Corporation, Painesville, OH. Accession No. 258779. (No MRID)