Chemical Code: **081901** **Date Out:** _____ 8-9-93

ENVIRONMENTAL FATE AND GROUND WATER BRANCH

Review Action

To: S. Lewis
Product Manager 23, Registration Division (H7505C)

From: Akiva Abramovitch, Section Head, Environmental Fate Review Section #3
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Thru: Hank Jacoby, Chief, Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Hank Jacoby 8/9/93

Attached, please find the EFGWB review of...

DPBarcode:	D166710, D181904, D181907, D190810		
Common Name:	Chlorothalonil	**Trade name:**	Bravo
Company Name:	ISK Biotech (formerly Fermenta, Diamond Shamrock, etc.)		
ID #:	050534-00008		
Purpose:	submission of data on field dissipation and run-off, various administrative actions		

Type Product:	Action Code:	EFGWB #(s):	Review Time:
fungicide	various	91-0783, 92-1300, -1305, ~~93-0464~~, -0682	

STATUS OF STUDIES IN THIS PACKAGE:

Guideline #	MRID	Status[1]
164-1	424338-01	U

STATUS OF DATA REQUIREMENTS:

	Status[2]
161-1	S
161-1	P
161-3	P
162-1	P
162-3	S
162-4	S
163-1	S
164-1	U
165-1	U
165-2	U
165-4	S

[1]Study Status Codes: A=Acceptable U=Upgradeable C=Ancillary I=Invalid.
[2]Data Requirement Status Codes: S=Satisfied P=Partially satisfied N=Not satisfied R=Reserved.

1. CHEMICAL:

chemical name: 2,4,5,6-tetrachloro-1,3-benzenedicarbonitrile
common name: Chlorothalonil
trade name: Bravo, Clortosip, Daconil 3787, Exotherm Termil.
structure:
CAS #:
Shaughnessy #: 081901

2. TEST MATERIAL:

3. STUDY/ACTION TYPE:

EFGWB# 91-0783, barcode D166710 -- proposed use on pecans, NO DATA

The proposed use rate is 1.5-3 lb/A a.i., possibly applied aerially

28/5RED → EFGWB# 92-1300, barcode D181904 -- inquiry re status of anaerobic soil metabolism studies, NO DATA

EFGWB# 92-1305, barcode D181907 -- submission of field soil dissipation study in NY, data included (MRID# 424338-13)

? EFGWB# 93-0464, barcode D188381 -- aquatic field run-off studies, TRANSFERRED TO SURFACE WATER SECTION

EFGWB# 93-0682, barcode D190810 -- proposed use on asparagus, emergency exemption, NO DATA

Approximately 10,000 to 12,000 acres in Michigan would be treated with a total maximum of 135,000 lb of a.i., as an alternative to EBDCs.

4. STUDY IDENTIFICATION:

Kenyon, R.G. and Bailee, D.L., Field-Soil Dissipation of Residues of Tetrachloroisophthalonitrile (Chlorothalonil, SDS02787), Its Soil Metabolites and Manufacturing Impurities in Soil from Bravo Treated Areas - Phelps, NY - 1986-1988. received at EPA 8/10/92 under MRID# 424338-13

5. REVIEWED BY:
Typed Name: E. Brinson Conerly-Perks
Title: Chemist, Review Section 3
Organization: EFGWB/EFED/OPP

E.B. Conerly-Perks 7/22/93

6. APPROVED BY:
Typed Name: Akiva Abramovitch
Title: Section Head, Review Section 3
Organization: EFGWB/EFED/OPP

Akiva Abramovitch 8/6/93

7. CONCLUSIONS:

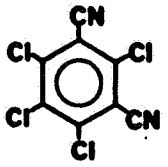
EFGWB# 91-0783, barcode D166710 -- proposed use on pecans, NO DATA

This is potentially an extensive use with a proposed rate of 1.5-3 lb/A a.i., possibly by aerial application.

EFGWB# 92-1300, barcode D181904 -- inquiry re status of aerobic soil metabolism studies, NO DATA

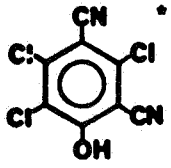
This data requirement was deemed still only partially fulfilled in a previous review.

EFGWB# 92-1305, barcode D181907 -- submission of field soil dissipation study in NY



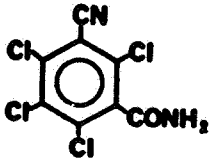
Tetrachloroisophthalonitrile

(CHLOROTHALONIL)



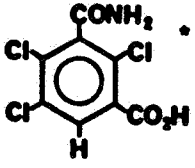
4-Hydroxy-2,5,6-trichlorisophthalo-nitrile

(SDS-3701, DAC-3701, DS-3701)



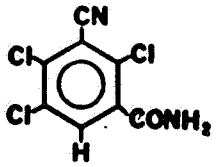
3-Cyano-2,4,5,6-tetrachloro-benzamide

(SDS-19221, DS-19221)



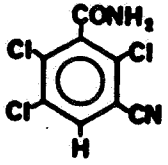
3-Carboxy-2,5,6-trichlorobenzamide

(SDS-46851, DS-46851)



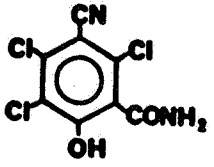
3-Cyano-2,4,5-trichlorobenzamide

(SDS-47523, DS-4723)



3-Cyano-2,5,6-trichlorobenzam

(SDS-47524, DS-47524)



2-Hydroxy-5-cyano-3,4,6-trichlorobenzamide

(SDS-47525, DS-47525)

The study is of marginal quality and only partially fulfills the data requirement. Because the soil was subjected to cultivation and harvest during the course of the study (apparently in an effort to combine features of both field dissipation and rotational crop investigations), it is difficult to interpret the results to obtain precise depth of leaching and half-life values. Although the study was not done under ideal conditions, it indicates persistence and mobility of chlorothalonil. Parent compound has an apparent field half-life of ca. 2 months. This study does establish that <u>under cultivation conditions</u> the compound easily reached a depth of 9 inches, but does *not* completely define the level to which chlorothalonil is likely to leach and remain detectable. There were some detections in the lowest depth sampled, and a considerable number in the depth just above that. Moreover, SDS-3701 appeared to have slightly greater mobility.

EFGWB# 93-0682, barcode D190810 -- proposed use on asparagus, emergency exemption, <u>NO DATA</u>

This is an apparently extensive use, although it is confined to Michigan. A total maximum of 135,000 lb of a.i. may be used.

8. <u>RECOMMENDATIONS</u>:

The available aerobic metabolism study has been identified as not fully acceptable in reviews over several years. The major deficiency was that the degradates were not completely characterized and quantified. The applicant should take immediate steps to upgrade this study if possible, or to provide new and acceptable data. (For details, see recommendations below for EFGWB# 92-1300)

EFGWB# 91-0783, barcode D166710 -- proposed use on pecans, <u>NO DATA</u>

Available information discussed in detail below indicates potential persistence and mobility, and therefore, a ground water concern. In considering this new use, it should be noted that it is potentially an extensive one, with a proposed rate of 1.5-3 lb/A a.i., possibly including aerial application.

EFGWB# 92-1300, barcode D181904 -- inquiry re status of soil metabolism studies, <u>NO DATA</u>

The registrant should be informed that the requirement for aerobic soil metabolism data is only partially fulfilled. The study which was discussed in the 1988 Registration Standard (MRID# 000873-51) is not adequate. An acceptable study (per Guidelines subpart N) must establish patterns of disappearance of parent; appearance and disappearance of degradates, and identity of degradates, and the study in question does not do so adequately. Although extraction methods were not exhaustive, compounds representing from 40 to 75% of applied material were classified as "unextractable", and neither identified or quantified. These uncharacterized residues may represent compounds of toxicological concern. The anaerobic soil metabolism study was fulfilled by submission of an acceptable anaerobic aquatic metabolism study.

EFGWB# 92-1305, barcode D181907 -- submission of field soil dissipation study in NY

Although numerous studies on field soil dissipation have been submitted and reviewed, EFGWB has not received any which are fully acceptable, including the one reviewed in this document. Nevertheless, because the information a new study would provide would be likely only to further confirm the qualitative assessment EFGWB has made based on available data, no further studies on field soil dissipation are being required at this time. The weight of evidence indicates that under most conditions, chlorothalonil is somewhat persistent with half-lives up to 59 days, and frequently reaches at least to 12 inches depth in the soil.

EFGWB# 93-0682, barcode D190810 -- proposed use on asparagus, emergency exemption, <u>NO DATA</u>

Available information indicates potential persistence and mobility, and therefore, a ground water concern. In considering this emergency exemption, it should be noted that this is an apparently extensive use. Although it is confined to Michigan, a total maximum of 135,000 lb of a.i. may be used.

9. BACKGROUND:

ENVIRONMENTAL FATE ASSESSMENT

Although some important fate data are partially acceptable or of marginal quality, some conclusions can be drawn with a degree of confidence.

The weight of evidence tends to support the view that chlorothalonil is somewhat persistent when applied to terrestrial sites. It is susceptible to aerobic and anaerobic soil metabolism, but resistent to other processes. In an acceptable study, it proved stable to hydrolysis at pH 5 and 7; only 10% degraded in 30 days at pH 9. Acceptable aqueous photolysis and soil photolysis studies also indicate stability for at least 30 days. A partially acceptable soil metabolism study indicates a half-life of 10.3 to 36.5 days in various soils. The study does not adequately establish patterns of disappearance of parent, appearance and disappearance of degradates, and identity of degradates. Although extraction methods were not exhaustive, compounds representing from 40 to 75% of applied material were classified as "unextractable", and neither identified nor quantified. These uncharacterized residues may represent compounds of toxicological concern. Numerous partially acceptable and unacceptable terrestrial field dissipation studies indicate persistence, $t_{½}$ 14 - 59 days.

Chlorothalonil may be less persistent under flooded or aquatic conditions, due to apparently higher rates of metabolism by microbes. Anaerobic soil data was supplied by an acceptable anaerobic aquatic metabolism study, indicating a 5-15 day half-life. Aerobic aquatic metabolism occurred with a half-life of 1.4 hours. A run-off study is currently under review by the surface water group, and may serve to clarify both the mobility and persistence issues.

Although much of the evidence is marginal, the overall indication is that chlorothalonil is at least moderately mobile. Ground water monitoring studies have been required because of findings of a degradate (SDS-46851) in ground water. Laboratory adsorption desorption studies indicate moderate mobility in sand (k_d = 3) to low mobility in silt (k_d = 29). In a leaching study done on sandy loam soil, parent compound did not appear in the leachate, but a considerable amount (5.5% of applied) of a degradate (SDS 46851) did. Partially acceptable and unacceptable field dissipation studies support the conclusion that chlorothalonil and degradates could leach under appropriate conditions. These reports regularly include detections of parent to 9-12 inch depths, and some findings of degradates.

Bioaccumulation in laboratory fish is minimal, with BCFs of 0.7-2.1 in edible tissues, 3.0-4.0 for non-edible tissues, and 2.3-3.6 for whole fish.

GROUND WATER ASSESSMENT

Because of its apparent characteristics of persistence and mobility as delineated above, chlorothalonil has the characteristics which indicate a possible threat to ground water in some situations. [*However, solubility in water is said to be low (0.6 ppm, Farm Chemicals Handbook, 1984).*] A monitoring study has been required because of residue findings (see attached ground water review), and a protocol has been submitted. It should be noted that appreciable metabolism might occur in ground water, based on the laboratory half-lives determined for anaerobic soil and anaerobic aquatic metabolism.

SURFACE WATER ASSESSMENT

Chlorothalonil will almost certainly move to surface water in areas where it is used. In many areas, it would reach surface water while adsorbed to soil particles, and become part of the sediment. Dissipation could be rapid ($t_{½}$ of 5-15 days) under anaerobic conditions. If chlorothalonil were dissolved in the

water phase, dissipation could be even more rapid. Under aerobic conditions, metabolism could occur with a half-life of ca. 2 hours.

DATA BASE ASSESSMENT The data requirements are summarized below:

Hydrolysis -- fulfilled -- MRID # 00405-39 -- stable at pH 5 and 7; 10% degrades in 30 days at pH 9; 2,4,5,6-tetra-Cl-isophthalimide the only degradate

Aqueous Photolysis -- fulfilled -- MRID#s 000872-81, 401834-18, 000405-40, 1899 Reg. Std. -- MRID# 401834-18 indicates stability to photolysis in unsensitized water

Soil Photolysis -- fulfilled -- MRID# 001437-51, 1988 Reg. Std. -- indicates stability to photolysis on soil

Aerobic Soil Metabolism -- partially fulfilled -- The study which was discussed in the 1988 Registration Standard, MRID# 000873-51, is not adequate. An acceptable study (per Guidelines subpart N) must establish patterns of disappearance of parent; appearance and disappearance of degradates, and identity of degradates, and that study does not do so adequately. Although extraction methods were not exhaustive, compounds representing from 40 to 75% of applied material were classified as "unextractable", and neither identified or quantified. These uncharacterized residues may represent compounds of toxicological concern.

Anaerobic Soil Metabolism -- fulfilled by acceptable anaerobic aqueous metabolism study (10/23/85, also HLB 4/22/86, MRID# 0014790-75)

Anaerobic Aquatic Metabolism -- fulfilled -- (10/23/85, HLB 4/22/86, MRID# 001479-75) -- $t_{\frac{1}{2}}$ 5-15 days; identified degradates were 4-hydroxy-2,5,6-trichloroisophthalonitrile, 3-cyano-2,4,5,6-tetrachlorobenzamide, 2-hydroxy-5-cyano-3,4,6-trichlorobenzamide, and 3-carboxy-2,5,6-trichlorobenzamide. No significant volatile degradates were detected.

Leaching/Adsorption/Desorption -- fulfilled (8/1/86, MRID#s 001151-05, -001537-10) -- low leachability in lab for both aged and ur. d material, but findings of residues in ground water triggered monitoring requirements (see attached ground water review). K_{ads} 3 (sand) to 29 (silt) in batch studies.

Terrestrial Field Dissipation -- partially fulfilled

MRID# 424338-13 is reviewed in this document. The study is of marginal quality and is only partially acceptable to fulfill the data requirement. Although the study was not done under ideal conditions, it indicates a certain persistence and mobility of chlorothalonil. Because the soil was subjected to cultivation and harvest during the course of the study (apparently in an effort to combine features of both field dissipation and rotational crop investigations), it is difficult to interpret the results to obtain precise depth of half-life values and leaching capability. Chlorothalonil had an apparent field half-life of ca. 2 months. Also, the study does establish that under cultivation conditions the compound easily reached a depth of 9 inches, although the level to which chlorothalonil is likely to leach and remain detectable was not well defined. There were some detections in the lowest depth sampled, and a considerable number in the depth just above that. Moreover, SDS-3701 appeared to have slightly greater mobility than parent.

Some of the other studies which have been reviewed are summarized below. Also, a considerable number of studies were reviewed in detail (EBC 3/5/91.

MRID # 000872-96 was reviewed in the 1988 Reg. Std

MRID# 415648-29 -- Fresno, CA. This study is unacceptable for several reasons. These data do not serve to define a pattern or time course for the dissipation of chlorothalonil under

field conditions. Soil sampling may not have gone deep enough to define the extent of leaching of chlorothalonil and its degradates. Analyses were done on composited samples (and sampling variation thereby minimized), and therefore, EFGWB cannot assess the "inherent" precision and accuracy of the procedures. The study author reported a half-life of 58 days for chlorothalonil in the upper 12 inches of soil using selected data, but since values were arbitrarily discarded, the calculated half-life is considered to be of questionable validity.

MRID# 451648-28 -- Donalsonville, GA. The study is unacceptable. The data do not serve to define a pattern or time-course for the dissipation of chlorothalonil under field conditions because they are too randomly variable. Soil was only sampled through day 29 following the tenth application, except for samples taken at 222 days posttreatment. The depth of soil sampling was insufficient to define the extent of leaching of chlorothalonil and its degradates.

Chlorothalonil was detected to a depth of 12-inches. It dissipated with an observed half-life of 14-29 days from the upper 12 inches of a plot of sandy loam soil. The degradates were 4-hydroxy-2,5,6-trichloroisophthalo nitrile (SDS-3701), 2-hydroxy-5-cyano-3,4,6-trichlorobenzamide (SDS-47525), 3-carboxy-2,5,6-trichlorobenzamide (SDS-46851), 3-cyano-2,4,5-trichlorobenzamide (SDS-47523/SDS-47524), 3-cyano-2,4,5,6-tetrachlorobenzamide (SDS-19221). The manufacturing impurities HCB and PCNB were isolated as deep as the 9- to 12-inch depth. Per the authors PCBN levels were related to the level of chlorothalonil residues present, but the levels of HCB were not. In addition, pretreatment samples taken from the two treated plots contained detectable residues of HCB (0.003-0.006 ppm).

MRID# 415648-30 -- Greenfield, CA. This study is unacceptable. The cultural practices employed may have compromised study results. It is highly probable that chlorothalonil residues were transferred to lower soil depths. Accordingly, the concentration of pesticide may have been diluted by bringing pesticide-free soil from lower horizons, and may have increased the rate of dissipation by aerating the soil and presenting new nutrient sources to the microbial population. Also, samples may have been contaminated by the sampling process itself. Moreover, soil was not sampled deeply enough to define the extent of leaching of chlorothalonil and its degradates.

At both treated plots, chlorothalonil residues were detected in the 12- to 15-inch depth, the lowest soil depth sampled. The soil should have been sampled to depths (preferably two sampling depths) at which residues were nondetectable. From selected data, the study author calculated a half-life of 40 days for chlorothalonil. The arbitrary exclusion of data used to calculate the half-life causes the resulting half-life to be of questionable value.

Accumulation in Confined Rotational Crops -- fulfilled, MRID # 410302-11 , but no longer the responsibility of EFGWB -- lettuce, carrots, and wheat grown as confined rotational crops. Some uptake and concentration were detected at an exaggerated rate of application (4 x the maximum single application). Closely related metabolites accounted for ca. 1/3 of total radioactivity observed in the plants. Remaining labelled material may derive from the soil "carbon pool".

Accumulation in Field Rotational Crops -- partially fulfilled -- Kenyon and Ballee, no MRID# -- but no longer the responsibility of EFGWB. This field crop accumulation study is not acceptable to completely fulfill the data requirement because the soil was not analyzed at planting time. The study can only be considered supplemental because it is not certain that residues were available for uptake, or at what level. Under these experimental conditions, no uptake was observed. Previously reviewed MRID#s 415648-32 through -46 cannot be used to fulfill data requirements at this time because data were not in a reviewable format. For this study to be reevaluated, the registrant must provide summarized soil residue data, complete site characteristics, and meteorological data. In addition, the lengths of time samples were stored frozen and acceptable freezer storage stability data must be provided. The freezer storage stability studies -- MRID#s 415648-20 through -27 cannot be used to fulfill data requirements because the experimental design used was not appropriate for determining the freezer storage stability of chlorothalonil and degradates in the various plant matrices.

Laboratory Accumulation - Fish -- MRID #s 409745-31 and 409745-24 taken together -- Maximum bioconcentration factors reported for total[^{14}C]-in bluegill sunfish exposed to 0.06 ppm [^{14}C]clethodim for 28 days at 21°C were 0.7-2.1X for edible tissues, 3.0-4.0X for non-edible tissues, and 2.3-3.6X for whole fish.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES: attached

11. COMPLETION OF ONE-LINER: no significant new information

12. CBI APPENDIX: attached to DER

DATA EVALUATION REVIEW 1

I. Study Type: terrestrial field dissipation, guideline 164-1

II. Citation:

Kenyon, R.G. and Bailee, D.L., Field-Soil Dissipation of Residues of Tetrachloroisophthalonitrile (Chlorothalonil, SDS02787), Its Soil Metabolites and Manufacturing Impurities in Soil from Bravo Treated Areas -Phelps, NY - 1986-1988. received at EPA 8/10/92 under MRID# 424338-13

III. Reviewer:

Typed Name: E. Brinson Conerly-Perks
Title: Chemist, Review Section 3
Organization: EFGWB/EFED/OPP

E.B. Conerly-Perks 7/22/93

IV. Conclusions:

The study is of marginal quality and is only partially acceptable to fulfill the requirement for field dissipation data. Because the soil was subjected to cultivation and harvest during the course of the study (apparently in an effort to combine features of both field dissipation and rotational crop investigations), it is difficult to interpret the results to obtain precise depth of leaching and half-life values. Although the study was not done under ideal conditions, it indicates a certain persistence and mobility of chlorothalonil, which has an apparent field half-life of ca. 2 months. Under cultivation conditions the compound easily reached a depth of 9 inches, although the study does not define the level to which chlorothalonil is likely to leach and remain detectable. There were some detections in the lowest depth sampled, and a considerable number in the depth just above that. Moreover, SDS-3701 appeared to have slightly greater mobility.

V. Materials and Methods:

ABSTRACT

A study was conducted near Phelps, New York to determine the dissipation of residues of chlorothalonil (SDS-2787), five metabolites and manufacturing impurities hexachlorobenzene (HCB) and pentachlorobenzonitrile (PCBN) in soil. This study investigated the levels of these compounds at various soil depths ranging from 0-15 inches when BRAVO 500 was applied to potatoes. The soil samples analyzed were taken at numerous time intervals over a period of 18 months. Samples were taken pretreatment, after four applications of BRAVO 500, after the last of twelve (12) applications of BRAVO 500, and at eighteen (18) post treatment intervals (PTI) from 6 to 544 days following the last application.

The test area was divided into three plots: 1, 2, and 3. Twelve applications of BRAVO 500 were applied in 1986 at a rate of 2.125 pints/A to potatoes planted in Plots 2 and 3. Potatoes grown in Plot 1 were untreated. Rotational crops consisting of cabbage, carrots, corn, oats, onions, potatoes, soybeans, spinach, tomatoes and winter squash were planted into Plots 1 and 2 during the following spring. No applications of BRAVO 500 were made to the rotated crops. Plot 3 was again planted to potatoes the second year. The potatoes were treated with twelve applications of BRAVO 500 in 1987. Plot 3 was included the second year for a rotational crop study and was not part of the soil dissipation study. This soil samples from plot 3 were not analyzed for this study during the second year.

VI. Study Author's Results and/or Conclusions:

RESULTS AS DESCRIBED BY THE STUDY AUTHOR

Levels of chlorothalonil found in the surface 3 inches of soil from the treated plots did not exceed 6.37 ppm and decreased at depths greater than 3 inches. Mean chlorothalonil levels (mean of plots 2 and 3) in the 0-3 inch soil layer were 4.28 and 4.71 ppm at day 0 and 6, respectively, following the last of 12 applications of BRAVO 500. Chlorothalonil residue remained primarily in the surface 3 inches through October 31, 1986 (PTI=13 days). The potatoes were dug on November 1, 1986 resulting in incorporation of chlorothalonil into the 3 to 6 inch layer. Further incorporation occurred when the plot areas were plowed on April 13, 1987. This was verified on the April 15, 1987 sampling (PTI=181 days) where residues of chlorothalonil increased markedly in the 3 to 6 and 6 to 9 inch soil depths. Chlorothalonil residues fell below 0.1 ppm within 231 days after the last of 12 applications.

Surface soil residues of chlorothalonil increased again to 0.28 ppm in Plot 2 at PTI=231 days which corresponded with the plant data of squash and to 0.77 ppm at PTI=318 days which corresponded to the harvest date of spinach. All increases occurred only in the 0-3 inch soil depths.

Residues of SDS-3701 were first detected at mean levels of 0.12 ppm and 0.20 ppm in the 0-3 inch depths of Plots 2 and 3 in samples taken after four BRAVO 500 applications, but generally decreased at lower depths. Residues of SDS-3701 increased in the 0-3 inch depth to 0.33 ppm (Plot 2) to 0.34 ppm (Plot 3) at Day 0 following 12 applications. As with chlorothalonil, SDS-3701 was incorporated into the 3-6 inch depth by the potato digging operation on November 1, 1986. SDS-3701 residues were generally concentrated in the 0-3", 3-6" and 6-9" depths at all sampling dates.

Maximum residues of SDS-46851, SDS-47525, SDS-47523-24 and SDS-19221 ranged from 2 to 5 times the non-detect level of 0.03 ppm. None of these compounds were found in depths below 9 inches. SDS-47525 was not detected until PTI=231 (spring planting) and SDS-47523-24 and SDS-19221 were generally not detected after PTI=231.

No HCB residues were detected above the method sensitivity of 0.003 ppm in any of the soil samples except for 30 day PTI samples in 0-3" depth from plot 3 with a mean level of 0.0006 ppm (likely a spurious value as it was not seen in plot 2). Levels of PCBN detected in soils were generally related to the level of chlorothalonil residues present. The maximum PCBN residue found was 0.080 ppm on day 0 after 12 applications in the 0-3" depth until potato digging on November 1, 1986 when PCBN was carried into the 3-6 inch layer. Further incorporation occurred to 6-9" depths when the plots were plowed on April 13, 1987.

CONCLUSIONS

The report did not contain any conclusions section. The implicit conclusion *re mobility* seems to be that chlorothalonil does not leach significantly. In the abstract section, chlorothalonil is said to have a half-life of 69 days under the conditions of the study. The implicit conclusion *re manufacturing impurit* appears to be that they do not appear in significant concentrations or accumulate.

VII. Reviewer's Comments:

1) The study is only partially acceptable to fulfill the requirement for field dissipation data. It was not done under ideal conditions and is of marginal quality but indicates a certain mobility for chlorothalonil, and *as defined by the registrant* indicates that the compound is somewhat persistent, with a field half-life of ca. 2 months.

2) This study does not define the level to which chlorothalonil is likely to leach and remain detectable, but does establish that under cultivation conditions easily reached a depth of 9 inches, indicating some mobility.

3) The sampling should have been done down to at least two levels below the depth at which residues were detected. There were some detections in the lowest depth sampled, and a considerable number in the depth just above that.

4) This study was apparently done to combine features both of field dissipation and rotational crop investigations. Therefore, it is difficult to interpret the results because the soil was disturbed (cultivated and harvested) during the course of the study.

5) The degradates that were found are summarized in attached tables. The significance of these degradates at these levels of concentration is unknown at this time.

VIII. CBI Information Addendum: attached

reprinted from computer file dated 5/12/93

Note

From: Brinson Conerly-Perks

To: James Wolf

Subject: Status of Chlorothalonil Aerobic Soil Metabolism Data Requirement

I have reexamined the previous reviews (done in 1984) of the two studies the applicant has cited. I did not rereview the two studies in question. The important question we must answer at this time is whether the proposed protocol for the ground water study is adequate. This protocol calls for analyzing for five degradates and parent. With the understanding that your final assessment must be based on the ground water study results, my recommendation is that the applicant proceed with the study as planned, with careful attention to developing a good material balance. Also, if the study is performed with a view to retaining samples for future analysis, this will provide "cheap insurance" in case of unforeseen questions. The following is my assessment of the two studies:

MRID# 000873-51 -- This study was originally deemed to fulfill the requirement for aerobic soil metabolism because it provided information on the decline of chlorothalonil and two major degradates. It was later downgraded because only approximately 50% of the radioactive material which was measured was further characterized, the rest appearing as water soluble (polar) or bound (non-extractable) materials.

MRID# 000294-07 -- The applicant states that this study was performed to answer the deficiencies identified by the original review of the study discussed above. It was deemed scientifically valid (i.e., the results could be duplicated if the procedures described were repeated). Five aerobic soil degradates were isolated. The two major degradates,

4-hydroxy-2,5,6-trichloroisophthalonitrile

3-cyano-2,4,5,6-tetrachlorobenzamide

were identified definitively (per the previous review), and three tentatively. The study did not serve to define a half-live or patterns of decline of parent and formation and decline of degradates. Further a material balance was not provided. The study was also compromised by the soil treatment -- soil was ground and sieved to 0.59 mm. Therefore this study only contributes qualitative information and does not serve to upgrade the study discussed above.