FILE

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Date Out EFB: 12 JUL 1983

TO: Hank Jacoby
Product Manager 21
TS-767

FROM: Dr. Richard Moraski
Acting Chief
Review Section No. 1
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Attached please find the environmental fate review of:

Reg./File No.: 201-119

Chemical: Telone

Type Product: Nematicide

Product Name: DD

Company Name: Shell Chemical Co.

Submission Purpose: Review data originally sent to SPRD

ZBB Code: Other

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Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

2016753

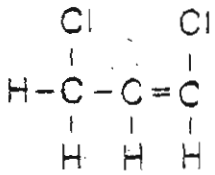
Environmental Fate and Exposure Assessment of Telone

1.0 INTRODUCTION

Telone is currently registered for use on a variety of vegetable and field crops, citrus and deciduous fruit, nuts, and nursery crops. It is also used on cotton, soybeans, and peanuts, under special local need permits. Telone is applied preplant as a soil fumigant to control nematodes, diseases, and weeds. Postplant application for perennial crops is allowed under an experimental use permit. Telone is used in combination with other related C_3 compounds (D-D Soil Fumigant), with chloropicrin (Telone C), and with related C_3 compounds and chloropicrin (Nemex).

2.0 STRUCTURE AND NOMENCLATURE

2.1	COMMON NAMES	Telone, dichloropropene
2.2	TRADE NAME	Telone II Soil Fumigant
2.3	CHEMICAL NAME	1,3-Dichloropropene
2.4	STRUCTURE	



3.0 USE AND APPLICATION RATES

C_3 compounds are applied at 250-600 lb ai/A. The soil should be tilled somewhat deeper than the depth of fumigation desired prior to application. The soil must be moist from the surface to a depth of 6 inches at the time of treatment. Application may be by broadcast spraying or by injection. The soil must be dragged and then compacted with a smooth roller immediately after application. Sealing with a tarpaulin is recommended, especially if the temperature is >70°F at a 6-inch depth. After fumigating for 4-7 days (longer in cold soils), the soil must be aerated until the odor of the fumigant is no longer detected. Approximately 10-12 days/100 lb ai applied are needed to aerate the soil. Cold temperatures and rain will slow aeration; cultivation will increase the rate of aeration.

Telone is applied postplant to perennial crops at 36.8-138 lb ai/A. Application is generally made after fruit harvest and before the emergence of new blooms. The soil must be in good seed bed condition, with moisture at ~50% of field capacity and the temperature between 40° and 80°F at the depth of injection. Telone is injected to a depth of 4-6 inches. The soil is sealed by dragging or roller compaction immediately after application. The soil should be wet to a depth of 6-24 inches by irrigation within 2 days after treatment. Only one application can be made during the recommended treatment period.

4.0 SCIENTIFIC STUDIES

4.1 STUDY 1

Rader, W.E., and J.W. Love. July, 1978. Impact of commercial Shell pesticides on microorganisms in the soil. Part II - Effect on decomposition of cellulose in the soil. Shell Development Co., Modesto, California. Report TIR-22-112-77, Part II. Acc. No. 242725. Reference 1.

Rader, W.E., and J.W. Love. March, 1978. Impact of commercial Shell pesticides on microorganisms in the soil. Part V - Details of the methods used in Part II of TIR-22-112-77. Shell Development Co., Modesto, California. Report TIR-22-112-77, Part V. Acc. No. 242725. Reference 4.

Summary

The data from this study were not reviewed since they are not currently required by EPA for the registration of pesticides. The following summary presents the authors' conclusions regarding telone.

In soil incubation studies, D-D Soil Fumigant prevented cellulose breakdown when applied at 2,000 lb/A, but did not prevent breakdown at 300 lb/A. In pure culture, Trichoderma viride growth was inhibited by D-D Soil Fumigant at >100 ppm. Laboratory solutions of α-amylase were inhibited slightly (14-20% reduction in enzyme activity) in the presence of D-D Soil Fumigant at 544-14,488 ppm, but cellulose activity was unaffected by D-D Soil Fumigant at 14,488 ppm. The authors' concluded that D-D Soil Fumigant applied at unrealistically high dosages would temporarily decrease cellulytic activity in the soil.

4.2 STUDY 2

Rader, W.E., J.W. Love, and E.Y. Chai. April, 1978. Impact of commercial Shell pesticides on microorganisms in the soil. Part III - Effect of compounds on the populations of microorganisms and the O_2/CO_2 exchange in treated soil. Shell Development Co., Modesto, California. Report TIR-22-112-77, Part III. Acc. No. 242725. Reference 2.

Summary

The data generated by this study were not reviewed since they are not currently required by EPA for the registration of pesticides. The following summary presents the authors' conclusions regarding telone.

Samples of an unsterilized sandy loam soil were treated with varying concentrations of several pesticides, including D-D Soil Fumigant. Total actinomycetes, bacteria, and fungi were determined at 0, 3, and 21 days after treatment. At the same sampling intervals, subsamples of the treated soil were fortified with glucose, and the CO_2 evolved and O_2 utilized were measured over a 4-hour period. Application rates of fumigant were not clear. The authors' concluded that D-D Soil Fumigant did not have any residual effect on microbial populations or O_2 utilization, although a temporary depression in microbial activity was observed. At higher dose rates the fungal population was slightly depressed 21 days after treatment with D-D Soil Fumigant.

4.3 STUDY 3

Rader, W.E. February, 1979. Impact of commercial Shell pesticides on microorganisms in the soil. Part IV - The effect of the compounds on soil nitrification. Shell Development Co. Modesto, California. Report TIR-22-112-77, Part IV. Acc. No. 242725. Reference 3.

Summary

The data from this study were not reviewed since they are not currenlty required by EPA for the registration of pesticides. The following summary presents the author's conclusions.

Samples of a sandy loam soil were treated with several pesticides, including D-D Soil Fumigant at 300 and 1,200 lb ai/A. The soils were incubated (80°F), and NO_2, NO_3, and NH_4 nitrogen levels were determined after 1 and 4 months. D-D Soil Fumigant did not affect the oxidation of NH_4 to NO_3. In pure culture studies, it did reduce the Nitrosomonas sp. conversion of NH_4 to NO_2 but did not prevent the oxidation of NO_2 to NO_3 by Nitrobacter sp.

4.4 STUDY 4

Kollmeyer, W.D., and R.L. Marxmiller. February, 1978. Residue levels of 1,3-dichloropropenes from D-D Soil Fumigant in air, soil and water, an accident study. Shell Development Co., Modesto, California. Report TIR-24-660-77. Acc. No. 242725. Reference 5.

Procedure

On November 17, 1977, ~7,000 gallons of D-D Soil Fumigant was accidentally spilled in Atwater, California. The spill encompassed a ~10,000 square foot area. Soil in the area was Atwater sand. The contaminated area was immediately covered with 40-50 square yards of soil to contain the pesticide. Filtered air samples (2-3 liters each) were collected directly over the spill area by using charcoal tube collectors on November 29 and 30, and December 8, 1977. Soil samples from within and adjacent to the contaminated area were collected (to a 60-inch depth) between November 23, 1977 and February 1, 1978. Water samples were taken from three buildings in the immediate vicinity of the spill. The wells from which these water samples were taken were 120 feet east of the spill, 280 feet west of the spill, and 320 feet southwest of the spill. Soil samples and charcoal (air samples) were frozen until analyzed. The water samples were stored under refrigeration until analyzed.

Methodology

The charcoal from the air samplers was extracted for 20 minutes with ethyl acetate in an ultrasonic bath. Soil cores were divided into segments of ≤12 inches. Each segment was extracted by shaking it with ethyl acetate for 30 minutes. Water samples were partitioned with hexane. The cis and trans isomers of telone were quantified in all extracts using GC (column: 20% SP-2100 and 0.1% Carbowax 1500 on Supelcoport; electron capture detector). Minimum detectable concentrations were given as 0.02-0.05 and 0.03-0.05 ppm for the cis and trans isomers of telone in soil, 0.001 ppm (both isomers) in water, and 0.03 and 0.04 ppm for the cis and trans isomers in air.

Results

Telone was not detected in any water samples. Air concentrations of telone (cis and trans isomers combined), 18 inches above the contaminated soil, were 10.3-32.0 ppm on November 29, 11 days after the spill. A single sample collected on November 29, ~40 feet from the contaminated site, contained telone at 3.2 ppm. December 8 air samples, collected 60 inches above the ground, contained telone at 0.33-0.40 ppm over the contaminated area and at 0.15 ppm ~40 feet outside the contaminated area. Telone could not be detected in the air within a building 65 feet east of the contaminated area 13 days after the spill. The cis and trans isomers each constituted ~50% of the air dispersed telone that was detected. Results of the soil analyses are summarized in Table 1. Despite the large quantity of fumigant spilled (~305,000 lb/A), penetration into the sand soil was not very deep (≤42 inches penetration at ≤100 ppm). Dissipation was slow; 2,829 ppm remained in the surface 12 inches of soil 76 days after the spill. Movement of telone into soil beyond the spill area was minimal. Low contamination was detected ~10 feet from the spill area but no contamination was found ≥20 feet from the spill area.

Table 1. Average concentrations of telone in soil from and near the spill site.

Sampling date	Sample location	Depth (inches)	Telone (ppm)[a] Cis	Telone (ppm)[a] Trans
11/23/77[b]	Spill area	0-6	4200	4400
		12-18	1000	1100
		24-30	700	850
		38-42	1.3	2.1
		48-52[d]	0.34	0.43
12/8/77[c]	Spill area[e]	0-12	1824	2051
		12-24	810	949
		24-36	79	107
		36-48	2.7	4.4
		48-60[d]	3.7	5.6
12/15/77[c]	10 ft west of spill area[e]	0-12	77	160
		12-24	0.19	0.54
		24-36	0.14	0.29
		36-48	0.09	0.18
		48-60	0.06	0.11
	20 ft west of spill area[de]	0-12	<0.02	<0.03
		12-24	<0.02	<0.03
		24-36	<0.02	<0.03
		36-48	<0.02	<0.03
		48-60	0.09	<0.03
2/1/78	Spill area	0-12	1309	1520
		12-24	292	374
		24-36	33	51
		36-48	7.1	13
		48-60	10.3	16
	20 ft west of spill area	0-12	<0.05	<0.05
		12-24	<0.05	<0.05
		24-36	<0.05	<0.05
		36-48	<0.05	<0.05
		48-60	2.8	2.7

[a]Values are averages of 1-3 samples.

[b]The zero depth was 0-12 inches below the soil surface and was delineated by a black band indicating D-D Soil Fumigant contamination. The overlying clean soil was applied after the spill to contain the pesticide.

[c]The zero depth was at the soil surface.

[d]Telone was not detected in a sample collected 30 feet west of the spill area.

[e]Hardpan at 60 or 63 inches. May have a perched water table.

Conclusions

Under the conditions of this study, telone was confined to the immediate spill area and did not dissipate very rapidly. However, insufficient data were provided to establish the environmental conditions under which the study was conducted and no conclusions about the rate or mode of telone dissipation can be made. The site was not described adequately (soil characteristics, slope). No meteorological data were given, and soil sampling was insufficient to fully evaluate the horizontal movement of telone.

4.5 STUDY 5

Marxmiller, R.L., and G.W. Gaertner. July, 1978. Residue levels of 1,3-dichloropropenes from D-D Soil Fumigant in soil and water, an accident study. Shell Development Co., Modesto, California. Report TIR-24-605-78. Acc. No. 242725. Reference 6.

Procedure

This study is a continuation of Study 4. Additional soil samples were collected on May 1, 1978 and additional water samples were collected on March 1, April 5, and May 1, 1978. Refer to Study 4, pg. 5 for further details.

Methodology

Refer to Study 4, pg. 5. Recovery of telone from fortified samples was 87-88% for soil and 84-93% for water.

Results

Water sampled from the well 120 feet east of the spill area on March 1, 1978 contained telone at 0.002 ppm (cis and trans isomers combined). Telone was not detected (<0.002 ppm) in any other water sample. Concentrations of telone in the soil had declined substantially in 165 days (Table 1, pg. 6 and Table 2). Nearly all of the residual telone was in the surface 12 inches. There was no evidence that telone moved laterally away from the spill area.

Table 2. Telone concentrations in soil from and near the spill area 165 days after the D-D Soil Fumigant spill.

Sample location	Depth (inches)	Telone (ppm) Cis	Trans
Near south edge of spill area	0-6	34	56
	12-18	9.0	17
	24-36	7.3	13
	36-48	5.3	7.3
	48-60[a]	5.8	7.4
Center of spill area	0-12	1200	1600
	12-24	6.2	12
	24-36	5.2	10
	36-48	1.7	3.7
	48-60	1.7	2.8
Northern section of spill area	0-12	320	430
	12-24	8.5	16
	24-36	1.9	3.9
	36-48	0.59	1.2
	48-60	2.3	3.5
Thirty feet west of spill area	0-12	<0.3	<0.4
	12-24	<0.3	<0.4
	24-36	<0.3	<0.4
	36-48	<0.3	<0.4
	48-60	<0.3	<0.4

[a]Hardpan at 60-inch depth.

Conclusions

No conclusion can be made about this study for reasons stated in Study 4, pg. 7.

5.0 EXECUTIVE SUMMARY

5.1

Studies on the effects of pesticides on microorganisms are no longer required by Subpart N of the Guidelines. Therefore, the submitted Reports 1 through 4 are considered ancillary studies.

5.2

In the study on the D-D Soil Fumigant spill, telone appears to dissipate slowly in the soil environment and not move horizontially in the soil. However, this study cannot be considered as a valid field dissipation study. Thus, the submitted Reports 5 and 6 are also considered ancillary studies.

5.3

Review of Exposure Assessment Branch files indicates that available data are insufficient to fully assess the environmental fate of telone and the exposure of humans and nontarget organisms to telone. The submission of data to fulfill registration requirements (Subparts N and K of the Guidelines) is summarized as follows:

Hydrolysis studies: Two studies were submitted, but they were not reviewed at this time since they were reviewed previously. One study (Van Dijk, 19??, Acc. No. 099516) dealt with the hydrolysis of dichloropropenes in soil. The second study (Meikle and Youngson, 1980, Acc. No. 248417) was inadequate because the study was not conducted under the appropriate conditions of pH, temperature, sterility, and light, and the hydrolysis of a cis-trans mixture of telone was not examined. All data are required.

Photodegradation studies in water: No data were submitted. All data are required.

Photodegradation studies on soil: No data were submitted, but no data are required because telone is incorporated into the soil.

Photodegradation studies in air: One study was submitted (Gioersch and Dilling, November, 1979, Acc. No. 248417). This study was not reviewed at this time but was reviewed previously. It was found to fulfill data requirements. No further data are required.

Aerobic soil metabolism studies: One study was submitted (Van Dijk, 1974, Acc. No. 099516, Tab No. D.4.4.0/D.4.5.0). This study was not reviewed previously and was not available for review at this time. This study must be reviewed.

Anaerobic soil metabolism studies: No data were submitted. All data are required.

Anaerobic and aerobic aquatic metabolism studies: No data were submitted, but these studies are not required because telone does not have a forestry, aquatic, or aquatic impact use.

Leaching and adsorption/desorption studies: Three studies were submitted. They were not reviewed at this time but were reviewed previously. All the studies were well-monitoring studies. Two of studies lacked sufficient information to be evaluated (Dow Chemical Co., December, 1980, Acc. No. 243990 and an unrefer-

enced study in Maryland). The third study was submitted as a summary report in a news magazine (Chemical Regulation Reporter) and as such was not adequate to be evaluated. All data are required.

Laboratory and field volatility studies: No data were submitted. Telone is volatile, and significant exposure to applicators and reentry workers is probable. Therefore, all data are required.

Terrestrial field dissipation studies: Two studies were submitted (Kollmeyer and Marxmiller, February, 1978, Acc. No. 242725, Reference 5; and Marxmiller and Gaertner, July, 1978, Acc. No. 242725, Reference 6). These studies were scientifically valid, but did not meet data requirements because meteorological and soil data were inadequate or missing, and sampling was insufficient. All data are required.

Aquatic field dissipation studies: No data were subitted, but no data are required because telone does not have an aquatic or aquatic impact use.

Forestry dissipation studies: No data were submitted, but no data are required because telone does not have a forestry use.

Dissipation studies for combination products and tank mix uses: No data were submitted. Insufficient information is available to determine if these studies are needed.

Long-term field dissipation studies: No data were submitted. Requirements for these data depend upon the results from terrestrial field dissipation data; however, it is anticipated that these data will not be required.

Confined and field accumulation studies on rotational crops: No data were submitted. If the registrant can show that telone is dissipated from the soil before crops are planted then data on rotational crops will not be needed.

Accumulation studies on irrigated crops: No data were submitted, but no data are required because telone has no aquatic food crop or aquatic nonfood use; it is not used in or around holding ponds used for irrigation purposes; and it has no uses involving effluents or discharges into water used for crop irrigation.

Laboratory studies of accumulation in fish: No data were submitted. All data are required.

Field studies of accumulation in nontarget organisms: No data were submitted; however, requirements for these data depend upon the results from laboratory studies of accumulation in fish and from toxicological data.

Reentry studies: One study was submitted (Tobal, January, 1982). It was not reviewed at this time, but was reviewed previously, and found to be scientifically valid. Data requirements for inhalation exposure during postplant treatment were fulfilled. Data on dermal exposure are required. All data for preemergent treatment, where application rates are much higher, are required.

Ancillary studies

Microbial effects: Rader and Love, July, 1978, Acc. No. 242725, Reference 1; Rader and Love, March, 1978, Acc. No. 242725, Reference 4; Rader et al., April, 1978, Acc. No. 242725, Reference 2; and Rader, February, 1979, Acc. No. 242725, Reference 3.

5.4

Extreme caution must be exercised when handling telone. Protective clothing and heavy footwear must be worn. No clothing or protective covering is completely impervious to telone. Light protective clothing must be removed immediately upon contamination. Heavy polyethylene (>3 mil), rubber, and neoprene provide short term protection, but if contaminated they must be washed immediately with soap and water. A NIOSH or MSHA approved half face respirator with goggles or a full face respirator must be worn.

6.0 RECOMMENDATION

5.1 Data in current submission are not adequate to assess the environmental fate of telone.

5.1.1 The following microbial effects studies are considered ancillary and, at this time, are not required for registration:

Microbial effects: Rader and Love, July, 1978, Acc. No. 242725, Reference 1; Rader and Love, March, 1978, Acc. No. 242725, Reference 4; Rader et al., April, 1978, Acc. No. 242725, Reference 2; and Rader, Bebruary, 1979, Acc. No. 242725, Reference 3.

5.1.2 Terrestrial Field Dissipation Study

The two studies submitted (Koolmeyer and Marxmiller, February, 1978, Acc. No. 242725, Reference 5; and Marmiller and Gaertner, July, 1978, Acc. No. 242725, Reference 6) are considered scientifically valid but do not meet guideline requirements because meteorological and soil data were inadequate or missing, and sampling was insufficient. Therefore, these studies do not satisfy this data requirement.

5.2 Data previously submitted and reviewed by EAB are inadequate to define the environmental fate of telone:

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