Date Out:

Chemical Code:029001
DP Barcode:D187001,D183864,D177250,D185193

ENVIRONMENTAL FATE AND GROUND WATER BRANCH

Review Action

SEP 20 1993

To: Linda Propst PM #73
Special Review and Reregistration Division (H7508W)

From: Akiva Abramovitch, Section Head
Chemistry Review Section #3
Environmental Fate & Ground Water Branch/EFED (H7507C)

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

Henry Jacoby 9/9/93

Attached, please find the EFGWB review of...

Common Name:	Dichloropropene	**Trade name:**	Telone, NCI-C03985
Company Name:	Dow Elanco		
ID #:	029001		
Purpose:	To review column leaching of aged residues and two field volatility studies.		

Type Product:	**Action Code:**	**EFGWB #(s):**	**Review Time:**
Nematicide	627,604	93-~~0785~~,0073,0193,0351 92-0785	5.0 days

STATUS OF STUDIES IN THIS PACKAGE:

Guideline #	MRID	Status[1]
163-1	42515501	A
163-3	42545101	A
163-3	42265701	C

STATUS OF DATA REQUIREMENTS ADDRESSED IN THIS PACKAGE:

Guideline #	Status[2]
163-1	P
163-3	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.

1. CHEMICAL: Common name:

Dichloropropene.

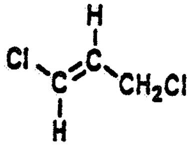
Chemical name(s):

(EZ)-1,3-Dichloropropene (IUPAC).
1,3-Dichloro-1-propene (CA).
3-Chloropropenyl chloride.

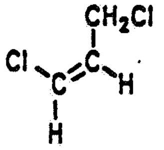
Trade name(s):

Telone, NCI-C03985.

Structure:



trans-1,3-dichloropropene



cis-1,3-dichloropropene

Formulations:

Ready-to-use liquid.

Physical/Chemical properties (isomer mixture):

Molecular formula: $C_3H_4Cl_2$.
Molecular weight: 110.97
Physical state: Colorless to amber liquid.
Melting point: Below -50 C.
Boiling point: 108 C.
Vapor pressure (25 C): 34.3 and 23.0 mm Hg for cis and trans
Henry's Law const.(25 C): 1.8×10^{-3} m^3 atm/gmol (cis)
1.05×10^{-3} m^3 atm/gmol (trans)
Solubility (20 C): Approximately 2.2 g/L water; miscible with hydrocarbons, halogenated solvents, esters, and ketones.

2. TEST MATERIAL:

Study 1: Active ingredient.
Studies 2 and 3: Technical chemical (Tech).

3. STUDY/ACTION TYPE:

Review of column leaching of aged residues and two field volatility studies.

4. STUDY IDENTIFICATION:

MRID #42515501: Batzer, F.R., S.A. Altscheffel, and J.L. Balcer. 1992. Aged column leaching of 1,3-dichloropropene and its metabolites on a loamy sand soil. Laboratory Study ID: ENV91043. Unpublished study performed by DowElanco, North American Chemistry Laboratory, Midland, MI, and submitted by DowElanco, Indianapolis, IN.

MRID #42545101: Knuteson, J.A., D.G. Petty, and B.A. Shurdut. 1992a. Field volatility of 1,3-dichloropropene in Salinas Valley California. DowElanco Laboratory Study ID: ENV91011. Unpublished study performed by A & L Great Lakes Laboratories, Inc., Fort Wayne, IN, and performed and submitted by DowElanco, Midland, MI, and Indianapolis, IN.

MRID #42265701: Knuteson, J.A., D.G. Petty, and B.A. Shurdut. 1992b. Field volatility of 1,3-dichloropropene in the Imperial Valley of southern California. DowElanco Laboratory Study ID: ENV91001. Unpublished study performed and submitted by DowElanco, Midland, MI, and Indianapolis, IN.

5. REVIEWED BY:

Kevin Poff
Chemist
EFGWB/EFED/OPP
Review Section #3

Signature: Kevin Poff

Date: SEP 8 1993

6. APPROVED BY:

Akiva D. Abramovitch
Chief
EFGWB/EFED/OPP
Review Section #3

Signature: Akiva Abramovitch

Date: SEP 8 1993

7. CONCLUSION:

Leaching and Adsorption/Desorption DER 1

1. Study MRID #42515501 satisfies the aged leaching/adsorption/desorption data requirements for 1,3-dichloropropene.
2. Aged (31 days) 1,3-dichloropropene residues were very mobile (25.6-32.0% of applied radioactivity in leachates) in 30-cm columns of loamy sand soil. 1,3-Dichloropropene and the degradates 3-chloroallyl alcohol, 3-chloroacrylic acid, and composite carboxylic acids (including acetic acid, oxalic acid, and propionic acid) were detected in leachates and soil segment (upper 2 cm) extracts.

Field Volatility DER 2

1. Study MRID #42545101 is acceptable and satisfies the field volatility 163-3 data requirement for 1,3-Dichloropropene.

2. 1,3-Dichloropropene volatilized from sandy loam soil in California following a direct injection (12- to 18-inch soil depth) application of 1,3-dichloropropene (Telone II, 96.6% technical) at 12.3 gallon/A (application rates of several crops in California are 6 to 9 gal/A). Approximately 25% of the applied 1,3-dichloropropene had volatilized by 14 days posttreatment (final sampling interval). The volatilization of 1,3-dichloropropene increased to 35.1 mg/m^2·hour by 3 days posttreatment (aerodynamic flux method using 33- and 90-cm sampling levels at plot center), then ranged from 8.13 to 22.3 mg/m^2·hour at 4-6 days, 4.6 to 17.5 mg/m^2·hour at 7-9 days, 3.31 to 7.78 mg/m^2·hour at 10-12 days, and then declined to 1.28 to 4.93 mg/m^2·hour at 12-14 days. Volatilization of 1,3-dichloropropene followed somewhat of a diurnal pattern with maximum air concentrations of 1,3-dichloropropene frequently detected during the 12-hour nighttime sampling intervals.

<u>Field Volatility</u> DER 3

1. Study MRID #42265701 is unacceptable for the following reasons:

a) It was not possible to determine a pattern of decline of the pesticide, because the study of plot 15-A was terminated after only 8 days of observation.

b) the application rate for the portion of this study conducted at the 2-A plot (loam/sandy clay loam soil) treated at 6.8 gallon/A was significantly less than the maximum application rate (36 gallon/A).

2. Study MRID #42265701 provides ancillary field volatility data.

3. 1,3-Dichloropropene volatilized from clay loam and loam/sandy clay loam soil in California following a direct injection (12- to 18-inch soil depth) application of 1,3-dichloropropene (Telone II, 97.7% technical) at 12.1 or 6.8 gallon/A. By 8 days posttreatment (final sampling interval), approximately 11.2% of the applied 1,3-dichloropropene had volatilized from clay loam soil treated at 12.1 gallon/A and 4.4% volatilized from loam/sandy clay loam soil treated at 6.8 gallon/A. The volatilization of 1,3-dichloropropene increased to a maximum of 20.4 mg/m^2·hour at 7 days posttreatment (aerodynamic flux method using 33- and 90-cm sampling levels at plot center), was 13.0 mg/m^2·hour at 7.5 days, and then declined to 3.94 mg/m^2·hour at 8 days (final sampling interval).

8. <u>RECOMMENDATIONS</u>:

Inform the registrant that study MRID #42515501 is acceptable and can contribute towards satisfying the leaching/adsorption/desorption 163-1 data requirement for 1,3-dichloropropene. To totally satisfy the 163-1 leaching/adsorption/desorption data requirement for 1,3-dichloropropene acceptable mobility data on the impurity <u>1,2-dichloropropane</u> is required. It was proposed to the Agency during the meeting of April 1, 1992 (between USEPA and DowElanco) that the 1,2-D mobility study be conducted as a batch adsorption/desorption study on four soils and a column leaching study on the Fuquay sandy loam. The proposed study would provide more information on the leaching potential than a column-only study. The rational for the conducting study was that the 1,2-dichloropropane (1,2-D) impurity is present in the product at the level of 0.1-0.05% and is a concern to the EFGWB because of its detection at various sites around the country. In order to clarify the impurity's potential to contaminate ground water the mobility studies are required on the 1,2-D impurity.

Inform the registrant that study MRID #42265701 is unacceptable and can not be used to satisfy the field volatility 163-3 data requirement for 1,3-dichloropropene for the following reasons:

a) sampling intervals were insufficient to establish a pattern of decline for 1,3-dichloropropene.

b) application rates in the study completed at the 2-A plot were significantly below (19% of maximum) the maximum application rate of 36 gallon/A.

Inform the registrant that study MRID #42545101 field volatility 163-3 is acceptable and partially satisfies the field volatility 163-1 data requirement for 1,3-dichloropropene. However, since the maximum field application rate for Telone II was reported as 36 gallon/A, additional information on the field volatility of 1,3-dichloropropene at the maximum application rate may be required depending on the needs of other branches within the agency.

9. BACKGROUND:

The following is a summary of the status of the environmental fate data requirements to support terrestrial food crop and terrestrial nonfood uses for 1,3-dichloropropene.

Satisfied:

161-1. **Hydrolysis**; EFGWB# 6307,6308,6309,6311,6588,6594, 8/1/86. pH 5, 7, 9, t1/2= 13.5 days at 20°C,
161-4. **Photodegradation in Air**; EFGWB# 80103,80150, 3/29/88. Stable.
162-2. **Anaerobic Soil Metabolism**; EFGWB# 70169, 10/29/87. SiClLm, 15°C t1/2=9.1 days; StClLm, 25°C t1/2=2.4 days; SdLm 15°C t1/2=7.7 days; SdLm 25°C t1/2=2.4 days.

Partially Satisfied:

163-1. **Leaching/Adsorption/Desorption**; EFGWB# 80533, 5/6/88. Loamy Sand K_d= 0.23, Sand K_d= 0.32, Clay K_d= 0.42 and 1.09. Avg. max K_{oc} values were 20 for sand, 25 for Loamy Sand, and 41 and 42 for two clay soils. In 30 cm columns of sand, loamy sand, and FLA. clay leached with > 25" water, 1.9-4.6% of appl. radio. remained in soils and 70-84% was in the leachate. Soil Column Leaching: (this review) EFGWB #'s 92-0785,-0073,-0193, MRID #42515501, aged (31 days) 1,3-dichloropropene residues were very mobile (25.6-32.0% of applied radioactivity in leachates).

To completely satisfy the leaching/adsorption/desorption 163-1 data requirement for 1,3-dichloropropene acceptable mobility data is required for 1,2-dichloropropane.

164-1. **Terrestrial Field Dissipation**; EFGWB# 90172 3/24/89 and EFGWB# 90418 3/5/90. 1 study submitted. t1/2=1 day, another calc. was t1/2= 7 days. Another study needs to be submitted.

163-3. **Field Volatility**; (this review) EFGWB's 92-0785,-0073,-0193, MRID #42545101. Approximately 25% of the applied 1,3-dichloropropene had volatilized by 14 days posttreatment (final sampling interval). The volatilization of 1,3-dichloropropene increased to 35.1 mg/m^2·hour by 3 days posttreatment (aerodynamic flux method using 33- and 90-cm sampling levels at plot center), then ranged from 8.13 to 22.3 mg/m^2·hour at 4-6 days, 4.6 to 17.5 mg/m^2·hour at 7-9 days, 3.31 to 7.78 mg/m^2·hour at 10-12 days, and 1.28 to 4.93 mg/m^2·hour at 12-14 days.

Not Satisfied:

162-1. **Aerobic Soil Metabolism.**
164-1. **Terrestrial Field Dissipation.** One additional study is required.
165-1. **Confined Rotational Crops.**
163-3. **Field Volatility.** (depending on needs of other branches within the agency).

Waived:

161-2. **Aqueous Photolysis** (soil injected, Sept. 1986 registration standard)
161-3. **Soil Photolysis** (soil injected, Sept. 1986 registration standard)

Reserved:

164-5. **Long Term Field Soil Dissipation.**
165-2. **Field Rotational Crop.**

Ground Water Monitoring is in progress.

Dichloropropene is a soil-incorporated nematicide registered for preplant application on a variety of terrestrial food (including fruits, vegetables, nuts, and field crops) and nonfood crops (ornamental, turf, tree nursery stock, and tobacco). In addition, dichloropropene has secondary insecticidal (soil insects) and fungicidal activity, and by controlling nematode virus vectors, helps to control viral diseases. Single active ingredient formulation include ready-to-use liquid (92.0% RTU), and multiple active ingredient formulations include chloropicrin. Some or all applications of dichloropropene may be considered RUP. Maximum application rates range from 38.3 to 1067.6 lb ai/A.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

Refer to attached reviews.

11. <u>COMPLETION OF ONE-LINER</u>:

Attac~~hed~~.

12. <u>CBI APPENDIX</u>:

N/A.

DATA EVALUATION RECORD

STUDY 1

CHEM 029001 Dichloropropene §163-1

FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 42515501
Batzer, F.R., S.A. Altscheffel, and J.L. Balcer. 1992. Aged column leaching of 1,3-dichloropropene and its metabolites on a loamy sand soil. Laboratory Study ID: ENV91043. Unpublished study performed by DowElanco, North American Chemistry Laboratory, Midland, MI, and submitted by DowElanco, Indianapolis, IN.

DIRECT REVIEW TIME = 12

REVIEWED BY: L. Binari TITLE: Staff Scientist

EDITED BY: K. Ferguson TITLE: Task Leader
W. Martin Staff Scientist

APPROVED BY: W. Spangler TITLE: Project Manager

ORG: Dynamac Corporation
Rockville, MD
TEL: 301-417-9800

APPROVED BY: K. Poff
TITLE: Chemist
ORG: EFGWB/EFED/OPP

SIGNATURE:

CONCLUSIONS:

Mobility - Leaching and Adsorption/Desorption

1. Study MRID #42515501 satisfies the aged leaching/adsorption/desorption data requirements for 1,3-dichloropropene.

2. Aged (31 days) 1,3-dichloropropene residues were very mobile (25.6-32.0% of applied radioactivity in leachates) in 30-cm columns of loamy sand soil. 1,3-Dichloropropene and the degradates 3-chloroallyl alcohol, 3-chloroacrylic acid, and composite carboxylic acids (including acetic acid, oxalic acid, and propionic acid) were detected in leachates and soil segment (upper 2 cm) extracts.

METHODOLOGY:

Sieved (2 mm), air-dried loamy sand soil (84% sand, 10% silt, 6% clay, 0.64% organic carbon, pH 4.7, CEC 3.3 meq/100 g) was weighed (100 g) into two incubation flasks, adjusted to 75% of 0.3 bar moisture, and treated at 100 ug/g with uniformly-labeled [^{14}C]cis/trans-1,3-dichloropropene (radiochemical purity >98%, specific activity 1.15 mCi/mMol, Sigma) plus unlabeled cis/trans-1,3-dichloropropene (purity 94-95%, source unspecified) dissolved in chilled acetone to reduce volatilization. To determine the actual treatment rate, aliquots of the test solution were analyzed for total radioactivity using LSC prior to and after treatment of the soil samples. Following treatment, the flasks were sealed, and the treated soil samples were incubated at approximately 25 C for 31 days; it was not specified whether the samples were incubated in darkness. At 31 days posttreatment, the flasks were chilled in an ice bath for approximately 10 minutes, then the atmosphere in the headspace of each flask was purged and drawn (air flow rate approximately 50 mL/minute) sequentially through two activated carbon traps and a 0.2 N sodium hydroxide trapping solution (Figure 3). The carbon traps were extracted twice with acetone, and extracts from corresponding carbon traps were combined; aliquots of the carbon trap extract and sodium hydroxide trapping solution were analyzed for total radioactivity using LSC.

To characterize [^{14}C]residues in the soil prior to leaching, samples of the aged treated soil were taken for analysis prior to and after placement of the aged treated soil onto untreated soil columns. Soil samples were extracted twice with acetone for 2 hours per extraction; extracts were separated from soil by centrifugation, combined, and aliquots were analyzed for total radioactivity using LSC. Additional aliquots were analyzed by reverse phase HPLC on a C-18 column with a gradient elution combining 1% acetic acid in water and 1% acetic acid in acetonitrile; fractions were collected (interval not specified) and analyzed for total radioactivity by LSC. Radioactive compounds were identified by comparison to the retention times of reference standards of [^{14}C]cis/trans-1,3-dichloropropene, [^{14}C]cis/trans-3-chloroallyl alcohol, [^{14}C]cis/trans-3-chloroacrylic acid, [^{14}C]acetic acid sodium salt, [^{14}C]oxalic acid, and [^{14}C]propionic acid sodium salt. The acetone extract was then concentrated, and aliquots were analyzed for total radioactivity using LSC; recoveries of sample radioactivity were >98% following the concentration step. Aliquots of the concentrated extract were again analyzed by reverse phase HPLC as described above. The extracted soil was reextracted with water followed by 0.2 N sodium hydroxide solution; extracts were analyzed for total radioactivity using LSC. Unextracted [^{14}C]residues remaining in the extracted soil were quantified using LSC following combustion.

Following the 31-day aging period, two soil columns were prepared. Sieved (1.19 mm), air-dried loamy sand soil was packed to a depth of 30 cm in glass columns (5-cm diameter). The columns were saturated

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with 0.01 N calcium chloride ($CaCl_2$) solution by ascending flow. Once saturated, each soil column was inverted, and a 2-cm segment of the soil column was removed and replaced with a portion (approximately 65 g) of the aged treated soil. The aged treated soil was packed down with a spatula and saturated with approximately 10 mL of $CaCl_2$ solution; in one column, pentafluorobenzoic acid was diluted in the $CaCl_2$ solution as a tracer. One of the soil columns was sealed, inverted (aged treated soil at bottom of column), and eluted by continuous upward flow with $CaCl_2$ solution at a rate of 3.0 mL/minute (9.2 cm/hour); total elution time was not reported. The second column was sealed and eluted by continuous downward flow at a rate of 2.0 mL/minute (6.1 cm/hour) over a 7-hour period; this column was eluted using downward flow in the normal position due to leaking when eluted with upward flow in an inverted position. Both columns were eluted with the equivalent of 20 inches of $CaCl_2$ solution (approximately 1000 mL) and maintained at ambient temperatures (not specified) during elution. Leachates were collected in 68- to 1022-mL fractions; fractions were chilled in an ice bath during collection. Following leaching, the soil columns were sealed and frozen.

Aliquots of the leachate fractions were analyzed for total radioactivity using LSC immediately upon collection; the remaining portion of the leachate fractions were stored ($\leq$1 day) frozen until analysis by reverse phase HPLC as described above. Selected leachate fractions were analyzed by ion exclusion HPLC on a reverse phase column eluted with 0.1 M ammonium dihydrogen phosphate (pH 2); radioactive compounds were detected and identified as described above (Table III). Selected leachate fractions were also analyzed by size exclusion chromatography; an aliquot of leachate was applied to a Sephadex G-25 column and eluted with distilled water, then 1.0-mL fractions were collected and analyzed for total radioactivity using LSC. To detect the tracer compound (pentafluorobenzoic acid) used in one of the soil columns, leachate fractions were analyzed by HPLC using UV (240 nm) detection on a reverse phase column eluted with water:acetonitrile:acetic acid (80:20:1, v:v:v).

For the soil columns, the 2-cm segment of aged treated soil was removed, then the remainder of each column was divided into five 5- to 6-cm thick segments. Soil segments were extracted with acetone, and the extracts were analyzed by reverse phase HPLC as described above for the aged treated soil samples. Extracted soil segments were reextracted sequentially with water (one soil column only), 0.2 N sodium hydroxide, and again with water; extracts were separately analyzed for total radioactivity using LSC. Selected sodium hydroxide extracts were analyzed by size exclusion chromatography as described above for the leachate. Unextracted [^{14}C]residues remaining in the extracted soil segments were quantified using LSC following combustion.

DATA SUMMARY:

Aged (31 days) residues of [^{14}C]cis/trans-1,3-dichloropropene (radiochemical purity >98%) were very mobile (25.6-32.0% of applied radioactivity in leachates) in 30-cm columns of loamy sand soil that were leached with 20 inches of 0.01 N calcium chloride solution over a 7-hour period (Tables X, XXVIII, and XXIX). In the leachates, 1,3-dichloropropene comprised 6.0-7.6% of the applied radioactivity, and the degradates

3-chloroallyl alcohol

comprised 13.4-18.8%,

3-chloroacrylic acid

comprised 2.7-4.3%, and

composite carboxylic acids (including acetic acid, oxalic acid, and propionic acid)

comprised 1.8-2.5% (Tables XIV-XVIII and XX-XXIV).

In the upper 2 cm of the soil columns, 10.2-11.5% of the applied radioactivity was acetone-extractable, 25.3-25.5% was sodium hydroxide-extractable, and 17.7-19.2% was unextracted (Tables XXVIII and XXIX). In the acetone extracts, 1,3-dichloropropene comprised 8.5-10.4% of the applied radioactivity and 3-chloroallyl alcohol comprised 0.7-1.1%; trace levels of 3-chloroacrylic acid and the composite carboxylic acids were also detected (see Comment 2). Size exclusion chromatography of 2-cm segment sodium hydroxide extracts indicated some incorporation of [^{14}C]residues into organic soil macromolecules. Material balances for the two soil columns were 86.0 and 92.2% of the applied (Table X).

<u>COMMENTS</u>:

1. In Tables XIII-XXIV, results presented in the final column of each table were reported in terms of percent of applied radioactivity remaining on the soil columns (Tables XIII and XIX) or percent of a specific compound (1,3-dichloropropene or one of its degradates) remaining on the soil columns (all other tables). Those results were not based on quantitative analysis of the soil segments, but were calculated by the registrant based on the concentrations of total radioactivity and/or individual compounds detected in the aged treated soil applied to the soil columns and the radioactivity recovered in the leachate fractions. Since those results are theoretical estimations, the data were not discussed in this review.

2. Concentrations of 1,3-dichloropropene and its degradate 3-chloroallyl alcohol detected in soil extracts from the upper 2-cm column segments were reported in terms of percent of extract rather than in terms of percent of total radioactivity applied to the soil columns; refer to study text in Results and Discussion section under <u>Leaching of 1,3-D</u>

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from Aged Soil Columns (page 25) and under Soil Segments from Aged Soil Columns (page 29). The registrant reported that 1,3-dichloropropene and 3-chloroallyl alcohol comprised approximately 83-90% and 6-11% of the acetone extractable radioactivity, respectively, in the upper 2-cm soil segments. The Dynamac reviewer calculated that 1,3-dichloropropene and 3-chloroallyl alcohol comprised 8.5-10.4% and 0.7-1.1% of the applied radioactivity, respectively, using the above results and the percent of applied radioactivity recovered in the acetone extracts (10.2-11.5% of applied radioactivity; Tables XXVIII and XXIX).

3. The registrant reported that extracts from soil segments below the upper 2 cm of the columns were not analyzed for 1,3-dichloropropene and its degradates by HPLC because of insufficient concentrations of total radioactivity.

4. Following the aging period, material balances were 73.8% and 80.8% of the applied radioactivity in the aged treated soil samples (Table VI). The registrant reported that the loss in radioactivity was due to incomplete purging of the incubation flask headspace; purged [^{14}C]volatiles totaled 7.2 and 24.0% of the applied radioactivity from the two incubation flasks following the aging period (Table IX).

5. It was intended that both soil columns were to be eluted by upward flow; however, one of the columns began to leak. When inverted and eluted by downward flow, the leaking stopped.

6. The elution time was only reported for one of the soil columns. The registrant reported that the column eluted with downward flow was eluted at a flow rate of approximately 2.0 mL/minute over a 7-hour period. The column eluted with upward flow was eluted at a flow rate of approximately 3.0 mL/minute, but total elution time was not reported. Since the flow rate for the upward flow column was faster than for the downward flow column, the Dynamac reviewer assumes that total elution time for the upward flow column was $\leq$7 hours. The Dynamac reviewer also notes that, with a total elution volume of approximately 1000 mL, calculated elution times for the upward and downward flow columns would be 5.6 and 8.3 hours, respectively, and the 7-hour elution time may actually be an average elution time for the two columns.

7. The registrant reported that 1,3-dichloropropene (Telone II, 94% technical) is a soil fumigant injected into the soil as a preplant treatment for nematodes (Study 2, MRID 42545101). In this study, the registrant reported that the 100 ppm treatment rate used for the aged treated soil was chosen to correspond with the maximum field application rate of 36 gallon/A for Telone II (Appendix C).

RIN 3413-94 1,3-DICHLOROPROPENE REVIEWS

029001

Page_____ is not included in this copy.

Pages 13 through 42 are not included.

The material not included contains the following type of information:

_____ Identity of product inert ingredients.

_____ Identity of product impurities.

_____ Description of the product manufacturing process.

_____ Description of quality control procedures.

_____ Identity of the source of product ingredients.

_____ Sales or other commercial/financial information.

_____ A draft product label.

_____ The product confidential statement of formula.

_____ Information about a pending registration action.

✓ FIFRA registration data.

_____ The document is a duplicate of page(s) __________.

_____ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

DATA EVALUATION RECORD

STUDY 2

CHEM 029001 Dichloropropene §163-3

FORMULATION--01--TECHNICAL CHEMICAL (Tech)

STUDY ID 42545101
Knuteson, J.A., D.G. Petty, and B.A. Shurdut. 1992a. Field volatility of 1,3-dichloropropene in Salinas Valley California. DowElanco Laboratory Study ID: ENV91011. Unpublished study performed by A & L Great Lakes Laboratories, Inc., Fort Wayne, IN, and performed and submitted by DowElanco, Midland, MI, and Indianapolis, IN.

DIRECT REVIEW TIME = 14

REVIEWED BY:	L. Binari	TITLE:	Staff Scientist
EDITED BY:	K. Ferguson W. Martin	TITLE:	Task Leader Staff Scientist
APPROVED BY:	W. Spangler	TITLE:	Project Manager

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APPROVED BY: K. Poff
TITLE: Chemist
ORG: EFGWB/EFED/OPP

SIGNATURE: K L Poff

CONCLUSIONS:

Mobility - Field Volatility

1. Study MRID #42545101 is acceptable and satisfies the field volatility 163-3 data requirement for 1,3-Dichloropropene.

2. 1,3-Dichloropropene volatilized from sandy loam soil in California following a direct injection (12- to 18-inch soil depth) application of 1,3-dichloropropene (Telone II, 96.6% technical) at 12.3 gallon/A (application rates of several crops in California are 6 to 9 gal/A). Approximately 25% of the applied 1,3-dichloropropene had volatilized by 14 days posttreatment (final sampling interval). The volatilization of 1,3-dichloropropene increased to 35.1 $mg/m^2 \cdot hour$ by 3 days posttreatment (aerodynamic flux method using 33- and 90-cm sampling levels at plot center), then ranged from 8.13 to 22.3 $mg/m^2 \cdot hour$ at 4-6 days, 4.6 to 17.5 $mg/m^2 \cdot hour$ at 7-9 days, 3.31 to

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7.78 mg/m^2·hour at 10-12 days, and then declined to 1.28 to 4.93 mg/m^2·hour at 12-14 days. Volatilization of 1,3-dichloropropene followed somewhat of a diurnal pattern with maximum air concentrations of 1,3-dichloropropene frequently detected during the 12-hour nighttime sampling intervals.

METHODOLOGY:

1,3-Dichloropropene (cis/trans-1,3-dichloropropene; Telone II, 96.6% technical, DowElanco) was applied at 12.3 gallons/A by direct injection (12- to 18-inch soil depth) to a plot (397 x 1089 feet) of sandy loam soil (62.6-76.6% sand, 13.0-23.0% silt, 10.4-16.4% clay, 0.50-0.94% organic matter, pH 7.2-8.2, CEC 6.94-10.61 meq/100 g; 0- to 30-cm depth, Table I) located in Monterey County, California, on September 25, 1991. Immediately after injection of the test substance, the soil was disked (depth unspecified) to disrupt the injection channels and compress the soil surface. A 100-foot untreated buffer zone was established around the treated plot. To trap volatilized 1,3-dichloropropene, air was drawn (flow rate 1.5 L/minute) continuously through an air sampler consisting of an activated charcoal adsorption tube and a SKC battery-powered vacuum pump. Five air samplers were placed vertically at 15, 33, 55, 90, and 150 cm above ground level on a pole (A-D and X, respectively, in Figure 5) located at the center of the treated plot (Figures 4-6). Two additional poles, each of which was equipped with two air samplers at 33 and 90 cm above ground level, were placed within the treated plot approximately 65 m from the central pole in a northeast-southwest line (E-F and G-H in Figure 5). Four off-site poles, each of which was equipped with one air sampler at 150 cm above ground level, were placed in a southeast-northwest (anticipated wind directions) line; two of the off-site poles were placed approximately 90 m from the plot center (J and K in Figure 4) and two poles were placed approximately 300 m from the plot center (I and L in Figure 4). Air sampling was initiated 1 day prior to treatment and continued up to 14 days after treatment; charcoal sampling tubes were collected and replaced following each of two 6-hour intervals during the day and a 12-hour interval at night. Upon collection, the ends of the charcoal sampling tubes were sealed and the tubes were stored refrigerated or frozen; lengths of storage time could not be determined from the information provided. The air flow rate of the samplers was determined using a floating bead type-rotometer each time a charcoal sampling tube was installed and replaced. Soil cores (diameter unspecified, 0- to 18-inch depth) for soil moisture determinations were collected at 0 and 14 days posttreatment, and cores (2.25-inch diameter, 0- to 12- and 12- to 24-inch depths) for soil bulk density determinations were collected at 14 days posttreatment. Soil temperatures (2.5-, 10-, 30-, and 50-cm depths), air temperatures, relative humidity, precipitation, total solar radiation (400-1100 nm), and wind velocity and direction were measured at the test site.

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Charcoal from the front and back half of each sampling tube was placed in separate vials. Charcoal contained in the front half of each sampling tube was extracted with chilled carbon disulfide for 1 hour using a flatbed mechanical shaker; extracts were stored frozen until analysis (lengths of storage time could not be determined from the information provided). Aliquots of the extract were analyzed for cis- and trans-1,3-dichloropropene using GC with flame ionization (FID) and/or electron capture (ECD) detection; the limit of quantitation was 1-11 ug for each isomer (cis/trans) by GC/FID and 0.1 ug per isomer by GC/ECD. Extracts with non-detectable concentrations of 1,3-dichloropropene after analysis by GC/FID were reanalyzed by GC/ECD. Selected samples of charcoal contained in the back half of the sampling tubes were extracted and analyzed; remaining charcoal samples were stored frozen. Recovery efficiencies from charcoal sampling tubes fortified with cis/trans-1,3-dichloropropene at 0.461-3439 ug ranged from 68.2 to 131.2% (mean 100.7%) of the applied (Table 1 in Appendix C). Results were corrected for mean recovery efficiencies. Volatilization of 1,3-dichloropropene was calculated over 6- or 12-hour intervals using the aerodynamic flux method (see Comment 1).

DATA SUMMARY:

Following the application of 1,3-dichloropropene (cis/trans-1,3-dichloropropene; Telone II, 96.6% technical) at 12.3 gallons/A by direct injection (12- to 18-inch soil depth) to a plot (397 x 1089 feet) of sandy loam soil located in Monterey County, California, in September 1991, the volatilization of 1,3-dichloropropene increased to 35.1 mg/m^2·hour by 3 days posttreatment (aerodynamic flux method using 33- and 90-cm sampling levels at plot center), then ranged from 8.13 to 22.3 mg/m^2·hour at 4-6 days, 4.6 to 17.5 mg/m^2·hour at 7-9 days, 3.31 to 7.78 mg/m^2·hour at 10-12 days, and 1.28 to 4.93 mg/m^2·hour at 12-14 days (Table IX and Figure 19). Volatilization of 1,3-dichloropropene followed somewhat of a diurnal pattern with maximum air concentrations of 1,3-dichloropropene frequently detected during the 12-hour nighttime sampling intervals. The registrant estimated approximately 25% of the applied 1,3-dichloropropene had volatilized by 14 days posttreatment. At the plot center, maximum air concentrations of 1,3-dichloropropene occurred at 2 days posttreatment and were 744 ug/m^3 at 15 cm above ground level, 553 ug/m^3 at 33 cm, 399 ug/m^3 at 55 cm, 225 ug/m^3 at 90 cm, and 102 ug/m^3 at 150 cm (Table VIII; sampler locations A-D and X, respectively). At two additional on-site locations each approximately 65 m from plot center in a northeast-southwest line, maximum air concentrations occurred at 2 days posttreatment and were 1002 and 168 ug/m^3 at 33 and 90 cm above ground level, respectively, at the northeast location and 663 and 204 ug/m^3 at 33 and 90 cm, respectively, at the southwest location (Table VIII; sampler locations E-H, respectively). At two off-site locations each approximately 90 m from plot center in a northwest-southeast line, maximum air concentrations at 150 cm above ground level were 50.3 ug/m^3 at 2 days posttreatment at the southeast location and 74.5 ug/m^3 at 3 days at the northwest location (Table

VIII; sampler locations J and K, respectively). At two additional off-site sampling locations each approximately 300 m from plot center in a northwest-southeast line, maximum air concentrations at 150 cm above ground level were 9.67 ug/m^3 at 2 days posttreatment at the southeast location and 29.0 ug/m^3 at 3 days at the northwest location (Table VIII; sampler locations I and L, respectively).

During the 14-day study period, no precipitation occurred, air temperatures ranged from 8.4 to 29.9 C, total daily solar radiation ranged from 15123 to 19640 kWatts/m^2, maximum wind gusts ranged from 9.2 to 11.5 m/second, and daily average wind velocity was 1.9-3.3 m/second (Table IV). Average hourly soil temperatures ranged between 10 and 35 C (Figure 15). Relative humidity ranged between approximately 35 and 95% (Figure 17). Wind direction generally occurred in a southeast-northwest pattern with calm, variable winds at night and in the morning and strong winds from the northwest in the afternoon and evening (Figures 11-14). During the study, the soil moisture content decreased from an average of 10.3% to 7.43% in the 0- to 6-inch depth, from 8.03 to 7.40% in the 6- to 12-inch depth, and from 8.44 to 7.99% in the 12- to 18-inch depth (Table V). Despite the drying of the test soil during the study, the soil moisture content remained above 15 bar moisture content (permanent wilting point) which was reported to be 4.87-6.16% in the 0- to 6-inch (0- to 15-cm) soil layer, 4.20-5.90% in the 6- to 12-inch (15- to 30-cm) layer, and 2.70-3.75% in the 12- to 18-inch (30- to 45-cm) layer (Table I).

COMMENTS:

1. The registrant reported that the aerodynamic flux method is a modified form of the Thornthwaite-Holzman equation (Majewski, M.S., M.M. McChesney, J.N. Seiber, 1991, A field comparison of two methods for measuring DCPA soil evaporation rates, Environmental Toxicology and Chemistry 10: 301-311.), which is based upon the log law of the wind speed profile. Aerodynamic flux is a gradient method requiring accurate vertical gradient measurements of horizontal wind speed, air temperature, and pesticide concentrations. The modified equation compensates for conditions which cause the atmosphere to be stable or unstable.

2. The registrant reported that immediate posttreatment soil samples were not collected to confirm the application rate because of the method of application (deep linear injection) and the diffusion of the test substance (laterally and vertically) within the soil immediately after application. The application rate was "quantitatively" determined by establishing precise plot dimensions and weighing the drums that contained the test substance prior to and after application (Table III). Since the pesticide was injected into the soil, off-site spray drift was considered unlikely by the registrant.

3. The test substance was applied at approximately one-third of the maximum application rate; 1,3-dichloropropene (Telone II, 96.6% technical) was applied at 12.3 gallons/A in this study, and the maximum field application rate for Telone II was reported as 36 gallons/A (Appendix C in Study 1, MRID 42515501).

4. Specific storage times for individual charcoal sample tubes and extracts were not reported. The registrant reported that collected sample tubes were stored refrigerated or frozen at the site, then shipped overnight to the analytical laboratory (it was not specified how long sample tubes were held at the test site). At the analytical laboratory, the sample tubes were stored refrigerated at 28.4 to 53.4 F between 10/4/91 and 10/24/91, and sample extracts were stored frozen at -0.6 to 30.4 F between 10/4/91 and 11/1/91. The registrant reported that 1,3-dichloropropene adsorbed onto activated charcoal was found to be stable at freezer temperatures (unspecified) for 90 days, but decreased an average of 10% over 24 days at ambient temperatures (unspecified); the storage stability study was referenced (Hugo, J.M, 1989, <u>Development and validation of a collection and analytical monitoring method for 1,3-dichloropropene and 1,2-dichloropropane</u>, HEH 2.12-38-2(22), unpublished Dow Chemical Report), but not provided for review.

5. Field spike stability was investigated. Charcoal sampling tubes were fortified with 1,3-dichloropropene at 0.46, 9.15, or 2287 ug. Each fortified tube was paired with an untreated charcoal sampling tube and placed approximately 23 cm above ground level on a pole located near the center of the treated plot. Recovery from the fortified tube was determined after subtracting the concentration of 1,3-dichloropropene detected in the untreated tube. The registrant reported (page 37; under <u>Field Spike Samples</u> of Materials and Methods) that recoveries at the 0.46-ug level were variable, but recoveries at the higher spike concentrations averaged 112.5 and 103.3% of applied for cis- and trans-1,3-dichloropropene, respectively. The average recoveries for the field spikes could not be confirmed by the Dynamac reviewer. Although results (ug 1,3-dichloropropene) from the field spikes were reported, the fortification level of each field spike was not indicated, and individual percent recoveries for the field spikes were not reported (Table VIII; sample location FS).

   In addition, stability during shipment of the sampling tubes was investigated. Charcoal sampling tubes were fortified with 1,3-dichloropropene at 0.46, 9.15, or 2287 ug at the test site and shipped with the field samples to the analytical laboratory in Midland, Michigan. Again, the registrant reported (page 37; under <u>Travel Spike (Field-Fortified) Samples</u> of Materials and Methods) variable recoveries at the 0.46-ug level, but average recoveries of 99.7 and 109.9% of applied for cis- and trans-1,3-dichloropropene, respectively, at the higher spike concentrations. As with the field spikes, the average recoveries from the travel spikes could not be confirmed by the Dynamac reviewer. Results (ug 1,3-dichloropropene) from the travel spikes were reported, but the fortification level of each travel spike was not indicated and individual percent recoveries for the travel spikes were not reported (Table 2 in Appendix C; sample TS).

6. The limit of detection for cis/trans-1,3-dichloropropene by GC/FID was reported as 1-11 ug for each isomer in the method and analytical report (Appendix C), but as 1 ug per isomer in the Materials and Method section of the study text under <u>Analytical Method for 1,3-Dichloropropene on Charcoal</u>.

7. The saturated vapor pressure was reported as 34.3 and 23.0 mm of Hg at 25 C for cis- and trans-1,3-dichloropropene, respectively. The solubility of the test substance in water at 25 C was reported as 2180 and 2320 mg/L for cis- and trans-1,3-dichloropropene, respectively.

8. Atmospheric cloud cover during the study period was not reported.

9. Daily minimum and maximum soil temperatures should have been reported in addition to the plot of the average hourly soil temperatures (Figure 15).

10. The test site was located in the flood plain of the Salinas River and the slope of the field was reported as nearly level. Available water capacity was reported as approximately 4-6 inches. The test site was approximately 70 feet above mean sea level.

11. Prior to this study, the site had been planted to broccoli in 1990 and 1991; the site was tilled following the last crop and the soil surface was free of plant residues at initiation of this study. Previous pesticide applications to the site were not reported.

12. The registrant reported that 1,3-dichloropropene (Telone II, approximately 94% technical) is a soil fumigant injected into the soil (10- to 24-inch depth) as a preplant treatment for nematodes.

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Page_____ is not included in this copy.

Pages _____ through _____ are not included.

The material not included contains the following type of information:

- ____ Identity of product inert ingredients.
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- ____ Description of the product manufacturing process.
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- ____ Sales or other commercial/financial information.
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- ____ The product confidential statement of formula.
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DATA EVALUATION RECORD

STUDY 3

CHEM 029001 Dichloropropene §163-3

FORMULATION--01--TECHNICAL CHEMICAL (Tech)

STUDY ID 42265701
Knuteson, J.A., D.G. Petty, and B.A. Shurdut. 1992b. Field volatility of 1,3-dichloropropene in the Imperial Valley of southern California. DowElanco Laboratory Study ID: ENV91001. Unpublished study performed and submitted by DowElanco, Midland, MI, and Indianapolis, IN.

DIRECT REVIEW TIME = 12

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CONCLUSIONS:

Field Volatility

1. Study MRID #42265701 is unacceptable for the following reasons:

a) It was not possible to determine a pattern of decline of the pesticide, because the study of plot 15-A was terminated after only 8 days of observation.

b) the application rate for the portion of this study conducted at the 2-A plot (loam/sandy clay loam soil) treated at 6.8 gallon/A was significantly less than the maximum application rate (36 gallon/A).

2. Study MRID #42265701 provides ancillary field volatility data.

3. 1,3-Dichloropropene volatilized from clay loam and loam/sandy clay loam soil in California following a direct injection (12- to 18-inch soil depth) application of 1,3-dichloropropene (Telone II, 97.7% technical) at 12.1 or 6.8 gallon/A. By 8 days posttreatment (final sampling interval), approximately 11.2% of the applied 1,3-dichloropropene had volatilized from clay loam soil treated at 12.1 gallon/A and 4.4% volatilized from loam/sandy clay loam soil treated at 6.8 gallon/A. The volatilization of 1,3-dichloropropene increased to a maximum of 20.4 $mg/m^2 \cdot hour$ at 7 days posttreatment (aerodynamic flux method using 33- and 90-cm sampling levels at plot center), was 13.0 $mg/m^2 \cdot hour$ at 7.5 days, and then declined to 3.94 $mg/m^2 \cdot hour$ at 8 days (final sampling interval).

METHODOLOGY:

1,3-Dichloropropene (cis/trans-1,3-dichloropropene; Telone II, 97.7% technical, DowElanco) was applied at 12.1 gallons/A by direct injection (12- to 18-inch soil depth) to a circular plot (15 A; radius of 139 m) of clay loam soil (26.8-36.8% sand, 36.0-43.0% silt, 27.2-30.2% clay, 0.99% organic matter, pH 7.9-8.1, CEC 11.7-15.7 meq/100 g; 0- to 15-cm depth, Table II) located near Brawley, California, on February 19, 1991. Immediately after injection of the test substance, the soil was disked (depth unspecified) to disrupt the injection channels and compress the soil surface. A 30-m untreated buffer zone was established around the treated plot. To trap volatilized 1,3-dichloropropene, air was drawn (flow rate 1.5 L/minute) continuously through an air sampler consisting of an activated charcoal adsorption tube and a SKC battery-powered vacuum pump. Five air samplers were placed vertically at 15, 33, 55, 90, and 150 cm above ground level on a pole located at the center of the treated plot (Figures 1 and 2; sampler locations A-E, respectively). Two additional poles, each of which were equipped with two air samplers at 33 and 90 cm above ground level, were placed within the treated plot approximately 50 m northeast and southeast from the central pole (F-G and H-I, respectively, in Figure 2). Eight off-site poles, each of which were equipped with one air sampler at 150 cm above ground level, were placed at 45 degree increments around the outer perimeter of the untreated buffer zone approximately 170 m from the plot center (J-Q in Figure 2). Six additional off-site poles, each of which were equipped with one air sampler at 150 cm above ground level, were placed in a circular pattern around the plot approximately 0.25 miles (400 m) from the plot center (R-V and AA in Figure 2). Air sampling was initiated 1 day prior to treatment and continued up to 8 days after treatment; charcoal sampling tubes were collected and replaced following 6- or 12-hour intervals (Appendix B). Upon collection, the ends of the charcoal sampling tubes were sealed and the tubes were stored frozen; lengths of storage time could not be determined from the information provided. The air flow rate of the samplers was determined using a floating bead-type rotometer each time a charcoal sampling tube was installed and replaced. Soil cores (2.5-cm diameter, 0- to 45-cm depth) for soil moisture determinations were collected at 0, 1, 2, 3, and 8 days posttreatment, and cores (2.25-inch diameter, 0- to 12- and 12- to 24-inch depths) for soil bulk density determinations were collected at 8 days posttreatment. Soil temperatures (2.5-, 10-, 30-, and 50-cm depths), air temperatures, relative humidity, precipitation, total solar radiation (nanometer range unspecified), and wind velocity and direction were measured at the test site.

Charcoal from the front and back half of each sampling tube was placed in separate vials. Charcoal contained in the front half of each sampling tube was extracted with chilled carbon disulfide for 1 hour using a flatbed mechanical shaker; extracts were stored frozen until analysis (lengths of storage time could not be determined from the information provided). Aliquots of the extract were analyzed for cis- and trans-1,3-dichloropropene using GC with flame ionization (FID) and/or electron capture (ECD) detection; the limit of quantitation was 10 ug for each isomer (cis/trans) by GC/FID and 0.1 ug per isomer by GC/ECD. Extracts with non-detectable concentrations of 1,3-dichloropropene after analysis by GC/FID were reanalyzed by GC/ECD. Selected samples of charcoal contained in the back half of the sampling tubes were extracted and analyzed; remaining charcoal samples were stored frozen. Recovery efficiencies from charcoal sampling tubes fortified with cis/trans-1,3-dichloropropene at 0.461-2304 ug ranged from 72.0 to 148.6% (mean 93.5%) of the applied (Table 2 in Appendix D). Results were corrected for mean recovery efficiencies. Volatilization of 1,3-dichloropropene was calculated over 6- or 12-hour intervals using the aerodynamic flux method (see Comment 1).

At the same site, 1,3-dichloropropene (Telone II, 97.7% technical) was applied at 6.8 gallons/A by direct injection to a circular plot (1.94 A; radius of 50 m) of loam/sandy clay loam soil (45.6-51.6% sand, 27.6-33.6% silt, 20.8% clay, 0.60-1.21% organic matter, pH 8.1, CEC 10.7-10.9 meq/100 g; 0- to 15-cm depth, Table III) on February 19, 1991. The 2-A plot was located approximately 4 km (2.5 miles) northwest of the 15-A plot (Figure 4). The soil was disked following treatment, and a 30-m untreated buffer zone was established around the plot. Three air samplers were placed at 155 cm above ground level (calculated ZINST; see Comment 1) on a pole located at the center of the treated plot (sampler locations W-Y in Figure 3). One off-site sampler at 150 cm above ground level was located approximately 370 m southeast from the plot center (sampler location Z). Air sampling was conducted as described above. Soil cores for moisture content and bulk density determinations were collected as described above. In addition to the meteorological parameters described for the 15-A plot, wind speed and ambient air temperatures were measured at 155 cm above ground level (ZINST) at the plot center. Charcoal sampling tubes were extracted and extracts were analyzed for cis/trans-1,3-dichloropropene as described above; however, volatilization of 1,3-dichloropropene was calculated over the 6- or 12-hour intervals using the theoretical profile shape method (see Comment 1).

DATA SUMMARY:

Following the application of 1,3-dichloropropene (cis/trans-1,3-dichloropropene; Telone II, 97.7% technical) at 12.1 gallons/A by direct injection (12- to 18-inch soil depth) to a circular plot (15 A; radius of 139 m) of clay loam soil located near Brawley, California, in February 1991, the volatilization of 1,3-dichloropropene increased to a maximum of 20.4 mg/m^2·hour at 7 days posttreatment (aerodynamic flux method using 33- and 90-cm sampling levels at plot center), was 13.0 mg/m^2·hour at 7.5 days, and 3.94 mg/m^2·hour at 8 days (final sampling interval; Table XIII and Figure 25). Volatilization of 1,3-dichloropropene followed somewhat of a diurnal pattern with maximum air concentrations of 1,3-dichloropropene frequently detected during nighttime (between 6:00 p.m. and 6:00 a.m.) sampling intervals. The registrant estimated approximately 11.2% of the applied 1,3-dichloropropene had volatilized by 8 days posttreatment. At the plot center, maximum air concentrations of 1,3-dichloropropene were 398.1 ug/m^3 at 15 cm above ground level at 7 days posttreatment, 270.6 ug/m^3 at 33 cm at 7 days, 178.6 ug/m^3 at 55 cm at 6 days, 83.9 ug/m^3 at 90 cm at 6 days, and 38.5 ug/m^3 at 150 cm at 3.75 days (Table X; sampler locations A-E, respectively). At two additional on-site locations each approximately 50 m from plot center, maximum air concentrations were 239.9 ug/m^3 at 33 cm above ground level at 7 days posttreatment and 76.7 ug/m^3 at 90 cm at 3.75 days at the northeast location and 208.2 ug/m^3 at 33 cm at 6 days and 61.9 ug/m^3 at 90 cm at 3.75 days at the southeast location (Table X; sampler locations F-I, respectively). At eight off-site locations each approximately 170 m from plot center, maximum air concentrations at 150 cm above ground level occurred between 0.5 and 7 days posttreatment and were 13.93 ug/m^3 at the east location, 12.94 ug/m^3 at the southeast location, 15.91 ug/m^3 at the south location, 15.71 ug/m^3 at the southwest location, 36.24 ug/m^3 at the west location, 61.17 ug/m^3 at the northwest location, 49.29 ug/m^3 at the north location, and 23.69 ug/m^3 at the northeast location (Table XII; sampler locations J-Q, respectively). At six additional off-site sampling locations each approximately 0.25 miles (400 m) from plot center, maximum air concentrations at 150 cm above ground level occurred between 4 and 7 days posttreatment and were 16.47 ug/m^3 at the northeast location, 4.53 ug/m^3 at the east location, 5.76 ug/m^3 at the southeast location, 2.14 ug/m^3 at the south location, 15.89 ug/m^3 at the west location, and 32.3 ug/m^3 at the north location (Table XII; sampler locations R-V and AA, respectively).

During the study at the 15-A plot, no precipitation occurred, air temperatures ranged from 2.7 to 28.2 C, relative humidity ranged from 7.7 to 89.1%, total daily solar radiation ranged from 15833 to 18928 kWatts/m^2, and average soil temperatures ranged from 15.3 to 19.1 C at the 2.5-cm depth, 16.0 to 18.5 C at the 10-cm depth, 16.8 to 18.2 C at the 30-cm depth, and 17.1 to 18.0 C at the 50-cm depth (Table VI). Wind speeds were moderate (<5 m/second) the day of application and generally light (<3 m/second) throughout the study; winds

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generally blew from the southeast to the northwest (Figures 9, 10, and 14). During the study, average soil moisture content ranged from 7.7% to 10.2% in the 0- to 15-cm depth, 14.5 to 16.5% in the 15- to 30-cm depth, and 15.5 to 17.8% in the 30- to 45-cm depth (Table VIII).

Following application of 1,3-dichloropropene (Telone II, 97.7% technical) at 6.8 gallons/A by direct injection (12- to 18-inch soil depth) to a circular plot (2 A; radius of 50 m) of loam/sandy clay loam soil located approximately 4 km (2.5 miles) northwest (downwind) of the 15-A plot on February 19, 1991, volatilization of 1,3-dichloropropene was detected at a maximum of 4.01 mg/m^2·hour at 0.25 day posttreatment (theoretical profile shape method using 155-cm sampling level at plot center), decreased to a minimum of 0.19 mg/m^2·hour at 1 day, then peaked again at 3.75 mg/m^2·hour at 4.5 days, and was 2.45 mg/m^2·hour at 8 days (final sampling interval; Table XIV and Figure 26). Volatilization of 1,3-dichloropropene from the smaller plot followed a diurnal pattern as seen with the 15-A plot with maximum air concentrations of 1,3-dichloropropene frequently detected during nighttime sampling intervals. The registrant estimated approximately 4.4% of the applied 1,3-dichloropropene had volatilized by 8 days posttreatment. At the plot center at 155 cm above ground level, maximum air concentrations of 1,3-dichloropropene were 7.01-7.42 ug/m^3 at 4-5.5 days posttreatment (Table XI; sampler locations W-Y). At one off-site location located approximately 370 m southeast from the plot center, the maximum air concentration at 150 cm above ground level was 3.09 ug/m^3 at 6 days posttreatment (Table XII; sampler location Z).

During the study at the 2-A plot, no precipitation occurred, air temperatures ranged from 2.5 to 28.7 C, total daily solar radiation ranged from 15889 to 18867 $kWatts/m^2$, and average soil temperatures ranged from 16.5 to 19.3 C at the 2.5-cm depth, 16.8 to 18.6 C at the 10-cm depth, 16.9 to 18.1 C at the 30-cm depth, and 17.0 to 17.8 C at the 50-cm depth; relative humidity was not reported (Table VII). Wind speeds and direction were comparable to those found at the 15-A plot (Figures 13 and 18). The average soil moisture content ranged from 6.3% to 7.7% in the 0- to 15-cm depth, 7.7 to 15.0% in the 15- to 30-cm depth, and 11.5 to 16.1% in the 30- to 45-cm depth (Table VIII).

COMMENTS:

1. Volatilization of 1,3-dichloropropene from the 15-A circular plot was determined using the aerodynamic flux method. Aerodynamic flux is a gradient method requiring accurate vertical gradient measurements of horizontal wind speed, air temperature, and pesticide concentrations. The registrant reported that the aerodynamic flux method is a modified form of the Thornthwaite-Holzman equation (Majewski, M.S., M.M. McChesney, J.N. Seiber, 1991, A field comparison of two methods for measuring DCPA soil evaporation rates, Environmental Toxicology and Chemistry 10: 301-311.), which is based upon the log law of the

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wind speed profile.. The modified equation compensates for conditions which cause the atmosphere to be stable or unstable.

Volatilization of 1,3-dichloropropene from the 2-A circular plot was determined using the theoretical profile shape method. In general, for a circular plot with a radius of ≤50 m, there is a height (designated ZINST) at which the flux is insensitive to unstable atmospheric conditions. The method requires determination of the zero velocity height (z_0) for the estimation of ZINST, the average air concentration (ug/m^3) at ZINST, and the average wind speed at ZINST. To estimate z_0, a dry-run of the pesticide application was conducted on a small plot adjacent to the 2-A plot 1 day prior to treatment (Figure 3).

2. The test substance was applied at approximately 34 and 19% of the maximum application rate; 1,3-dichloropropene (Telone II, 97.7% technical) was applied at 12.1 and 6.8 gallons/A in this study, and the maximum field application rate for Telone II was reported as 36 gallons/A (Appendix C in Study 1, MRID 42515501). The registrant reported that the application rate chosen for this study was typical for the crops grown in the Imperial Valley region, and that the highest label use rate was not appropriate for the species of nematode, depth of the crop root zone, and texture and organic content of the soil in that region.

3. For the 15-A plot that was treated at 12.1 gallon/A, the sampling intervals were terminated before the pattern of decline of 1,3-dichloropropene was clearly established. Although, the volatilization of 1,3-dichloropropene was decreasing at the final two sampling intervals (7.5 and 8 days posttreatment), additional sampling intervals would have confirmed that the decrease in volatilization was established (Figure 25).

4. For the 2-A plot that was treated at 6.8 gallons/A, the treatment rate was significantly less that the reported maximum label use rate, which may have affected volatilization of the pesticide. The intended application rate for both plots was 13 gallon/A. The registrant estimated that approximately 11.2% of the applied 1,3-dichloropropene had volatilized from the 15-A plot treated at 12.1 gallon/A, and only 4.4% volatilized from the 2-A plot treated at 6.8 gallon/A by 8 days posttreatment. In addition, maximum air concentrations of 1,3-dichloropropene detected at approximately 1.5 m above ground level at the plot centers were significantly different; maximum air concentrations at 150/155 cm were 38.5 ug/m^3 for the 15-A plot and only 7.01-7.42 ug/m^3 for the 2-A plot.

5. The registrant reported the results in terms of posttreatment sample periods numbered 1 through 25 (Tables X-XII). Unfortunately, the sample periods did not always refer to the same posttreatment time interval for the various sampler locations; for example, sample period 2 occurred at 1200:1800 hours on 02/19/91 (12 hours posttreatment) for on-site sampler locations A-I, but at 1800:0600

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hours between 02/19 and 02/20/91 (1 day posttreatment) for off-site sampler locations J-V and AA (Appendix B). To adequately compare results between various sampler locations, the Dynamac reviewer found it necessary to convert sample periods (1-25) to sampling intervals (days posttreatment) using the sample schedule information presented in Appendix B.

6. Immediate posttreatment soil samples were not collected to confirm the application rate. The registrant reported that application rates were "quantitatively" determined by establishing precise plot dimensions and weighing the drums that contained the test substance prior to and after application (Table V). In another field volatility study (Study 2, MRID 42545101) concurrently submitted with this study, the registrant reported that immediate posttreatment soil samples were not collected and analyzed because of the method of application (deep linear injection) and the diffusion of the test substance (laterally and vertically) within the soil immediately after application. In addition, off-site spray drift was considered unlikely by the registrant, since the pesticide was injected into the soil.

7. Specific storage times for individual charcoal sample tubes and extracts were not reported. The registrant reported that collected sample tubes were stored frozen at the site, then shipped overnight (-24.7 to 16.2 F during transport) within 4 days of collection. At the analytical laboratory, the sample tubes and extracts were stored frozen (-24.3 to 20.5 F) between 02/26/91 and 05/01/91. The registrant reported that 1,3-dichloropropene adsorbed onto activated charcoal was found to be stable at freezer temperatures (unspecified) for 90 days, but decreased an average of 10% over 24 days at ambient temperatures (unspecified); the storage stability study was referenced (Hugo, J.M, 1989, Development and validation of a collection and analytical monitoring method for 1,3-dichloropropene and 1,2-dichloropropane, HEH 2.12-38-2(22), unpublished Dow Chemical Report), but not provided for review.

8. Field spike stability was investigated. A total of six charcoal sampling tubes were fortified with 1,3-dichloropropene at 0.461, 18.4, or 2304 ug. Each fortified tube was paired with an untreated charcoal sampling tube and placed approximately 150 cm above ground level on a pole located 40 m from plot center in the 15-A plot. Recovery from the fortified tube was determined after subtracting the concentration of 1,3-dichloropropene detected in the untreated tube. Recoveries of cis- and trans-1,3-dichloropropene from the "field spikes" ranged from 48.5 to 63.0% of the applied at the 0.461-ug fortification level, but increased to 87.7-98.4% of the applied at the 18.4- and 2304-ug fortification levels (Appendix F).

   In addition, stability during shipment of the sampling tubes was investigated. Charcoal sampling tubes (35) were fortified with 1,3-dichloropropene at 0.461, 18.4, or 2304 ug at the test site and shipped with the field samples to the analytical laboratory in

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Midland, Michigan. Recoveries of total 1,3-dichloropropene from the "travel spikes" ranged from 70.8 to 120.6% (mean 93.7%) of applied (Appendix E).

9. The limit of detection for cis/trans-1,3-dichloropropene by GC/FID was reported as 10 ug for each isomer in the method and analytical report (Appendix D), but as 1 ug per isomer in the Materials and Method section of the study text under <u>Analytical Method for 1,3-Dichloropropene on Charcoal</u>.

10. The saturated vapor pressure was reported as 34.3 and 23.0 mm of Hg at 25 C for cis- and trans-1,3-dichloropropene, respectively. The solubility of the test substance in water at 25 C was reported as 2180 and 2320 mg/L for cis- and trans-1,3-dichloropropene, respectively.

11. Daily atmospheric cloud cover during the study period was not reported. The registrant did report that days and nights were generally cloudless, but a high ceiling of haze formed during the days.

12. Relative humidity values were not reported for the 2-A plot.

13. The registrant reported that the two plots were located in flat, open agricultural fields; elevations for the 15- and 2-A plots were 175 and 195 feet above sea level, respectively. The depth to the water table was not reported.

14. Prior to this study, the 15-A plot had been planted to carrots and the 2-A plot had been planted to lettuce; both were harvested in December 1990. Preparation of the site just prior application was not reported. Previous pesticide applications to the site were not specified. The registrant reported that a typical use site was selected that had 1,3-dichloropropene applied in years (unspecified) prior to this study; however, no usage occurred in the entire study region for at least 9 months prior to the study, and preapplication air concentrations were "negligible".

15. The registrant reported that 1,3-dichloropropene (Telone II, approximately 94% technical) is a soil fumigant injected into the soil (10- to 24-inch depth) as a preplant treatment for nematodes.

RIN 3413-94 1,3-DICHLOROPROPENE REVIEWS

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Page_____ is not included in this copy.

Pages 94 through 140 are not included.

The material not included contains the following type of information:

____ Identity of product inert ingredients.

____ Identity of product impurities.

____ Description of the product manufacturing process.

____ Description of quality control procedures.

____ Identity of the source of product ingredients.

____ Sales or other commercial/financial information.

____ A draft product label.

____ The product confidential statement of formula.

____ Information about a pending registration action.

✓ FIFRA registration data.

____ The document is a duplicate of page(s) ________.

____ The document is not responsive to the request.

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

APPENDIX

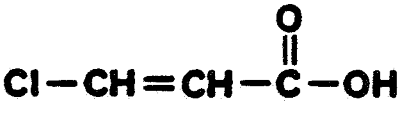
DICHLOROPROPENE AND ITS DEGRADATES

$Cl-CH=CH-CH_2-Cl$

1,3-Dichloropropene

$Cl-CH=CH-CH_2-OH$

3-Chloroallyl alcohol



$Cl-CH=CH-\overset{\overset{\displaystyle O}{\|}}{C}-OH$

3-Chloroacrylic acid

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
DICHLOROPROPENE
Last Update on March 25, 1993
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

LOGOUT	Reviewer:	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
(Formul'tn):SINGLE ACTIVE INGREDIENT, 94% RTU
Physical State: CLRLSS-PALE YLW LIQUID

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

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	
	E	ppm	@ °C	
	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 in air.

Aerobic Soil Metabolism (162-1)

[S]	SOIL	%OM	C	pH	T1/2DA
[ ]	SPIER SL	11.6	15	?	22
[ ]	SPIER SL	11.1	15	?	37
[ ]	HAREN SL	3.6	15	5.0	22
[ ]	BOGERCIE SL	3.6	20	5.6	25
[ ]	CLAY	1.1	20	6.8	3
[ ]	CLAY	1.8	20	7.2	8

Anaerobic Soil Metabolism (162-2)

[V]	SOIL	TEMP	T 1/2
[ ]	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)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Environmental Fate & Effects Division
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Soil Partition Coefficient (Kd) (163-1)

[V] LOAMY SAND .23
[V] SAND .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)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Small Scale Retrospective (166-2)
[ ]
[ ]
[ ]
[ ]

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.
[ ]

146

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)

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.

References: EPA REVIEWS
Writer : PJH, KLP, EW