Shaughnessy Number: 078701

DP Barcode: 157920

Date Out of EFGWB: FEB 7 1991

TO: Eric B. Feris
Special Review and Registration Division (H7508C)

FROM: Michael R. Barrett (H7507C) Eliz Behl for MRB
Ground Water Section
Environmental Fate & Ground Water Branch/EFED

THRU: Henry Jacoby, Chief (H7507C) Henry Jacoby
Environmental Fate & Ground Water Branch/EFED

Attached, please find the EFGWB review of:

Reg./File #: 078701

Chemical Name: DCPA

Type Product: Herbicide

Company Name: Frementa ASC Corporation

Purpose: Review proposed protocol for Small-Scale Retrospective Ground Water Monitoring Study.

Date Received: 11/08/90 ACTION CODE: 660

Date Complete: 12/16/90 EFGWB #(s): 91-100

Monitoring Study Requested: x Total Review Time: 6 Days

Monitoring Study Voluntary: _____

Deferrals To: _____ Biological Effects Branch

_____ Science Integration & Policy Staff, EFED

_____ Non-Dietary Exposure Branch, HED

_____ Dietary Exposure Branch, HED

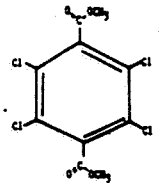
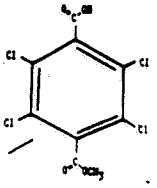
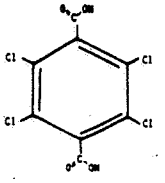
_____ Toxicology Branch, HED

REVIEW OF SMALL-SCALE RETROSPECTIVE GROUND WATER MONITORING STUDY

1. CHEMICAL:

Chemical name: Dimethyl tetrachloterephthalate
Common name: DCPA
Trade name: Dacthal

Structure:

DCPA  MPT  TTA 

Physical/Chemical Properties:	DCPA	TTA*
Molecular Formula	$C_{10}H_6Cl_4O_4$	
Water Solubility	0.2 to 0.5 ppm	5780 ppm
K_d	6.8(sand)	0.07(sic)
K_{oc}	90.2(sic)	0.23(sl)
Vapor Pressure:	K_H 5.5 x 10^{-6} to 2.2 x 10^{-6}	

*Tetrachloroterephthalic acid (degradate)

2. TEST MATERIAL:

Not Applicable.

3. STUDY/ACTION TYPE:

Review proposed protocol for small-scale retrospective ground water monitoring study in conjunction with supportive information.

4. STUDY IDENTIFICATION:

Title: "DRAFT" Study Design DCPA (Dacthal) Small-Scale Retrospective Ground Water Study.

Author(s):

American Agricultural Services, Inc.
P.O. Box 1293
Cary, NC 27512

Geraghty & Miller
Koger Center - Glenwood
3724 National Drive
Suite 228
Raleigh, NC 27612

Ricera, Inc.
P.O. Box 1000
Painesville, OH 44077-1000

Submitted by:

Fermenta ASC Corporation
5966 Heisley Road
P.O. Box 8000
Mentor, OH 44061-8000

Identifying No: 078701
Action Code: 660
Accession Number:
Record Number:
Date Sent to EFED: 11/07/90

5. Reviewed by:
James K. Wolf Signature: James K. Wolf
Soil Scientist
OPP/EFED/EFGWB/Ground water section Date: 1/24/91

6. Approved by:

Michael R. Barrett Signature: Guy Bell for MRB
Chief (acting)
OPP/EFED/EFGWB/Ground water section Date: 1/24/91

7. CONCLUSIONS:

The objective of this review is to assess the "Draft" protocol for a small scale retrospective ground water study for Dacthal (active ingredient DCPA). Information and review comments from previously submitted documents have also been considered in this review.

The ground water study design outlined in the protocol is not acceptable in its present form as several areas are deficient and will require some modifications.

Although, studies to date do not satisfy guideline requirements, they do provide some insight concerning the behavior of DCPA and degradates in the environment. DCPA appears to be immobile to somewhat mobile in soils with a relatively short half-life, whereas TTA (di-acid), an important degradate, is extremely mobile in soils and very persistent. Thus, TTA has the potential to be transported to ground water. In the light of this and the fact that DCPA degradates have been detected in ground water by the Pesticide in Ground Water Data Base (NY - 1000 ppb, OR - 350 ppb) and the EPA's National Survey of Pesticides in Drinking Water Wells (NPS) a thorough understanding of the fate of DCPA is needed. Additionally, TTA was the most widely detected pesticide in the NPS.

The EFGWB recommends that the Registrant delay the site selection process until site characterization data from the NPS is evaluated. Climatic conditions may be need to be

considered in site selection, because many of the DCPA di-acid metabolite detections in water wells (Pesticides in Ground Water Data Base and NPS) occurred in the Northeast and Midwestern United States and few or no detections occurred in major use areas such as California, Texas, and Florida. Therefore, study sites may need to be placed in areas with climatic conditions that are cooler and wetter than California and Texas. Additionally, it is recommended that protocol development be delayed until the updated Draft Guidance document for ground-water monitoring studies is completed so that it can be consulted.

The registrant proposes compositing soil samples from each depth increment for only one sampling time, resulting in one sample per depth for one time period. This does not allow for an understanding of the spatial variability or temporal variability within the soil. The importance of this is demonstrated by data submitted by the registrant (MRID #'s 415086-09 and 415086-10). For example, Plot 1: Day 0 (right after DCPA application), 0-3" depth 3.76 ppm DCPA was reported; Plot 1:Day 1 (one day after application), 0-3" depth 5.10 ppm DCPA was reported. This data shows an increase of 1.34 ppm for the DCPA parent material with time, rather than a decrease. The pattern demonstrated here is repeated throughout the study. Without some measure of variability, it is not possible to evaluate the significance of the data. A large enough number of samples must be collected to have a reasonable confidence concerning the data. Split samples should also be included to demonstrate laboratory consistency (precision).

Monitor well screens lengths should not exceed 5 feet as greater the well screen length the greater the likelihood of masking the detection of the desired compounds.

The registrant must confirm that the sites are appropriate, discuss details with the Ground Water Section, and must submit an interim report containing all pertinent information. This should include all supportive site selection data. Supportive information for sites not selected and reasons why deleted should also be included.

8. <u>RECOMMENDATIONS</u>:

1) Data requirements from the Pesticide Assessment Guidelines (Subdivision N) document were not satisfied as noted by other reviewers (see summary by B. Conerly, 10/31/90, EFGWB #90-0693). These data requirements still need to be submitted for review so that an environmental fate assessment can be completed.

2) Use and sales data, by region, for the years 1988, 1989, and 1990 for turf and onions and cole crops have been submitted by the registrant. Fermenta submitted this

information (to Mr. Eric Feris - dated December 11, 1990 - from Mr. Jerry R. Lucietta), in response to the November 5, 1990 meeting. EFGWB is specifically interested in the registrant providing turf usage and sales information, at a minimum, by State and County, in addition to cole and onion crop use and sales for this period.

3) The EFGWB recommends delaying the site selection process until well site characterization data collected during the NPS can be obtained and evaluated. It is anticipated that this additional data will aid in the selection of suitable study sites. Additionally, an updated ground-water monitoring guide document is being developed (draft available in near future), which will aid the Registrant in the designing the ground-water monitoring study.

However, the following rationale should be incorporated into the site selection process. The first criteria considered should be hydrogeologic vulnerability rather than usage and cropping history. The study site selection process first requires the determination as to which Counties and States have a high to moderate hydrogeologic vulnerability. Once these areas are selected at a county-level, existing soil survey, geologic, and hydrogeologic data plus crop or pesticide usage information can be considered to narrow down the number of potential sites for preliminary consideration. Then, following site specific characterization and identification of a farmer/cooperator, the suitability of several possible sites can be evaluated. Once several sites are selected, the information must be reviewed by EFGWB for final site approval prior to initiation of the study.

4) Based upon current information and thinking the EFGWB will require a study with at least three sites rather than two: an onion site and cole crop site as proposed plus a turf site. After reviewing the NPS well site information, study site selection criteria can better defined. A turf use site, located in a hydrogeologically vulnerable setting, should be added to the study because of the high leaching potential and persistence of the degradate TTA. TTA has been detected in ground water around golf courses. Turf areas such as golf courses and sod farms often receive frequent irrigations thus increasing the leaching potential. Additionally, golf courses and sod farms may be located in areas with high water tables. Turf use areas may also surround a well head or recharge site.

5) EFGWB is concerned that proposed sites in California and Texas may not receive a sufficient volume of water to transport residues to the saturated zone. Irrigation is necessary in both states because evapotranspiration far exceeds rainfall and/or the rainfall occurring during the non-growing season. If irrigation scheduling is properly conducted (ie., to create a leaching fraction and to

minimize or eliminate the accumulation of salt in the irrigation-return flow) conditions may not exist to adequately represent a "worst" case or realistic "worst" case scenario. In other words, evapotranspiration is great enough and irrigation plus precipitation is low enough that the soil water flux (to the water table) may not occur or be adequate to transport the pesticide or degradate to the ground water. Therefore, the EFGWB requires that the registrant demonstrate that proposed study sites meeting these conditions adequately represent a "worst" case or realistic "worst" case scenario. A water balance or some other method could be used to address this concern.

6) The monitor well clusters should contain at least three monitor wells with well screen lengths not exceeding five feet. Longer well screens may tend to mask the effects of contaminant migration by inducing inflow from the uncontaminated zones. This can result in erroneous ground water monitoring results and incorrect conclusion.

7) The protocol does not address the second study objective on page 7 (page 3 of 40 of the ground-water study protocol). Objective 2 is to characterize the leaching pattern in the soil profile at different points in time. In order to achieve this objective the collection and analysis of soil samples by depth and time intervals or the collection and analysis of soil pore water samples collected from suction lysimeters at specified depths and time intervals will be required.

8) It is recommended that one or more detailed field dissipation studies be incorporated into the ground-water study. The leaching patterns of DCPA, MTP, and TTA in soil should be determined in addition to the rate of decline for DCPA and increase/decrease for MTP and TTA. The half-life of DCPA has been determined, but half-lifes of the degradates need to be determined. The lack of this information was addressed by other reviewers (recommendation #1 and #5 of this document). The integration of the field dissipation study into the ground-water study can be used to satisfy the Guideline requirements (field dissipation study requirements assuming that the study is properly conducted and meets EFGWB approval) and also provide a more thorough understanding of the fate of DCPA and degradates in a hydrogeologically sensitive environment. This would be more or less like a prospective and retrospective study being conducted at the same time. This will allow estimates of contamination potential from a given amount of DCPA. Soil samples should not be composited.

9) The soil and water analysis should include HCB and TCDD. The potential for soil and ground water contamination by

these compounds should be considered. If HCB and TCDD are not detected, analysis at some lower sampling frequency could be considered, or dropped entirely.

10) Ground-water samples should be collected at least once a month rather than the proposed bi-monthly.

11) The background ground-water quality at the site should be characterized. This includes such parameters as: Ph, EC, suspended solids, redox potential, temperature, NO_3^-, SO_4^{-2}, Ca^{+2}, Mg^{+2}, Na^+.

12) It is desirable that multiple (3 to 5) rain gauges be placed at each study site. Multiple rain gauges will allow for an estimate of rainfall variation, but primarily will ensure that a good record of on site precipitation is collected. At least one of which should be a recording type rain gauge. A short recording time period, daily or weekly rather than monthly, is desirable. This information could then be utilized to obtain an estimate of rainfall intensity and duration plus the amount.

13) Methods used to analyze soil and water samples, including pesticide and residue analysis, should be defined and references given. In addition minimum detection limits, analytical interferences, and analytical limitations should be addressed.

14) It is recommended that several banks of tensiometers (2 or 3 per depths per bank) be installed at several locations to determine direction of water movement (below the root zone) in the vadose zone. The intent of these tensiometers is determine direction of water flow. Since the study is interested in ground water recharge, the desired water flow direction is down. The tensiometers should be deep enough to indicate a downward water movement during recharge periods and not the upward gradient occurring during periods of high evapotranspiration.

15) Permanent wilting point, available water content, soil water content, and saturated hydraulic conductivity should be included in the soil characterization sampling program. Volumetric soil water content should be determined for all sampling dates and sampling depths (all soil samples).

9. <u>BACKGROUND</u>:

Dacthal (active ingredient DCPA) is a pre-emergence herbicide used to control weed grasses and certain broad leaf weeds. It is commonly used on vegetable crops, such onions and cole crops, and turf, such as golf courses and sod farms.

Formulations vary in DCPA contents: manufacturing use products contain 50, 75, and 90 percent DCPA; wettable powders with 25, 50, 60, 75, and 90 percent DCPA; and granular products containing 1.15 to 24.0 percent DCPA. Manufacturing impurities identified by the EPA include hexachlorobenzene (HCB) and 2,3,7,8-TCDD. Two primary degradates have been identified, MTP or Mono-acid (Mono methyltetrachloroterephthalate), and TTA or Di-acid (tetrachloroterephthalic acid).

Leaching/adsorption/desorption and terrestrial dissipation studies do not comply with EPA guideline requirements (reviews by B. Conerly, 10/31/90, EFGWB #90-0693 and C. Eiden, 2/86). Although these studies submitted by the registrant are inadequate, they can be used to make some observations concerning DCPA and potential impacts to ground water. DCPA generally is thought to be immobile in soil with a low water solubility (0.2 - 0.5 ppm) and somewhat short half-life (18-45 days). However, two studies submitted be the registrant (MRID #'s 415086-09 and 415086-10) indicates that DCPA may be mobile. The intermediate degradation product MTP appears to have a short half-life; therefore, does not accumulate in soil. The principle degradate is TTA which is very soluble (5870 ppm), high mobility (K_d<1 and K_{oc}<100) and very persistent (half-life unknown). DCPA degradates (TTA) have been identified in ground water in several states. Because of the high mobility and solubility the occurrence of TTA in ground water is not unexpected.

The registrant has supplied sales and usage data for the years 1984 to 1988. Dacthal's predominant use has consisted of cole and vegetable crops (onions) and turf (golf courses and sod farms). Sales data suggests that turf uses have declined from 52.4% in 1984 to 13.2% in 1988. Cole and vegetable crops corresponded to about 77% of sales in 1988; the remaining 23% of sales for 1988 were for turf (13%), formulator (6.5%), and other (3.2%). The 1987 usage data for cole and vegetable crops was given by state and county, if usage was equal to or greater than 0.5 tons. Usage data for 1988 (1888?) for four counties in Idaho, Oregon, and Washington was also supplied by the registrant. No usage information for turf uses was supplied by the registrant. EFGWB indicated during our 11/5/90 meeting with the Registrant and its representatives that we will want usage information for turf grass and sod uses. Additionally, all usage information should be made current by supplying use information for 1988, 1989 and 1990.

10. DISCUSSION:

Preliminary Dacthal Sensitivity Analysis Information, prepared by Geraghty & Miller, Inc., was given to EFGWB during the November 5, 1990 meeting. Page C-1 of this

information makes reference to Section 3 in Appendix A and Section 3.6 of Appendix A. The above mentioned Sections and Appendix could not be located or identified. The proper citations for this information is should be included.

Site maps should show the locations of all sample sites, soil borings, monitor wells, soil pits, rain gauges, decontamination site, etc. Also the maps should have a complete legend; north arrow, scale, symbol key, title, plus State, County, Section number, Range and Township, etc.

The dissipation studies are not adequate, because soil sampling depths were not adequate to determine the extent of pesticide movement, as DCPA and degradates were detected for all depths sampled, duration of study was not long enough, and no statistical confidence was obtained. The DCPA degradate, TTA, is very mobile and appears to be very persistent. Thus, there is a good chance for it to contaminate ground water. The registrant has not supplied information which would address a material balance to follow the application of DCPA to the end product (ie. x pounds of DCPA will result in y pounds of TTA in ground water). Nor is the persistence of TTA addressed.

Page 24 (page 20 of 40) The equation for the determination of one well volume appears to be incorrect. It would seem that one of the "h's" should be Pi.

Soil descriptions should utilize USDA SCS methodology (USDA SCS Handbooks 18 and 436). EFGWB would prefer soil sampling increments not exceed 6 inches in the upper 5 feet, because the greatest sorption and biological degradation takes place in the upper portion of the soil. This may, however, require some adjustment to stay within soil horizons so that physical/chemical data are available to aid in correlating soils to soil series.

Soil analytical data, primarily texture (particle size distribution), which is used for site selection should be sampled by soil horizon. Soil series have allowable limits for selected properties to be included in a given series designation. The property is usually defined by horizon, therefore, data are needed to demonstrate that a soil found at site meets the requirements established for the series. The soil sampling protocol indicates sampling for two separate phases: 1) Site Characterization and 2) Residue delineation. The following analysis will be conducted for the site characterization phase: particle size distribution, texture, organic matter (organic carbon * 1.724?), field capacity, bulk density, and Ph. The following parameters should also be measured: wilting point (so available water

can be estimated), soil water content, and at minimum saturated hydraulic conductivity. These additional data are generally the minimum model requirements. Phase two soil sampling will determine DCPA, MTP, and TTA. The manufacturing impurities HCB and TCDD should also be analyzed for to assess whether they may lead to ground water contamination.