Date Out: 7/31/96

Chemical Code: 029001
DP Barcode: D227645

ENVIRONMENTAL FATE AND GROUND WATER BRANCH

Review Action

To: Lisa Engstrom, PM #62
Special Review and Reregistration Division (7508W)

From: Elizabeth Behl, Section Head
Ground Water Technology Section
Environmental Fate & Ground Water Branch/EFED (7507C)

Thru: Henry Jacoby, Chief
Environmental Fate & Ground Water Branch/EFED (7507C) 7/31/96

Attached, please find the EFGWB review of...

Common Name:	1,3-Dichloropropene	Trade name:	Telone II
Company Name:	DowElanco		
ID #:	029001		
Purpose:	Review site selection report and monitoring plan for small-scale prospective monitoring study in Portage County, Wisconsin.		

Type Product:	Action Code:	EFGWB #(s):	Review Time:
Nematicide	820	NA	2 days

STATUS OF STUDIES IN THIS PACKAGE: REQUIREMENTS

Guideline #	MRID	Status[1]
166-1	NA	U

STATUS OF DATA ADDRESSED IN THIS PACKAGE:

Guideline #	Status[2]
166-1	P

[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 W=Waived. NA=Not Available.

1. CHEMICAL: Dichloropropene

Chemical name: 1,3-Dichloropropene
Common name: Telone II; Telone C-17; 1,3-D

2. TEST MATERIAL:

Soil, soil-pore water, ground water, air.

3. STUDY/ACTION TYPE:

Review detailed site selection report and protocol for Wisconsin small-scale prospective monitoring study.

4. STUDY IDENTIFICATION:

Title(s): Environmental Fate of 1,3-Dichloropropene in a Cold Climate - Detailed Site Characterization Report

Draft Protocol Amendment: Site Specific Monitoring Plan

Author(s): Bruce F. Douglas, Michael H. Pottinger, John Zabik

Submitted for: DowElanco
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Indianapolis, IN 46268-1054

Identifying No.: 029001
DP Barcode: D227645
Date Sent to EFED: 7/02/96

5. REVIEWED BY:

Estella Waldman
Hydrologist
OPP/EFED/EFGWB/Ground-Water Section

Signature: Estella Waldman

Date: 7/30/96

6. APPROVED BY:

Elizabeth Behl
Section Head
OPP/EFED/EFGWB/Ground-Water Section

Signature: EBehl

Date: 7/30/96

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7. CONCLUSIONS:

A detailed site selection report and monitoring plan for a small-scale prospective monitoring study for 1,3-dichloropropene was received by the Agency. The quality of the site selection report submitted by the registrant is very high. However, additional information must be amended to the monitoring plan and submitted to the Agency as soon as possible.

8. RECOMMENDATIONS:

1) **Well construction/development.** Since the "shallow wells may not always yield samples because the field water level may fall below the screened interval," EFED requests that 10-foot screens be used for the monitoring wells.

   Well installation and development should take place approximately 30 days prior to the pesticide application.

2) **Irrigation.**

   a. To be consistent with the requirements of the Florida 1,3-dichloropropene monitoring study, EFED requests that irrigation be used to reach at least 130% of the 10-year average rainfall for the first month of the study. After that time, normal agronomic practices can be followed.

      Although this study will generally be conducted according to standard agricultural practices for potatoes, there is one major difference where irrigation is concerned. The purpose of this study is to determine the leaching potential of 1,3-dichloropropene and not to obtain a healthy crop of potatoes. In addition, because of the environmental fate pattern of 1,3-dichloropropene, water inputs at the beginning of the study are extremely important.

   b. Irrigation water should be analyzed for fenamiphos and its degradates.

3) **Soil sampling.** In keeping with the soil sampling design established for the Florida 1,3-dichloropropene study, nine soil cores should be collected to a depth of 12 inches below the surface during each soil sampling round.

4) **Ground-water sampling.** An additional ground-water sample should be taken at Day 28 after application.

5) **Tracer.** The registrant should inform EFED about the application rate and application method for the tracer.

6) **Limits of Detection.** No information was provided about the limits of detection for the analytes including *cis*- and *trans*-1,3-D; 1,2-D; *cis*- and *trans*-3-chloroallyl alcohol;

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and *cis*- and *trans*-3-chloroacrylic acid. EFED will assume that these detection limits are the same as those stated in the monitoring plan for the Florida monitoring study. However, these must be specifically stated in a monitoring plan amendment to be submitted as soon as possible. If the detection limits are not the same as those in the Florida protocol, EFED must be notified immediately.

7) **Mixing and loading areas.** Locations of former and future pesticide mixing areas for the farm should be described.

8) **Reporting.** No mention is made in the monitoring plan of reporting requirements. EFGWB requests that brief quarterly reports be submitted to the Agency in addition to the final report.

9) **Additional data.** Evapotranspiration should be calculated on the site.

10) **Air sampling.** EFED defers to HED for review and comment on the air sampling portion of this submission.

9. BACKGROUND:

Detections of 1,3-D were seen in a small-scale retrospective study conducted by the registrant for the Agency in Nebraska. Trace levels of 1,3-D were also seen in another study in Washington. Because of the concern for 1,3-D leaching in cold climates, the Agency requested that the registrant conduct a small-scale prospective ground-water monitoring study in a northern climate. Site approval was given by the Agency on March 15, 1996. This submission describes the site information in detail and the monitoring plan for the proposed study.

10. DISCUSSION:

A small-scale prospective study is being conducted to monitor the fate of 1,3-dichloropropene and its degradates under vulnerable conditions in a cold climate. In the northern U.S., Telone is primarily used to control nematodes in potatoes and sugar beets. Telone II Soil Fumigant (formulated as 94 percent 1,3-D and 6 percent inerts) will be applied to a potato field in Wisconsin under typical use conditions.

Detailed Site Selection Report and Draft Site Specific Monitoring Plan

The following information has been provided:

GENERAL INFORMATION --

- General Geology and Hydrogeology. Sand-plain province of central Wisconsin. Outwash and gravel aquifer with yields averaging 1100 gallons/minute from large-

capacity wells. Site probably within recharge area for the shallow aquifer. Discharge of aquifer to Halladay Creek located one-half mile north of study site.

- Climate. Cold, snowy winters and warm summers. Milwaukee (159 miles southeast) has an average of 149 days below freezing.

SITE-SPECIFIC INFORMATION

- Site Location. A potato-growing region in Portage County, Wisconsin near the town of Plover.

- Site Size. Test site size of 10 acres; located within a 160-acre field.

- Slope of Site. Generally less than 2 percent except in the northeast corner where less than one-tenth of an acre has a 2-3 percent slope pitched towards the site.

- Site Characterization. Done using nine soil borings and one 5-foot deep test pit.

- Soils on the Site. Plainfield loamy sand overlying to medium to coarse sand. Organic matter content ranges from 0.7 to 1.5 percent in upper two feet. Some gravel lenses. pH ranges from 5.3 to 7.6 from the surface to 35 feet. No 1,3-D detected in soil samples.

- Soil Characterization. Undisturbed bulk density ranges from 0.79 to 1.82 g/cm^3 (means range from 1.3 to 1.7 g/cm^3). Soil samples also analyzed for organic carbon content, texture, water-holding capacity, CEC, cation concentration, and pH. The unsaturated field hydraulic conductivity was measured using a Guelph permeameter.

- Results of Ground Penetrating Radar. No impermeable layers evident.

- Water Table Depth. The depth to the water table ranges from 15 to 21 feet below the surface.

- Aquifer Characteristics. The aquifer extends to a depth of approximately 60 feet below the surface. Slug tests indicate that the aquifer in the vicinity of the site has a hydraulic conductivity ranging from 1×10^{-2} to 2×10^{-2} cm/sec (30 to 50 feet/day). The average linear velocity flow is 9×10^{-5} cm/sec (0.24 feet/day).

  Ground-water flow direction is from southeast to northwest.

- Ground-Water Analyses. Very low levels of bromide; no background levels of 1,3-D.

INSTRUMENTATION

- Piezometers. Five piezometers were installed.

- Suction Lysimeters. Eight suction lysimeter clusters will be placed on the site; one suction lysimeter cluster will be placed in the control plot. Each cluster will contain four lysimeters at approximately 3, 6, 9, and 12 feet.

- Monitoring Wells. Eight two-well clusters will be placed on the site. One well cluster will be placed southeast of the site in the control plot. Proposed screen lengths are 5 feet; dedicated bladder pumps will be installed in each well.

- Soil Moisture. A TDR unit with multiplexed probes will be installed.

- Meteorological Equipment. Measure solar radiation, precipitation, air temperature, soil temperature, barometric pressure, and wind speed and direction.

IRRIGATION

- Irrigation. The farm on which the site is located (Okray Family Farms) uses center pivot irrigation. Irrigation well is approximately 800 feet southwest of treatment area. The site selection report states that "the site will be irrigated at normal agronomic rates due to 1) the large test plot study site area, 2) the potential damage to the crop, and 3) loss of fertilizer and economic return to the cooperator that is likely to result from excessive irrigation."

STUDY SPECIFICS

- Crop Type for the Study. Potatoes.

- Crop History on the Site. Potatoes, sweet corn, and green snap beans. No 1,3-D use within the last five years. Information about other pesticides used on site provided.

- Start of Study. Application anticipated in early September 1996.

- Crop Maintenance and Harvesting. Determined by farm.

- Study Duration. The monitoring plan states that the study will continue for 24 months and may be concluded earlier. It also states that EPA approval in writing will be required before the study is terminated.

- Well, Lysimeter, and Piezometer Decommissioning.

- Records Maintenance.

TEST CHEMICAL/TRACER

- Application of Tracer. Potassium bromide will be applied to the plot. Report includes safety information; assay, shipping, calibration, and application instructions.

- Application Rate and Verification of Test Material. The chemical will be applied at 25 gallons per acre -- the maximum rate on Irish potatoes to control stubby root nematodes. Target depth for the application is 18 inches. Test containers will be weighed before and after use to determine the amount of Telone applied. Tracer application will be verified by filter disks, petri dishes and/or soil cores.

- Field spikes for soil, water, and air.

ADDITIONAL INFORMATION

- Site Survey. Well, lysimeter, air sampler, and meteorological equipment locations will be surveyed after installation. An aerial photograph will be taken and reference points will be marked.

- Figures. Regional location map, site location map, borehole sampling and instrumentation locations, soils map, topographic map, cross-sections of site, ground-water elevation and depth to ground water maps.

SAMPLE COLLECTION SCHEDULES/ANALYSES

- Ground-Water Sampling Schedule, Sampling Methods, Storage and Shipping. The ground-water sampling schedule is adequate except that an additional sample should be taken on Day 28 after application. Results from the 1,3-dichloropropene study in Florida indicate that residues are decreasing in ground water at that time in some wells but increasing in others. The proposed schedule proposes to sample at 21 days and then at 42 days (a gap of three weeks). An additional 28-day sample could help to better understand the pattern of movement of the chemical.

- Suction Lysimeter Sampling Schedule, Sampling Methods, Storage and Shipping.

- Analytical Methods. For volatiles, metabolites, and tracer.

- Soil Sampling Schedule and Analysis. The registrant proposes that four soil cores will be collected to a maximum of three feet at 1-foot intervals.

- Air Sampling and Analysis. Flux (onsite) and ambient (offsite) air samples will be collected.

- Soil Air Sampling. Two soil vapor nests will be installed. Samples collected at approximately three, six, nine, and twelve feet at two locations on the site.

- Good Laboratory Practice.

MODELLING/STATISTICAL METHODS

- Modelling. ISCST3 (air dispersion), and Leachv or modified Chain-2D (unsaturated some transport) will be used. Additional models may be tested.

- Proposed Statistical Methods. Summary statistics on the results of sample analysis will be performed.

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
DICHLOROPROPENE
Last Update on July 30, 1996
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

LOGOUT	Reviewer: EW	Section Head:	Date: 7/30/96

Common Name:DICHLOROPROPENE
Smiles Code:ClC=CCCl
PC Code # : 29001 CAS #:542-75-6 Caswell #:

Chem. Name :1,3-DICHLOROPROPENE

Action Type:NEMATICIDE; FUNGICIDE; INSECTICIDE; HERBICIDE

Trade Names:1,3-D; TELONE II
(Formul'tn):SINGLE ACTIVE INGREDIENT, 94% RTU
Physical State: COLORLESS/PALE YELLOW LIQUID

Use Patterns (% Usage) :SOIL FUMIGANT, APPLIED PRIOR TO PLANTING TERRESTRIAL-FOOD AND NON-FOOD USE SITES.

Empirical Form: $C_3H_4Cl_2$
Molecular Wgt.: 110.97 Vapor Pressure: 27.30E Torr
Melting Point : NA °C Boiling Point: 104 °C
Log Kow : pKa: @ °C
Henry's : 1.80E -3 Atm. M3/Mol (Measured) 1.59E -3 (calc'd)

Solubility in ...					Comments
Water	2.50E 3	ppm	@20.0	°C	
Acetone	E	ppm	@	°C	
Acetonitrile	E	ppm	@	°C	
Benzene	E	ppm	@	°C	
Chloroform	E	ppm	@	°C	
Ethanol	E	ppm	@	°C	
Methanol	E	ppm	@	°C	
Toluene	E	ppm	@	°C	
Xylene	E	ppm	@	°C	
Water	2.70E 3	ppm	@20.0	°C	1,2-dichloropropane
	E	ppm	@	°C	

Hydrolysis (161-1)
[V] pH 5.0:13.5 DAYS AT 20 C
[V] pH 7.0:13.5 DAYS AT 20 C
[V] pH 9.0:13.5 DAYS AT 20 C
[ ] pH :pH5.5, 2 C, 90-100 DAYS
[ ] pH : " 15 C, 11-13 DAYS
[ ] pH : " 29 C, 2 DAYS

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Photolysis (161-2, -3, -4)
[ ] Water:
[ ] :
[ ] :
[ ] :

[V] Soil :RAPID, although study not required due to soil incorporation
[V] Air :stable to direct photo. Does react with OH rad and ozone.

Aerobic Soil Metabolism (162-1)
[V] 12 day half-life in a silt loam soil; 54 days in a loamy sand;
[ ] major degradates are cis/trans-3-chloroprop-2-en-1-ol, cis-3-
[ ] chloroprop-2-enoic acid, and trans-3-chloroprop-2-einoic acid,
[ ] and numerous naturally occurring carboxylic acids.
[ ]
[ ]
[ ]

Anaerobic Soil Metabolism (162-2)

	SOIL	TEMP	T 1/2
[V]	SILT CLAY LOAM	15 C	9.1 DA
[ ]	" " "	25 C	2.4 DA
[ ]	SANDY LOAM	15 C	7.7 DA
[ ]	" "	25 C	2.4

[ ]
[ ]

Anaerobic Aquatic Metabolism (162-3)
[S] AT pH 6.9-7.5, T1/2=20 DAYS
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Aerobic Aquatic Metabolism (162-4)
[ ]
[ ]
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[ ]
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[ ]
[ ]

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Soil Partition Coefficient (Kd) (163-1)
[V] LOAMY SAND 0.23
[V] SAND 0.32
[V] CLAY 0.42 AND 1.09
[ ] AVG MAX Koc VALUES WERE 20 FOR
[ ] SAND, 25 FOR LOAMY SAND, AND
[ ] 41 AND 42 FOR TWO CLAY SOILS

Soil Rf Factors (163-1)
[V] IN 30 CM COLUMNS OF SAND,
[ ] LOAMY SAND, AND FLA. CLAY,
[ ] LEACHED WITH >25" WATER, 1.9-
[ ] 4.6% APPL RADIO. REMAINED IN
[ ] SOILS AND 70-84% WAS IN
[ ] LEACHATE. (unaged)

[V] Aged residues were very mobile 25.6-32.0% of applied in leach ate.

Laboratory Volatility (163-2)
[ ]
[ ]

Field Volatility (163-3)
[V] 25% of applied volatilized within 14 days posttreatment.
[S] 11% of applied volatilized within 8 days posttreatment.

Terrestrial Field Dissipation (164-1)
[V] 1,3-D APPLIED AT 342 LB AIA DECLINED FROM A MAX OF 130,000
[ ] PPB IN .30-.45 M LAYER, IMMEDIATELY AFTER TREATMENT, TO
[ ] <10 PPB (DETECTION LIMIT) IN ANY SOIL LAYER AT 71 DAYS; THIS
[ ] WAS IN A FIELD PLOT OF SAND SOIL IN CALIFORNIA.
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Aquatic Dissipation (164-2)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Forestry Dissipation (164-3)
[ ]
[ ]

Long-Term Soil Dissipation (164-5)
[ ]
[ ]

Accumulation in Rotational Crops, Confined (165-1)
[ ]
[ ]

Accumulation in Rotational Crops, Field (165-2)
[ ]
[ ]

Accumulation in Irrigated Crops (165-3)
[ ]
[ ]

Bioaccumulation in Fish (165-4)
[ ]
[ ]

Bioaccumulation in Non-Target Organisms (165-5)
[ ]
[ ]

Ground Water Monitoring, Prospective (166-1)
[ ] Study in Florida ongoing (12/95 application).
[ ]
[ ] Wisconsin site accepted; study expected to begin in Sept. 1996.
[ ]

Ground Water Monitoring, Small Scale Retrospective (166-2)
[ ] Five studies completed. Residues up to 3.86 ppb reported
[ ] in ground water at Nebraska site; degradates in four wells.
[ ] Residues below detection limit at Washington site. No detections
[ ] at two CA sites and in NC but few samples collected.

Ground Water Monitoring, Large Scale Retrospective (166-3)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Miscellaneous Data (158.75)
[ ] Detections of 1,3-D in ground water in New York, Florida, and
[ ] California range from 0.279 to 270 ppb.
[ ]

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Field Runoff (167-1)
[ ]
[ ]
[ ]
[ ]

Surface Water Monitoring (167-2)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Droplet Spectrum (201-1)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Field Evaluation (202-1)
[ ]
[ ]
[ ]
[ ]

Degradation Products

None detected in leached column studies
3-chloroallyl alcohol, in field dissipation studies, declined from max of 410 ppb in the .66-.81 M layer at 7 days post-treatment to <10 ppb in any soil layer at 71 days.
Propionic acid and an unknown (contg. an alcohol of carboxyl)

Two metabolites: 3-chloroallyl alcohol (c-OH, t-OH)
3-chloroacrylic acid (c-CAA, t-CAA)

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Comments

In anaerobic studies, 1,3-D has an affinity for the water phase over the organic phase.
1,3-D exposed to 275 W GE sunlamp degraded; T 1/2 = .5 to 3.3 DA.
Wells 65-1200 feet in So. Cal. had no 1,3-D or chloroallyl alc..
Wells in Suffolk Co.(NY) had detectable 1,3-D and 1,2-D 68 days after fumigation of field with 140 L/HA; conc peaked at 83 days and persisted for 138 days.
Despite 7000 gal spill in Calif, 1,3-D decreased to <100 ppm in 0-12"depth 5.5 mos later, and was never found in wells nearby.

Kd(ads) values for 1,2-Dichloropropane are all < 1.0. Soil column leaching suggest high mobility with 85.8% of applied found in the leachate (0.64% OC) and 73.2% in the leachate of another column (2.32% OC).

References: EPA REVIEWS
Writer : PJH, KLP, EW