Date Out: 4/2/97

Chemical Code: 029001
DP Barcode: D234628

ENVIRONMENTAL FATE AND GROUND WATER BRANCH

Review Action

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

From: Elizabeth Behl, Acting Chief
Environmental Fate & Ground Water Branch/EFED (7507C)

Attached, please find the EFGWB review of...

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

Type Product:	Action Code:	EFGWB #(s):	Review Time:
Nematicide	860	NA	1 day

STATUS OF STUDIES IN THIS PACKAGE:

Guideline #	MRID	Status [1]
166-1	442269-01	A

STATUS OF DATA REQUIREMENTS 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.

3. STUDY/ACTION TYPE:

Review first progress report for Wisconsin small-scale prospective ground-water monitoring study.

4. STUDY IDENTIFICATION :

Title: Environmental Fate of 1,3-Dichloropropene in a Cold Climate -- Progress Report #1

Submitted for: DowElanco
9330 Zionsville Road
Indianapolis, IN 46268-1054

Date Sent to EFED: 3/31/97

5. REVIEWED BY:

Estella Waldman Signature: Estella Waldman
Hydrologist
OPP/EFED/EFGWB/Ground-Water Section Date: 3/31/97

6. APPROVED BY:

Elizabeth Behl Signature: E Behl
Acting Chief
OPP/EFED/EFGWB Date: 4/1/97

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7. CONCLUSIONS:

This report describes the progress of the Wisconsin prospective ground-water monitoring study from September 6, 1996 (pre-application) through December 9, 1996 (Day After Application or DAA 92).

The monitoring data generated by this study demonstrate that 1,3-D has the potential to contaminate drinking water in environments similar to those found in Wisconsin. Furthermore, the concentrations found in ground water are generally above the estimated lifetime health advisory level of 0.3 ppb, indicating a concern for human health.

Preliminary results for 1,3-D and 1,2-D indicate that both analytes have been detected in ground water on the site. 1,3-D was detected in all of the onsite shallow and deep wells (16 wells) at concentrations ranging from 0.001 to 278 ppb. The highest concentrations were seen in the last sampling round which took place 62 to 63 days after application.

1,2-D was detected in all 8 of the onsite shallow wells and four of the onsite deep wells at concentrations ranging from trace levels to 1.2 ppb. For 1,2-D also, residue concentrations increased to Day 62/63.

Neither 1,3-D or 1,2-D were detected in the field blanks or the offsite wells located 75 feet downgradient of the site (these wells were installed two months after the Telone application).

8. RECOMMENDATIONS :

1. The results of this study -- that 1,3-dichloropropene and its degradates can leach to ground water at high levels -- could have serious implications for other areas of the U.S. Therefore, the registrant should examine the Telone use areas in the U. S. (including Hawaii and Puerto Rico) and determine those that are vulnerable to ground-water contamination from Telone use. The registrant should then propose restrictions to prevent ground-water contamination.

2. According to this report, there was no evidence of 1,3-D or 1,2-D contamination in the field blanks taken during sampling in Wisconsin. In the Florida Telone study, however, many (67 percent) of the equipment blanks contained 1,3-D and one contained 1,2-D. EFED requests that the registrant provide an immediate explanation of why the results were different for the blanks in these two studies.

3. In future progress reports, EFED requests to see plots of:

- applied water (irrigation and precipitation) and evapotranspiration versus days after application, and
- pesticide residues and bromide in the wells versus days after application.

Examples of these graphs are attached.

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. The study in Wisconsin was initiated on February 2, 1996.

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. Telone II Soil Fumigant (formulated as 94 percent 1,3-D and 6 percent inerts) was applied to a potato field in Portage County, Wisconsin on September 9, 1996. Telone was injected to a depth of approximately 18 inches below the surface at a rate of 283 lbs a.i./acre (28 gallons per acre). The potassium bromide tracer was applied on September 7 and 8, 1996 at a rate of approximately 133.4 lbs/acre.

The test site is a 9-acre area with a 1-acre control plot. The soil is Plainfield loamy sand. Depth to the water table ranges from 15 to 22 feet; ground-water flow is to the northwest.

A winter cover crop of rye grass was planted in October and Vapam was applied immediately after planting at a rate of 50 gallons per acre.

Instrumentation. TDR probes, multiplexors, TDR-3 cable tester and a Campbell datalogger were installed from July 24-26, 1996. Nine monitoring well clusters were installed from July 23-26, 1996. Two additional monitoring wells were installed downgradient of the test plot on November 10, 1996. Nine suction lysimeter clusters were installed from July 23-25, 1996. Two meteorological stations were installed in August and September 1996.

RESULTS

Climatological Data. Monthly evapotranspiration ranged from 1.53 to 1.63 centimeters. Total precipitation and irrigation was 130 percent of the ten-year average. Soil temperature ranged from 16.8-19.2°C on September 12, 1996 to 0.6-6.5°C on November 10, 1996.

Site Hydrogeology. Depth to ground water during the first quarter of the study ranged from 15 to 22 feet below the surface. The water table fluctuated less than 2 feet between the February, April, September, and November measurements (except in OW-3 where a measurement error is suspected). The average linear horizontal flow velocity was calculated to range from $7x10^{-2}$ ft/day ($2x10^{-5}$ cm/sec) to 0.1 ft/day ($4x10^{-5}$ cm/sec). No vertical gradient was seen since the water level was below the tops of the pumps in the shallow wells during the sampling period.

Bromide Data, 1,3-D in Soil, 1,3-D in Soil-Pore Water. No results were available when the report was submitted.

1,3-D and Degradates in Ground Water. 1,3-D was detected in all of the onsite shallow and deep wells (16 wells) at concentrations ranging from 0.001 to 278 ppb. The highest concentrations were seen in the last sampling round which took place 62 to 63 days after application.

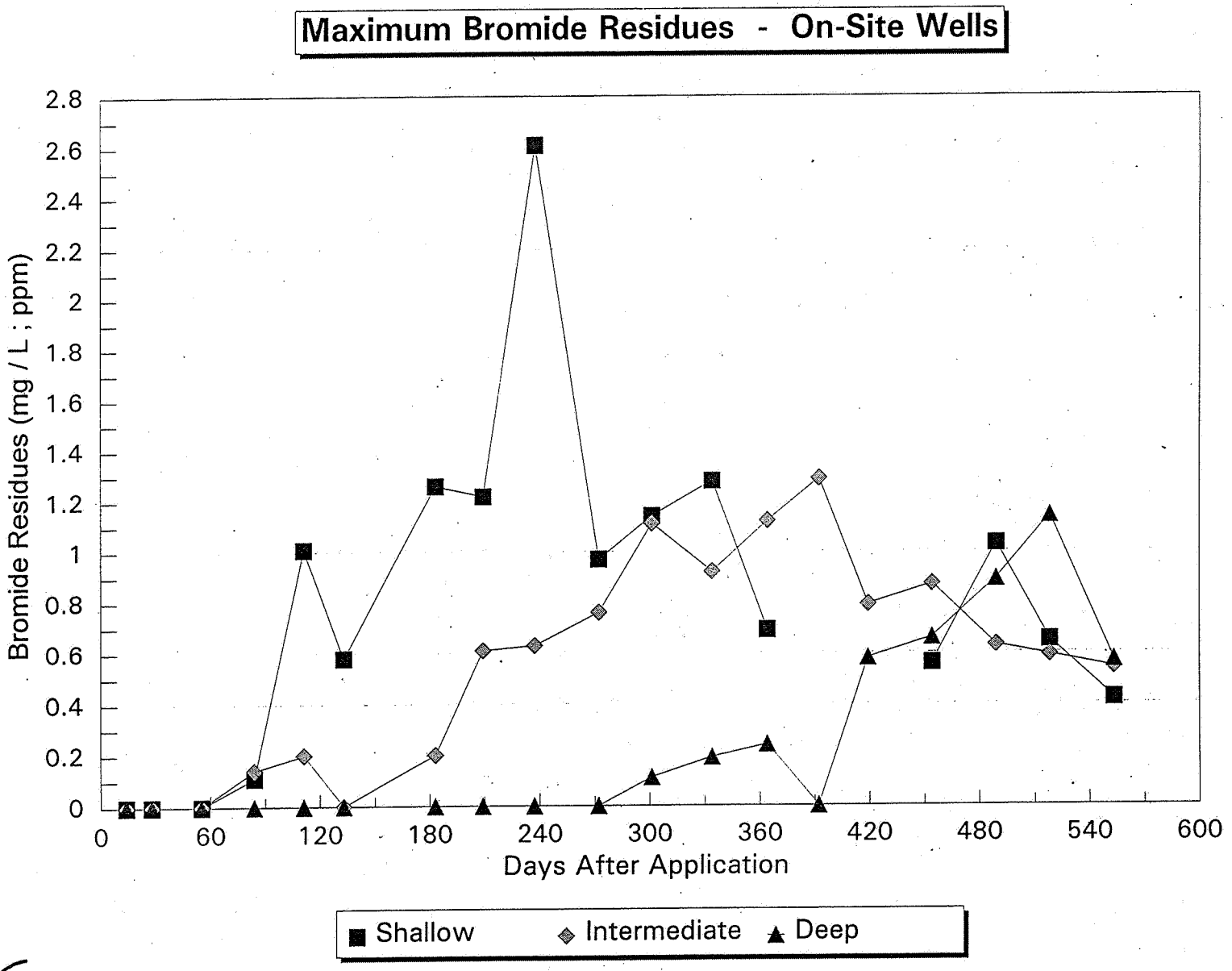
The average concentration of 1,3-D in the shallow wells on the site was 100 ppb; the maximum concentration was 278 ppb. No 1,3-D residues were detected in the offsite wells located 75 feet downgradient of the treated area.

1,2-D in Ground Water. 1,2-D was detected in all 8 of the onsite shallow wells and four of the onsite deep wells at concentrations ranging from trace levels to 1.2 ppb. For 1,2-D also, residue concentrations increased to Day 62/63.

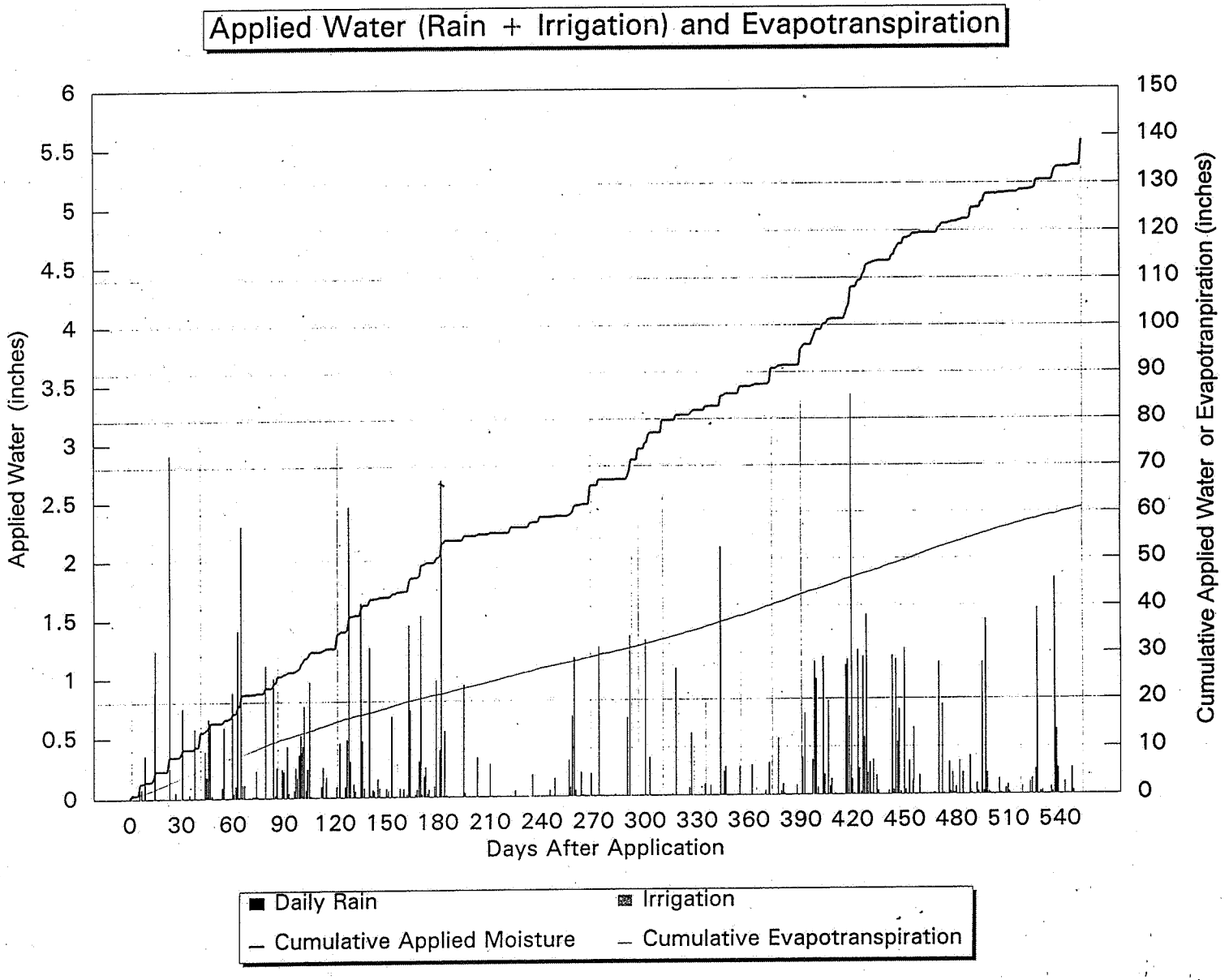
The average concentration of 1,2-D in the shallow wells on the site was 0.5 ppb; the maximum concentration was 1.2 ppb. No 1,2-D was detected in the offsite wells located 75 feet downgradient of the treated area.

Field Blanks. No 1,3-D or 1,2-D above the limit of quantitation was detected in the field blanks.

EXAMPLE


Maximum Bromide Residues - On-Site Wells
Bromide Residues (mg / L ; ppm)
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
60
120
180
240
300
360
420
480
540
600
Days After Application
Shallow
Intermediate
Deep

EXAMPLE


Applied Water (Rain + Irrigation) and Evapotranspiration
Applied Water (inches)
Cumulative Applied Water or Evapotranpiration (inches)
Days After Application
0 30 60 90 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Daily Rain
Irrigation
Cumulative Applied Moisture
Cumulative Evapotranspiration

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
DICHLOROPROPENE
Last Update on March 31, 1997
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

LOGOUT	Reviewer: EW	Section Head:	Date:

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; TELONE C-17
(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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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)
[ ]
[ ]

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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)
[ ] Detections of 1,3-D and two degradates in FL in shallow and deep
[ ] aquifers (progress report, one year after application, D233703).
[ ] 1,3-D concentrations in shallow wells ranged from 0.11-364 ppb.
[ ] 1,3-D concentrations in deep wells ranged from 0.05-1.03 ppb.

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)
[ ] SMALL-SCALE PROSPECTIVE: Preliminary results indicate 1,3-D found
[ ] in all 16 shallow and deep wells. Concentrations range from 0.001
[ ] to 278 ppb. 1,2-D found in all shallow wells and 4 deep wells at
[ ] concentrations ranging up to 1.2 ppb.

Ground Water Monitoring, Miscellaneous Data (158.75)
[ ] Detections of 1,3-D in ground water in New York, Oregon,
[ ] Washington, and California range up 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