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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

June 5, 1998

MEMORANDUM

TO: Lisa Nisenson
Special Review Branch
Special Review and Reregistration Division (7508W)

FROM: Christina Scheltema, Biologist
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RE: Drinking Water Risk Assessment for Telone

Introduction

The Special Review and Reregistration Division (SRRD) has asked the Health Effects Division (HED) to perform a drinking water risk assessment for Telone (request D241644). It is HED's understanding that this drinking water risk assessment will be used to identify scenarios for potential risk mitigation. This drinking water risk assessment will also be incorporated into the Reregistration Eligibility Decision Document (RED) for Telone. This document is an addendum to the HED RED chapter for Telone.

The Environmental Fate and Effects Division (EFED) has recently reviewed numerous ground water monitoring studies for Telone, including preliminary results of the prospective

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ground water monitoring studies in Wisconsin and Florida (USEPA 1997, 1998). In addition, EFED has estimated the potential concentration of Telone in surface water (USEPA 1998). HED has estimated drinking water risk for Telone using the information provided by EFED. This report contains contributions from Alan Levy, Catherine Eiden, Steve Knizner, Barbara Madden, John Abbotts, and Alberto Protzel of HED and Jim Carleton, Estella Waldman, Betsy Behl, Henry Nelson, and Kevin Poff of EFED.

cc: C. Eiden, C. Scheltema, R. McNally, Nancy Zahedi, CASWELL FILE, RCAB file

I. EXECUTIVE SUMMARY

As noted in the HED chapter for the Telone RED (September 2, 1997), Telone does not require raw agricultural commodity or food/feed tolerances, and Telone has no registered residential uses. All dietary, non-occupational exposures to Telone are expected to occur through drinking water. Therefore, HED has conducted a drinking water risk assessment for Telone using the results of ground and surface water monitoring studies, and environmental simulation modeling, as reviewed and conducted by the Environmental Fate and Effects Division. This risk assessment includes (1) Telone and its degradates found in water, (3-chloroallyl alcohol and 3-chloroacrylic acid), and (2) the contaminant 1,2-dichloropropane (1,2-D), present in the Telone formulation at <1%, which was also found in water monitoring studies.

Hazard Assessment

The HED chapter of the Telone RED contains an extensive discussion of the toxicity database for Telone and 1,2-D. Telone was classified as a Group B2 carcinogen by the Cancer Peer Review Committee (CPRC) on December 8, 1989 based on tumor induction in rats and mice by the oral and inhalation routes. HED derived an oral Q_1^* of 1.22×10^{-1} (mg/kg/day)$^{-1}$ in human equivalents using the Multistage Model and the 3/4 interspecies scaling factor. The oral Q_1^* was based on the incidence of forestomach, liver, adrenal, and thyroid tumors in the 1985 NTP rat bioassay. In January 1997, the RfD Committee evaluated the results of the recent dietary study on microencapsulated Telone submitted by DowElanco but concluded that these results were not sufficient to revisit either the cancer classification of Telone or the basis for the Q_1^*. The Registrant submitted further information on the carcinogenicity and mutagenicity of Telone in September and November 1997 in response to the 1997 HED RED Chapter. This information included several rebuttals as well as new mutagenicity data, including a short-term mechanistic study. This information is under review by HED toxicologists. For the purposes of this drinking water risk assessment for Telone, the oral Q_1^* of 1.22×10^{-1} (mg/kg/day)$^{-1}$ will be used to estimate cancer risk.

An RfD of 0.025 mg/kg/day was selected based on the NOEL of 2.5 mg/kg/day established in a 2-year dietary admix (microcapsule) toxicity/carcinogenicity study in rats and using an uncertainty factor of 100. The LOEL was 12.5 mg/kg/day based on a decrease in body weight gain and an increase in the incidence of basal cell hyperplasia of the nonglandular mucosa of the stomach.

The Health Effects Division has not evaluated the toxicity of 1,2-dichloropropane because it is no longer a registered pesticide. However, the toxicity of 1,2-dichloropropane has been evaluated by the Agency's Carcinogenicity Assessment Group (CAG) and the Office of Water. HED has chosen to use the toxicological endpoints identified by these groups for human health risk assessment. The CAG classified 1,2-dichloropropane (1,2-D) as a Group B2, probable human carcinogen, based on the statistically significant increased incidence of hepatocellular adenomas and carcinomas in male and female B6C3F1 mice and a dose-related trend in mammary adenocarcinomas was noted in female F344 rats. An oral Q_1* of 6.7 X 10^{-2} $(mg/kg/day)^{-1}$ for males and 2.2 X 10^{-2} $(mg/kg/day)^{-1}$ for females was calculated for 1,2-dichloropropane based on incidence of hepatocellular adenoma and carcinoma (USEPA 1990) and the linearized multistage model and 2/3 interspecies scaling factor. The Health Effects Division has recently revised the 1,2-dichloropropane oral Q_1* using the 3/4 interspecies scaling factor as per OPP policy (P. Fenner-Crisp 1994/Fisher 1997). This policy change results in a The revised oral Q_1* is 3.69 X 10^{-2} $(mg/kg/day)^{-1}$ in human equivalents based on the incidence of hepatocellular adenomas and/or carcinomas in the male mouse. For the purposes of this drinking water risk assessment for the contaminant 1,2-D, the oral Q_1* of 3.69 X 10^{-2} $(mg/kg/day)^{-1}$ will be used to estimate cancer risk.

The HED Metabolism Committee met on April 14, 1997 and determined that the degradates 3-chloroallyl alcohol and 3-chloroacrylic acid, in the absence of toxicology data for the degradates, should be considered to have toxicological equivalence to Telone (Abbotts 1997). For water risk assessment, the Telone oral Q_1* (1.22 X 10^{-1} $(mg/kg/day)^{-1}$) will be used to determine risk for combined exposure to the parent compound and degradates.

Exposure Assessment

Ground water monitoring data show that Telone and its degradates migrate to ground water. Monitoring data show that Telone, its degradates, and the contaminant 1,2-dichloropropane are persistent in ground water. Ground water contaminated with Telone, its degradates, and 1,2-D may be used potentially as a source of drinking water. EFED has recommended that the results of the ground water monitoring studies be used for quantitative risk assessment.

Limited surface water monitoring data associated with the small-scale ground-water prospective monitoring study indicate that Telone may migrate to surface water through dissolution of the chemical from the air into the water at the air/water interface. Conservative modeling (Tier 2) suggests that Telone and its degradates may migrate to surface water via runoff. Environmental fate data, physical chemical properties of Telone, and the limited surface water monitoring indicate that Telone will dissipate rapidly from surface water; however, there is the possibility of its degradates, 3-chloroallyl alcohol and 3-chloroacrylic acid occurring and persisting in surface waters. That is, residues of Telone in surface water are not expected to persist long enough to provide a chronic exposure scenario; however, the same conclusion cannot be drawn for its degradates at this point with the data available.

Risk Characterization

This document provides risk estimates for chronic, non-cancer effects based on the RfD, and cancer based on the Q^*_1 for Telone and its degradates. Risk estimates for cancer based on the Q_1^* for 1,2-D have also been provided.

The excess individual lifetime drinking water cancer risk estimates for Telone (parent only) in ground water range from 1.4 X 10^{-7} (70 feet deep wells in Florida) to 4.7 X 10^{-4} (monitoring data from the Wisconsin prospective ground water monitoring study). Excess individual lifetime drinking water cancer risk estimates for Telone and its degradates range from 5.9 x 10^{-7} (70-feet deep wells in Florida) to 1.2 x 10^{-3} (Wisconsin data). Drinking water cancer risk estimates for the contaminant 1,2-D range from 6.3 X 10^{-8} (70-foot wells in Florida) to 1.8 X 10^{-6} (Wisconsin data).

Using these same monitoring data, chronic exposure to Telone in drinking water is not expected to exceed the RfD even under the most highly exposed scenario. Chronic (non-cancer) risk as a percentage of the RfD were 15% for the total US population, 18% for females, and 52% for infants and children.

Drinking water cancer risks were not calculated for surface water because the available monitoring information on Telone and its degradates in surface water is inadequate (does not provide a long-term average concentration value, i.e., a time-weighted mean concentration) for use in a chronic exposure assessment to estimate cancer risks. HED/EFED believe that continued chronic exposure to Telone is unlikely because Telone is likely to dissipate rapidly from surface water via volatilization, making chronic exposure through surface-water sourced drinking water unlikely. The potential for chronic exposure to the degradates in surface water may be greater, since they are likely to be less volatile than the parent.

All dietary exposure to Telone and its degradates is assumed to be through drinking water. Standard default body weight and drinking water consumption values used by the Office of Water (OW) were used in the risk assessments. These default assumptions are conservative but in keeping with EPA policy. Exposure and risk estimates were based on the results of two small-scale prospective ground water monitoring studies conducted in Florida and Wisconsin. These were the best data available to estimate exposure and risk to Telone and its degradates in drinking water. EFED/HED have a high level of confidence in the quality of these data used for risk assessment. These exposure and risk estimates are given in Tables 3, 5 and 6.

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II. BACKGROUND

Telone, or 1,3-dichloropropene, is a highly volatile liquid used as a broad-spectrum preplant fumigant to control nematodes, insects, and certain bacterial, fungal, and viral diseases on vegetable, fruit and nut, nursery and field crops. 1,3-Dichloropropene was first introduced as a soil fumigant by the Dow Chemical Company in 1955 under the trade name Telone and subsequently registered in 1966. Telone is presently registered as a preplant fumigant for agricultural use.

Commercial 1,3-dichloropropene is a mixture of approximately equal proportions of the cis- and trans- isomers (1:1 ratio). 1,3-Dichloropropene is also formulated with chloropicrin. The Telone II formulation contains 94% 1,3-dichloropropene and 6% inert ingredients. The Telone C-17 formulation contains 77.9% 1,3-dichloropropene 16.5% chloropicrin, and 5.6% inert ingredients. A contaminant, 1,2-dichloropropane may also be present in small quantities (<1%).

The physical and chemical properties of Telone are listed below:

CAS Number:	542-75-6
Empirical Formula:	$C_3H_4Cl_2$
Physical State:	liquid under pressure, volatile
Molecular Weight:	110.98
Odor:	sweet, pungent, penetrating
Water Solubility:	0.218 g/100 mL for cis isomer 0.232 g/100 mL for trans isomer
Vapor Pressure:	34.3 mmHg for cis isomer 23.0 mmHg for trans isomer
Boiling Point:	104°C for cis isomer 112.6°C for cis isomer
Specific Gravity:	1.209 g/mL at 25°C

Telone is applied by injection below the soil surface. However, once in the soil, Telone moves rapidly through the soil by diffusion as a gas. Telone diffuses rapidly through soil because of its high vapor pressure. It may leach to ground water under certain conditions or migrate to surface water through dissolution from air into water at the air/water interface or through runoff. Exposure may occur through either inhalation or ingestion of Telone in drinking

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water. Inhalation exposure has been addressed in previous HED risk assessments, including the 1997 HED Chapter of the Reregistration Eligibility Decision Document (RED).

i Drinking Water Standards

Telone is not currently regulated under the Safe Drinking Water Act. No national maximum contaminant level (MCL) has been established for Telone; the maximum contaminant level goal (MCLG) is zero because Telone is a B2 carcinogen (USEPA 1996). Public water supply systems are not required to sample and analyze for Telone.

The Office of Water has established Health Advisories for Telone: the 1-day, 10-day, and longer term health advisories for a 10-kg child are 30 ppb. The Longer-Term Health Advisory for a 70 kg adult has been set at 0.2 ug/L for a 10^{-6} cancer risk. However, the Office of Water used an RfD of 0.0003 mg/kg/day to set these Health Advisories; OPP has recently set an RfD of 0.025 mg/kg/day based on a new dietary admix study.

The contaminant 1,2-Dichloropropane is regulated under the Safe Drinking Water Act. It has a maximum contaminant level (MCL) of 5 ppb, and a maximum contaminant level goal (MCLG) of 0 because it is a B2 carcinogen (USEPA 1990). In addition, the Office of Water has established a Health Advisory for 1,2-dichloropropane: the 10-day Health Advisory for a 10-kg child is 0.09 mg/L. The drinking water concentration associated with a 10^{-4} cancer risk for a 70-kg adult is 0.06 mg/L (USEPA 1996). The 10^{-6} cancer risk for a 70 kg adult would be 0.0006 mg/L (0.6 ug/L).

The Office of Water did not establish a 1-day health advisory for 1,2-dichlororopane because there were insufficient toxicological data on acute effects. In 1979, the National Academy of Sciences recommended an acceptable level of 0.3 mg/L for a 70 kg adult exposed to 1,2-dichloropropane for a week.

ii Hazard Identification/Dose-Response Assessment

Risk Assessment Endpoints for Telone

Toxicology endpoints for the Telone drinking water risk assessment were selected by HED's various toxicology peer review committees. The Carcinogenicity Peer Review Committee evaluated Telone in 1985 and 1989 and classified Telone as a B2 Carcinogen. The Reference Dose Committee met on January 30, 1997 to evaluate the entire toxicology database for Telone and select an appropriate RfD. The RfD Committee also determined that the Cancer Peer Review Committee did not need to reevaluate the Carcinogenicity of Telone. The HED Toxicology End Point Selection Committee (TESC) met on February 4, 1997 and on August 20, 1997 to identify what, if any, acute, short-, or intermediate-term toxicological endpoints should be used in the drinking water risk assessment for Telone.

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Acute, Short-, or Intermediate-Term Exposure. No appropriate toxicological endpoint was identified for acute, short to intermediate term risk assessments for Telone.

Reference Dose (RfD). The HED RfD Peer Review Committee met to discuss and evaluate the toxicology database for Telone on January 30, 1997. An RfD of 0.025 mg/kg/day was selected based on the NOEL of 2.5 mg/kg/day established in a 2-year dietary admix (microcapsule) toxicity/carcinogenicity study in rats and using an uncertainty factor of 100. The LOEL was 12.5 mg/kg/day based on a decrease in body weight gain and an increase in the incidence of basal cell hyperplasia of the nonglandular mucosa of the stomach (MRID 43763501).

Carcinogenicity. The HED Cancer Peer Review Committee evaluated the carcinogenic potential of Telone on September 5, 1985. The Committee classified Telone II as a Group B2, probable human, carcinogen based on NTP studies where there were increased tumors in both sexes of rats (Fischer 344) and mice (B6C3F1) after oral administration (tumor types noted included forestomach, liver, mammary, thyroid, adrenal, urinary, and lung). HED determined that it is appropriate to calculate cancer risk estimates for Telone using a Q_1* derived from the linearized low dose extrapolation model. The oral unit risk (cancer potency, Q_1*) was calculated to be 1.75×10^{-1} $(mg/kg/day)^{-1}$ in human equivalents using the Multistage Model and the 2/3 interspecies scaling factor. This oral Q_1* was later revised to incorporate the 3/4 interspecies scaling factor (OPP policy change: P. Fenner-Crisp, 1994). The revised oral Q_1* is 1.22×10^{-1} $(mg/kg/day)^{-1}$ in human equivalents (Fisher 1997).

On August 23, 1989, the HED Cancer Peer Review Committee met to assess the inhalation studies in rats and mice. The Committee reaffirmed the Group B2 classification with the additional information from the inhalation studies (increased bronchioloalveolar adenomas in male B6C3F1 mice). The cancer potency factor (Q_1*) for humans via the inhalation route was calculated to be 9.66×10^{-2} $(mg/kg/day)^{-1}$. The inhalation Q_1* was later revised to 5.33×10^{-2} $(mg/kg/day)^{-1}$ to incorporate the 3/4 interspecies scaling factor (Fisher 1994).

Additional oral carcinogenicity data were received for Telone subsequent to the Cancer Peer Review meetings. The new data, chronic/carcinogenicity studies in the rat and mouse using dietary administration of microencapsulated Telone, were reviewed by the HED RfD Peer Review Committee on January 30, 1997. The RfD Committee also evaluated previously submitted studies upon which the RfD and carcinogenicity classification were based. The RfD Committee determined that results from the recent chronic/carcinogenicity studies did not necessitate having the Carcinogenicity Peer Review Committee reevaluate the carcinogenicity classification or the Q_1*.

The Registrant submitted further information on the carcinogenicity and mutagenicity of Telone in September and November 1997 in response to the 1997 HED RED Chapter. This information included several rebuttals as well as a short term mechanistic study.
This information is under review by HED toxicologists.

Endpoints for Telone's Degradates

The HED Metabolism Committee met on April 14, 1997 and determined that the degradates 3-chloroallyl alcohol and 3-chloroacrylic acid should be considered to have toxicological equivalence to the Telone parent in the absence of toxicology data for the degradates (Abbotts 1997). A single literature study was found on the degradates, which are reported to be positive in the Ames assay with (but not without) metabolic activation (Connors, Stuart, and Cope, 1990). For this drinking water risk assessment, the Telone oral Q_1* will be used to determine risk for combined exposure to parent and degradates.

Endpoints for 1,2-Dichloropropane

The Health Effects Division has not evaluated the toxicity of 1,2-dichloropropane because it is no longer a registered pesticide. However, the toxicity of 1,2-dichloropropane has been evaluated by the Agency's Carcinogenicity Assessment Group and the Office of Water. HED has chosen to use the toxicological endpoints identified by these groups for human health risk assessment.

Carcinogenicity. 1,2-Dichloropropane has been classified as a Group B2, probable human carcinogen, based on the statistically significant increased incidence of hepatocellular adenomas and carcinomas in male and female B6C3F1 mice. In addition, a dose-related trend in mammary adenocarcinomas was noted in female F344 rats. This is considered significant because F344 rats have a relatively low background incidence of these tumors (USEPA 1991). In addition, 1,2-dichloropropane was mutagenic in Salmonella and in Aspergillus nidulans. 1,2-Dichloropropane also induced sister chromatid exchange and chromosome aberrations in Chinese hamster ovary cells. Based on the weight of the evidence, the EPA Carcinogen Assessment Group (CAG) classified 1,2-dichloropropane as a Group B2, probable human, carcinogen. An oral Q1* of 6.7×10^{-2} $(mg/kg/day)^{-1}$ for males and 2.2×10^{-2} $(mg/kg/day)^{-1}$ for females was calculated for 1,2-dichloropropane based on incidence of hepatocellular adenoma and carcinoma (USEPA 1990) and the linearized multistage model and 2/3 interspecies scaling factor. The Health Effects Division has recently revised the 1,2-dichloropropane oral Q_1* using the 3/4 interspecies scaling factor (Fisher 1997). The revised oral Q_1* is 3.69×10^{-2} $(mg/kg/day)^{-1}$ in human equivalents based on the incidence of hepatocellular adenomas and/or carcinomas in the male mouse.

III DRINKING WATER EXPOSURE ASSESSMENT

i Factors Influencing Drinking Water Exposure

The amount of Telone found in either ground or surface water is related to its physical

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and chemical properties as well as a number of local environmental conditions, including soil temperature, soil type, and depth of the water table. Telone, once applied, migrates rapidly through the soil and may migrate to ground or surface water or volatilize to the air.

Telone's mobility in soil is measured by soil adsorption coefficients (Kd's) which range from 0.23 in loamy sand to 1.09 in clay. Telone has a low adsorption coefficient in a range of soils and tends to partition preferentially into water over soil (USEPA 1997). Telone is considered to be a mobile chemical.

For this assessment, the half life of a chemical in the environment is presented as two different measurements: (1) the dissipation half-life, which reflects physical transport (i.e. volatilization) and degradation, and (2) the degradation half-life, which reflects degradation via biological and chemical mechanisms, only. These measurements can be conducted in both the lab and field.

For Telone, field dissipation studies show half-lives of 1 to 7 days, but laboratory measurements of aerobic soil metabolism show half-lives of up to 37 days. (Because of Telone's high volatility, the aerobic soil metabolism is likely a more accurate measurement of Telone's degradation half-life in soil.) Hydrolysis studies of Telone show that hydrolysis is independent of pH, but extremely variable with varying temperatures; longer half-lives are seen with low temperatures (USEPA 1997).

The major degradates of Telone in soil appear to be 3-chloroallyl alcohol and 3-chloroacrylic acid, both of which were detected in prospective ground water monitoring studies (USEPA 1997). Information on the physical and chemical properties of Telone's degradates, 3-chloroallyl alcohol and 3-chloroacrylic acid, are limited; however, the degradates are not expected to be as volatile as Telone. It is the high volatility of Telone that aids in its rapid dissipation from aquatic environments.

Telone may migrate to ground water under certain conditions. Extensive ground water monitoring has been conducted for Telone, and detections have been found in several states. However, no information about past Telone usage is available to correlate with retrospective ground water monitoring data. Results of a recent ground water prospective monitoring study show that Telone may also migrate to surface water via atmospheric transport, i.e., dissolution of Telone vapors in surface waters. Surface water modeling suggests Telone can migrate to surface water via runoff as well. Because of Telone's volatility, it is not expected to persist in surface waters at high concentrations. The stability and persistence of its degradates in surface waters is unclear, but they are likely to be substantially less volatile than the parent, and therefore more persistent.

The contaminant 1,2-dichloropropane has a different environmental fate profile than Telone. 1,2-Dichloropropane is stable and highly persistent in the environment. The degradation of 1,2-dichloropropane is not temperature dependent, unlike Telone. Laboratory studies also indicate that 1,2-dichloropropane is very mobile and that mobility is inversely proportional to the amount of soil organic matter.

ii Ground water

The Environmental Fate and Effects Division has reviewed available ground water monitoring data for Telone (Waldman 1997). The Pesticides in Ground water Database (EPA 1992) indicates detections of Telone in Oregon, New York, and Washington following normal field use. This database also reports detections in California because of point source pollution, and Telone has also been detected in California following normal use. Additional monitoring in Hawaii, Massachusetts, and Mississippi has not yielded any detections of Telone. Monitoring in the Netherlands has shown detects following normal use in potato and flower bulb fields (Lagas et al.). Small scale retrospective monitoring conducted by the registrant showed detections in studies conducted in Nebraska and Washington state, but not in California or North Carolina.

(a)Ground water Monitoring Studies

General Monitoring Studies. The Pesticides in Ground water Database (EPA 1992) indicates detections of Telone in Florida, New York, and Washington following normal field use, detections in California because of point source pollution, but no detections of Telone in Hawaii, Massachusetts, Mississippi, and Oregon. The Florida detections of Telone are probably 1,2-dichloropropane contamination. General monitoring studies are summarized in Table 1 below.

Small Scale Retrospective Studies. In 1986, the Agency requested that the Registrant conduct retrospective ground water monitoring studies in a variety of environments and use patterns to address concerns for potential ground water contamination. These studies were required as a condition of Reregistration. Retrospective studies were conducted in Washington, California, North Carolina, and Nebraska. In the Nebraska study, Telone was detected in ground water at concentrations from 0.23 to 3.86 ppb using a detection limit of 0.05 ppb. Telone was also detected in trace concentrations (0.03 ppb) in Washington. No residues of Telone, its degradates, or 1,2-dichloropropane were detected in ground water in the North Carolina or California studies. Although there were significant problems with study design and sampling, the results indicated that Telone can leach to ground water in some environments.

Table 1. Summary of General Ground water Monitoring for Telone*.

State	Detections			Locations	Year of Sampling	Reference
	ppb	# of wells	LOD			
CA	0.89-1.9	6	0.5 ppb	Del Norte, Fresno, Santa Clara counties	1987, 1988, 1991	Bartkowiak 1997

Table 1. Summary of General Ground water Monitoring for Telone*.						
State	Detections			Locations	Year of Sampling	Reference
	ppb	# of wells	LOD			
CA	none	9915	0.02 to 100 ppb	NA	May 79 to June 96	Bartkowiak 1997
CA	6.8-31 (6 detects)	1	NA	Riverside (illegal use)	1986, 1987	USEPA 1992
FL	none	9505	0.085	NA	1987-1996	Fisher 1997
FL	0.2790-7.83 (1,2-D)	NA	NA	NA	NA	Riotte 1997
HI	none	54	NA	pineapple regions	1979-1987	Giambelluca 1988
MA	none, no degradates analyzed	239	1	tobacco regions	1985	MA ITF 1986
MS	none	348	0.1	statewide	1989-1996	Landreth 1997
NY	37-270	1	2 ppb	Suffolk county	1983	Loria et al. 1986
NY	none	9	2 ppb	near treated fields	NA	Kotcon and Loria 1987
OR	some detects	NA	0.5 ppb	NA	NA	McLaughlin 1997
WA	0.10-0.11/3 wells	196 wells sampled	NA	NA	NA	Larsen 1997

NA, information not available. * Excludes data from retrospective and prospective ground water monitoring studies. All references as cited in USEPA 1997.

Small Scale Prospective Monitoring Studies. The Agency required that the Registrant conduct small scale prospective ground water monitoring studies in Florida and Wisconsin to provide information on the magnitude of Telone residues in ground water following normal agricultural use in vulnerable areas. The Agency was concerned about the potential for leaching and persistence of Telone in ground water in cold climates because of its physical chemical properties and environmental fate. The Registrant volunteered to conduct small scale monitoring in Southern Florida because of concerns for ground water contamination due to local environmental conditions.

These two small scale prospective monitoring studies provide the best available data on the potential for Telone to contaminate ground water to date, and EFED recommends using ground water concentrations from these studies for determining potential drinking water exposure and human health risk. These monitoring data are believed to be representative of ground water that is either currently used as a source of drinking water or ground water that could reasonably be expected to be a source of drinking water. Monitoring data from the Florida and Wisconsin studies are summarized in Table 2 below.

Florida. Telone was detected in the Florida prospective study at concentrations ranging from 0.05 to 21.6 ppb in shallow wells (screened at a 10 feet depth) not used for drinking water and up to 1 ppb in wells that tap into an aquifer (screened at a 70 feet dpeth) which could be used for drinking water. In Florida, total Telone residues (parent + degradates) in ground water were detected up to 43.9 ppb in the shallow wells (10 feet deep), and up to 8.9 ppb in the deeper wells (70 feet deep). The Florida study has been completed and the data presented herein reflect 12 months of ground water monitoring following Telone application.

Wisconsin. In Wisconsin, preliminary results show that Telone (parent only) was detected in an aquifer used for drinking water at concentrations ranging from 0.05 to 579 ppb. The Wisconsin study is in progress, and the most recent data, from ground water monitoring up to 337 days following Telone application, are presented in this report. In the Wisconsin study, ground water monitoring was conducted in both on and offsite wells following application of Telone II at a rate 28 gal/acre (283 lbs ai/acre, typical rate). However, the offsite monitoring was limited to 1 shallow and 1 deep well downgradient from the treated field. Telone was detected in all 8 of the shallow onsite wells at concentrations up to 579 ppb. Telone was also detected in downgradient offsite shallow and deep wells at concentrations up to 173 ppb (Carleton 1998). The degradate 3-chloroallyl alcohol was detected in all of the onsite shallow wells, at concentrations up to 2740 ppb, in all of the onsite deep wells at concentrations up to 194 ppb, and in downgradient offsite shallow and deep wells at concentrations up to 74 ppb. The degradate 3-chloroacrylic acid was detected in all of the onsite shallow wells at concentrations up to 1092 ppb, in all of the onsite deep wells at concentrations up to 358 ppb, and in all of the downgradient offsite shallow and deep wells at concentrations up to 153 ppb. The contaminant 1,2-D was found in all of the onsite shallow and deep wells at concentrations up to 3.9 ppb, and in the offsite wells at concentrations up to 0.9 ppb.

Table 2. Summary of Prospective Ground water Monitoring Data for Telone

Compound	FLORIDA PROSPECTIVE STUDY*		WISCONSIN PROSPECTIVE STUDY**
	10 ft wells	70 ft well	shallow aquifer (15-22 ft)
PEAK (Maximum) Concentrations (ug/L)			
Telone	21.6	1.03	579
3-chloroallyl alchohol	13.5	7.85	1090

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Table 2. Summary of Prospective Ground water Monitoring Data for Telone			
Compound	FLORIDA PROSPECTIVE STUDY*		WISCONSIN PROSPECTIVE STUDY**
	10 ft wells	70 ft well	shallow aquifer (15-22 ft)
3-chloroacrylic acid	8.79	0.03	2740
Telone + Degradates	43.9	8.91	4409
1,2-D	1.28	0.24	3.94
Time-Weighted Mean Concentrations (ug/L)			
Telone	0.30	0.04	134
3-chloroallyl alchohol	0.31	0.11	87
3-chloroacrylic acid	0.54	0.03	136
Telone + Degradates	1.15	0.17	357
1,2-D	0.22	0.06	1.69

* Florida values represent a 365 day TWA. ** Wisconsin values based on 337 days (~ 11 months) of monitoring data for Telone and the degradates 3-chloroacrylic acid and 3-chloroallyl alchohol; Quantification limits as follows: 0.05 ppb for Telone, 1,2-dichloropropane, and 3-chloroacrylic acid; 0.10 ppb for 3-chloroallyl alcohol; nondetects treated as ½ the limit of quantification.

iii Surface Water

Limited surface water monitoring data are available for Telone. Ambient surface water monitoring was conducted concurrent with the Florida prospective ground water study. Monitoring was performed at 4 sampling sites along 2 perimeter ditches around a Telone treated field. Telone was detected above a detection limit of 0.05 µg/L in 14 of 20 samples collected from the 2 ditches in the first five days post-application (prior to the first runoff event). Concentrations ranged from 0.07 to 1.8 µg/L. The maximum concentration of 1.8 µg/L was the only detection > 1 µg/L. No Telone was detected in samples collected from the ditches after 5 days post-application. The degradate, 3-Chloroacrylic acid, was detected in 4 of the 20 samples collected from the 2 ditches in the first five days post-application at concentrations ranging from 0.09 to 0.15 µg/L. The degradate, 3-Chloroallyl alcohol, was detected at a concentration of 0.78 µg/L in one sample collected from the north ditch 9 days post-application. No detections were noted after the first rainfall event. No rainfall events of sufficient magnitude to generate runoff occurred during the ditch water monitoring.

The origin of the Telone found in the Florida surface water monitoring is unclear. DowElanco has proposed that the Telone found in surface water might be from dissolution of volatilized compound from the air. DowElanco postulates that volatilized Telone moves close to the ground when there is low wind, because it has greater density than air. Any such Telone passing over surface water could be re-dissolved in the water. Ground water from a shallow

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Florida aquifer could also contribute Telone to surface water. Telone may also impact surface water directly through runoff. Any potential contribution of Telone to surface water may result in the presence of the degradates.

EFED used Tier 2 modeling to evaluate the potential for Telone contamination of surface water from runoff. EFED used the PRZM/EXAMS model to estimate concentrations of Telone, 3-chloroallyl alcohol, and 3-chloroacrylic acid in surface water in a small pond.

EFED estimated the concentration of Telone and its degradates in a pond 1 hectare by 2 meters deep adjacent to a 10-hectare field. EFED assumed that Telone was incorporated to a depth of 25 cm below the soil surface. The model simulation included a decay rate from the parent compound (Telone) to the alcohol and acid degradates. The rate of formation of the degradates was assumed to be equal to the rate of decay of Telone in soil and water, i.e., the half-life ($t_{1/2}$) of Telone under aerobic conditions in soil and water. The assumptions regarding decay rates used for Telone in the assessment are standard within EFED, and are expected to produce conservative results relative to actual concentrations of Telone in surface water. For aerobic soil degradation, the modeling used the 90% upper confidence limit on the mean of the two available values (12 and 54 days) or 97.6 days. Since no aerobic aquatic data were available, the aerobic aquatic half-life was assumed to be twice the aerobic soil half-life, or 195.2 days. An overall aquatic aerobic decay rate of 30 days was estimated for the composite degradate from a published study (Yon et al., 1991). These conservative decay rates used in the simulation for Telone may underpredict concentrations of the degradates in surface water. Thirty-six-year means (average) concentrations are given for 3 different application rates of Telone to reflect the single maximum usage rates for 3 different crops: potatoes, cotton and tobacco. The model simulation used one application at the maximum rate for each crop simulated.

The maximum reported concentrations of Telone, 3-chloroallyl alcohol, and 3-chloroacrylic acid detected in the Florida surface water monitoring study were: 1.8 ug/L, 0.15 ug/L, and 0.78 ug/L, respectively. Maximum concentrations of Telone, and 3-chloroallyl alcohol/ 3-chloroacrylic acid (combined) estimated to be in pond water from the PRZM/EXAMS model were: 1390, and 24 ug/L, respectively. The highest average annual concentrations of Telone and its degradates in surface water estimated from the PRZM/EXAMS model were 0.801 and 0.340 ug/L. Average annual concentrations of Telone and its degradates in ditch water from the Florida small-scale prospective monitoring study could not be calculated from the limited monitoring data available. The discrepancy between model estimates of the maximum concentrations in surface water and the monitoring data reflect, in part, the fact that they address different transport pathways. These data are presented below in a tabular format for easier comparison.

Comparison of Concentrations of Telone and its Degradates Estimated in Surface Water from PRZM/EXAMS Model Simulation vs. Monitored Ditch Water Concentrations (FL). (ug/L)				
	PRZM/EXAMS Maximum (ug/L)	PRZM/EXAMS Average (ug/L)	MONITORING in FL Maximum (ug/L)	MONITORING in FL* Average (ug/L)
Telone	1390	0.80	1.8	N/A
alcohol	24 (combined degradates)	0.34 (combined degradates)	0.15	N/A
acid			0.78	N/A

*Long-term average concentrations of Telone and its degradates from the ditch water monitoring were not available. Not enough samples were taken.

iv Drinking Water Exposure Estimates

Ground water. The best available ground water monitoring data are preliminary results from two prospective small scale ground water monitoring studies in Florida and Wisconsin. **EFED has recommended that the results of the Florida and Wisconsin studies be used to derive ground water concentrations to quantitate exposure to Telone and its degradates in drinking water.** HED has estimated dietary exposure toTelone via drinking water using these study results and a daily water consumption value of 2 L/day for adult males and females with bodyweights of 70 kg and 60 kg, respectively, and 1 L/day consumption for infants and children with a 10 kg bodyweight. The following equation used to estimate exposure to Telone through drinking water for adult males is provided as an example of how HED calculated exposure to Telone and its degradates in drinking water:

$$\text{Exposure (mg/kg/day)} = \frac{(\text{conc'n}, \mu g/L)(2\ L/day)(0.001\ mg/\mu g)}{70\ kg\ \text{adult body weight}}$$

The 2 L/day and 1L/day drinking water consumption values and 70 kg, 60 kg, and 10 kg body weights are the default values used by OPP and other EPA Program Offices, including the Office of Water in their exposure assessments. Chronic exposure estimates for Telone, its degradates and 1,2-D based on their time-weighted mean concentrations (TWMC, given in Table 2) detected in ground water from small-scale prospective studies are provided in Table 3 below. Exposure calculations are provided for the populations: adult males and females, and infants/children.

Table 3. Chronic Exposure Estimates for Telone, Degradates, and 1,2-D based on Time-Weighted Mean Concentrations from Prospective Ground Water Studies.

Populations	Compound	FLORIDA PROSPECTIVE STUDY				WISCONSIN PROSPECTIVE STUDY	
		10-ft wells		70-ft wells		shallow aquifer (15-22 ft)	
		TWMC µg/L	Estimated Exposure, mg/kg/day	TWMC µg/L	Estimated Exposure, mg/kg/day	TWMC µg/L	Estimated Exposure, mg/kg/day
Adult males	Telone	0.30	8.6×10^{-6}	0.04	1.1×10^{-6}	134	3.8×10^{-3}
Adult females			1×10^{-5}		1.3×10^{-6}		4.5×10^{-3}
Infants & Children			3×10^{-5}		4×10^{-6}		1.3×10^{-2}
Adult males	3-chloroacrylic alcohol	0.31	8.8×10^{-6}	0.11	3.1×10^{-6}	87	2.5×10^{-3}
Adult females			$1 \times 10_{-5}$		3.6×10^{-6}		2.9×10^{-3}
Infants & Children			3×10^{-5}		1×10^{-5}		8.7×10^{-3}
Adult males	3-chloroacrylic acid	0.54	1.5×10^{-5}	0.03	8.6×10^{-7}	136	3.9×10^{-3}
Adult females			1.8×10^{-5}		1×10^{-6}		4.5×10^{-3}
Infants & Children			5.4×10^{-5}		3×10^{-6}		1.4×10^{-2}
Adult males	Telone + Degradates	1.15	3.3×10^{-5}	0.17	4.9×10^{-6}	357	1×10^{-2}
Adult females			3.8×10^{-5}		5.6×10^{-6}		1.2×10^{-2}
Infants & Children			1.2×10^{-4}		1.7×10^{-5}		3.6×10^{-2}
Adult males	1,2-D	0.22	6.3×10^{-6}	0.06	1.7×10^{-6}	1.69	4.9×10^{-5}
Adult females			7.3×10^{-6}		2×10^{-6}		5.6×10^{-5}
Infants & Children			2.2×10^{-5}		6×10^{-6}		1.7×10^{-4}

Surface Water. Limited surface water monitoring data from the Florida prospective study suggest that Telone may migrate to surface water under certain conditions. As stated previously, EFED has also provided estimates of Telone and its degradates' concentrations in surface water from the PRZM/EXAMS model. However, because information regarding potential Telone migration to surface water is limited, and because Telone is a volatile fumigant not well suited to the PRZM/EXAMS model, the concentrations of Telone and its degradates derived from the model will be compared to a drinking water levels of concern, only. That is, they will not be used to quantitate a drinking water risk associated with residues of Telone and its degradates in surface water.

In the absence of reliable, available monitoring data, EFED uses models to estimate concentrations of pesticides in ground and surface water. For Telone and its degradates, modeling was used to estimate surface water concentrations because of very limited surface water monitoring data. However, HED does not use these model estimates to quantitate risk. Currently, HED uses drinking water levels of concern (DWLOCs) as a surrogate to capture risk associated with exposure to pesticides in drinking water. A DWLOC is the concentration of a pesticide in drinking water that would be acceptable as an upper limit in light of total aggregate exposure to that pesticide from food, water, and residential uses (if any). A DWLOC will vary depending on the toxicity endpoint and with drinking water consumption patterns and body weights for specific subpopulations. HED calculated DWLOC values for chronic (RfD) and cancer (Q*) endpoints. HED has compared model concentration estimates from the PRZM/EXAMS to calculated DWLOC values to provide a screening level qualitative risk estimate for Telone and its degradates in surface water. If screening model estimates exceed the DWLOC values, monitoring data are usually required.

DWLOC/Telone. The HED RfD for Telone was used to calculate a Drinking Water Level of Concern (DWLOC) for non-cancer, chronic effects. **The $DWLOC_{chronic}$ is the concentration of Telone in drinking water consumed daily over a lifetime that as part of the aggregate chronic exposure from all sources occupies no more than 100% of the RfD. The $DWLOC_{chronic}$ for Telone is 875 ppb for the total US population, 750 ppb for females 13+ years old, and 250 ppb for children 1-6 years old.**

The **$DWLOC_{chronic}$** for Telone was calculated using the following formula:

$$DWLOC_{chronic}\ (\mu g/L) = \frac{\text{(chronic water exposure, mg/kg/day)(body weight)}}{\text{(water consumption, L/day)}(10^{-3}\ mg/\mu g)}$$

where chronic water exposure = RfD (because there is no exposure to Telone via food);

water consumption is 2 L/day for adults and 1 L/day for children; and body weight is 70 kg for total US population, 60 kg for females 13+ years old, and 10 kg for children 1 to 6 years old.

The oral Q_1* for Telone was used to calculate a DWLOC for cancer effects caused by Telone. **The $DWLOC_{cancer}$ is the concentration of Telone in drinking water consumed daily over a lifetime that is associated with a 1 X 10^{-6} cancer risk. The $DWLOC_{cancer}$ for Telone is 0.3 µg/L (ppb).** Because there is no dietary (food) exposure to telone, individuals could be exposed to 8.2 x 10^{-6} mg/kg/day telone in drinking water before HED's level of concern (1 x 10^{-6} cancer risk) would be exceeded.

The **$DWLOC_{cancer}$** for Telone was calculated using the following formula:

$$\underset{(\mu g/L)}{DWLOC_{cancer}} = \frac{\text{(chronic water exposure, mg/kg/day)(body weight)}}{\text{(water consumption, L/day)}(10^{-3}\ mg/\mu g)}$$

$$\text{where chronic water exposure} = \frac{1 \times 10^{-6}}{\text{oral } Q_1^* \text{ of } 1.22 \times 10^{-1}\ (mg/kg/day)^{-1}},$$

water consumption is 2 L/day, and body weight is 70 kg.

DWLOCs were not calculated for Telone's degradates because there are no toxicology data on which to base the calculation. Because HED is combining Telone and the alcohol and acid degradates to determine exposure, and assuming that the degradates have toxicity equivalent to the parent, the DWLOC calculated for Telone includes exposure contributed by the degradates.

DWLOC/1,2-D. The oral Q_1^* for 1,2-dichlorpropane was used to calculate a DWLOC for cancer effects caused by 1,2-D. **The $DWLOC_{cancer}$ for 1,2-dichloropropane is 1 ug/L.**

The **$DWLOC_{cancer}$ for 1,2-dichloropropane** was calculated using the following formula:

$$\underset{(\mu g/L)}{DWLOC_{chronic}} = \frac{\text{(chronic water exposure, mg/kg/day)(body weight)}}{\text{(water consumption, L/day)}(10^{-3}\ mg/\mu g)}$$

$$\text{where chronic water exposure} = \frac{1 \times 10^{-6}}{\text{oral } Q_1^* \text{ of } 3.69 \times 10^{-2}\ (mg/kg/day)^{-1}}.$$

water consumption is 2 L/day, and body weight is 70 kg.

As stated previously in this document, DWLOCs are compared to model estimates as a surrogate way to capture risk. The DWLOCs for chronic (RfD) and cancer toxicity endpoints for Telone and its degradates are given below and compared to the 36-year mean concentrations for Telone and its degradates estimated by PRZM/EXAMS. DWLOC values were calculated for chronic (non-cancer) effects for 3 subpopulations (US population, adult females, and children and infants), and calculated for cancer effects for the general US population. Table 4 below provides a comparison of the model estimates to the calculated DWLOC values.

Table 4. Estimated Concentrations of Telone, 3-chloroallyl alcohol, and 3-chloroacrylic acid in Pond Water (PRZM/EXAMS).					
Subgroup	DWLOC (ug/L)	36-Year Mean (ug/L)			Compound (ug/L)
		Potatoes (ID)	Tobacco (GA)	Cotton (MS)	
US Population	875*	0.045	0.357	0.801	Telone
Females	750*	0.016	0.081	0.340	Degradates
Children & Infants	250*	0.061	0.438	1.141	Total
US population	0.3**				

* DWLOC for chronic, non-cancer (RfD) endpoint. ** DWLOC for cancer endpoint.

Telone concentrations are not expected to persist in surface waters long enough to provide chronic exposures. Estimated average concentrations of Telone and its degradates, alone or in total, are well below the DWLOCs for chronic, non-cancer effects for the subpopulations of concern. Estimated concentrations of Telone, per se, are greater than the DWLOC for cancer effects in 2 of the 3 scenarios modeled. HED/EFED has some concern that the degradates, being less volatile than the parent compound, may persist in surface waters. Estimated concentrations of Telone's degradates are essentially equivalent to the DWLOC value for cancer effects for the US population for the high-use cotton scenario modeled.

Telone is not expected to persist in surface water long enough to cause chronic effects. The ultimate environmental fate of the degradates is unknown. Surface water monitoring data to clarify the fate of the degradates are warranted. Although long-term mean concentrations could be estimated using the PRZM/EXAMS model, the average concentrations of Telone and the degradates in surface water in the ditches were not calculated as sampling occurred over a short period of time (2 weeks) and meaningful long-term averages for use in a chronic risk assessment based on cancer were not available. It should be noted that concentrations of Telone in the ditch water fell below detection limits within 5 days after application.

IV DRINKING WATER RISK CHARACTERIZATION

i Acute and Subchronic Drinking Water Risk

No acute toxicological endpoints were identified for Telone exposure for acute or subchronic time duration. Therefore, no acute or subchronic drinking water risk assessment was conducted.

Because the maximum concentration of 1,2-dichlorpropane found in the prospective ground water monitoring studies does not exceed the 10-day health advisory for children, it is not considered to be of concern. The Office of Water does have a children's 10-day health advisory for 1,2-dichloropropane of 0.09 mg/L (90 μg/L). HED compares the maximum ground water concentration of 1,2-dichloropropane to this level, much as one would compare chronic dietary or drinking water exposure to an RfD. The maximum concentration of 1,2-dichloropropane found was 1.28 μg/L in the Florida study and 3.94 in the Wisconsin study.

The MCL for 1,2-dichloropropane is 0.005 mg/L (0.5 μg/L). The maximum concentration of 1,2-dichloropropane in both the Florida and Wisconsin studies exceeds the MCL and is therefore of concern.

ii Chronic Drinking Water Risk (%RfD)

The HED RfD Committee determined that the oral RfD for Telone should be 0.025 mg/kg/day, based on a NOEL of 2.5 mg/kg/day from a 2-year chronic/carcinogenicity study in rats and an uncertainty factor of 100.

The chronic drinking water risk is calculated as a percent of the RfD taken up by drinking water. The following calculation is used:

$$\% \text{ RfD} = \frac{\text{(Drinking Water Exposure, mg/kg/day)}}{\text{RfD of 0.025 mg/kg/day}} \times 100\%$$

Time-weighted average ground water concentrations from the prospective ground water monitoring studies were used to estimate risk as a percentage (%) of the RfD. Chronic drinking water exposure was compared to the RfD for the total US population as represented by adult males, adult females, and infants/children. For the maximum exposure scenario using ground water monitoring data from the Wisconsin prospective ground water monitoring study, chronic exposure to Telone for the total US population was 15% of the RfD, for adult females chronic exposure is 18% of the RfD, and for infants/children chronic exposure is 52% of the RfD. Dietary and drinking water exposures below 100% of the RfD are generally considered not to be of concern. Chronic (non-cancer) risk estimates based on exposure to Telone in drinking water are presented in Table 5 below.

Risk estimates for drinking water associated with chronic, non-cancer effects were not calculated for surface water because the available monitoring information on Telone and its degradates in surface water is inadequate (does not provide a long-term average concentration value, i.e., a time-weighted mean concentration) for use in a chronic exposure assessment to estimate chronic, non-cancer risks.

No RfD was available for 1,2-dichloropropane; therefore, no chronic drinking water risk assessment was performed.

Table 5. Risk Estimates for Chronic Effects (non-cancer) of Telone as a %RfD based on Maximum Exposure Calculated from the Wisconsin Ground Water Data.			
Populations	Compound	Exposure (mg/kg/day)	% RfD
Adult males	Telone	3.8×10^{-3}	15
Adult females		4.5×10^{-3}	18
Infants & Children		1.3×10^{-2}	52

iii Carcinogenic Risk from Drinking Water

HED estimated cancer risks associated with dietary exposure to Telone via drinking water from ground water sources. Appropriate and reliable monitoring data for surface water were not available. Cancer risks were estimated for the total US population only, because the Agency has insufficient information to estimate lifetime drinking water consumption (or cancer risk) for subpopulations of varying ages and reproductive status.

Cancer risk estimates were calculated using the following equation:

Cancer risk = (chronic drinking water exposure, mg/kg/day) X Q_1*, $(mg/kg/day)^{-1}$

Chronic drinking water exposure values are derived from time-weighted mean concentrations of Telone, its degradates, and 1,2-D detected in the Wisconsin and Florida prospective monitoring studies.

The oral Q_1* was set equal to 1.22×10^{-1} $(mg/kg/day)^{-1}$ for Telone and 3.69×10^{-2} $(mg/kg/day)^{-1}$ for 1,2-Dichloropropane.

For ground water, drinking water cancer risk estimates for Telone range from 1.4×10^{-7} to 4.7×10^{-4}. Cancer risk estimates derived from both the Florida and the Wisconsin study based on total concentration of Telone and the degradates, 3-chloroallyl alcohol and 3-chloroacrylic acid (assuming that the degradates have cancer potency equivalent to Telone) range from 5.9×10^{-7} to 1.2×10^{-3}.

Drinking water cancer risks were not calculated for surface water because the available monitoring information on Telone and its degradates in surface water is inadequate (does not provide a long-term average concentration value, i.e., a time-weighted mean concentration) for use in a chronic exposure assessment to estimate cancer risks. HED/EFED believe that continued chronic exposure to Telone is unlikely because Telone is likely to dissipate rapidly from surface water via volatilization, making chronic surface water exposure unlikely. The potential for chronic exposure to the degradates is expected to be greater, since they are likely to be less volatile than the parent.

Drinking water cancer risk estimates based on ground water data for the contaminant 1,2-dichloropropane range from 6.3×10^{-8} to 1.8×10^{-6}. Cancer risk estimates for drinking water are summarized in Table 6 below.

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Table 6. Chronic Exposures and Cancer Risk Estimates for Telone, its Degradates, and 1,2-D based on Time-Weighted Mean Concentrations from Prospective Ground Water Monitoring Studies

Compound	Florida Ground water Monitoring Data						Wisconsin Ground water Monitoring Data		
	10 ft wells			70 ft wells			shallow aquifer (15-22 ft)		
	Conc'n, µg/L	Estimated Exposure, mg/kg/day	cancer risk	Conc'n, µg/L	Estimated Exposure, mg/kg/day	cancer risk	Conc'n, µg/L	Estimated Exposure, mg/kg/day	cancer risk
Telone	0.30	8.57×10^{-6}	1.0×10^{-6}	0.04	1.1×10^{-6}	1.4×10^{-7}	134	3.8×10^{-3}	4.7×10^{-4}
3-chloroacrylic alcohol	0.31	8.86×10^{-6}	n/a	0.11	3.1×10^{-6}	n/a	87	2.5×10^{-3}	n/a
3-chloroacrylic acid	0.54	1.54×10^{-5}	n/a	0.03	8.6×10^{-7}	n/a	136	3.9×10^{-3}	n/a
Telone + Degradates	1.15	3.17×10^{-5}	4.0×10^{-6}	0.17	4.9×10^{-6}	5.9×10^{-7}	357	1.0×10^{-2}	1.2×10^{-3}
1,2-Dichloropropane	0.22	6.3×10^{-6}	2.3×10^{-7}	0.06	1.7×10^{-6}	6.3×10^{-8}	1.69	4.8×10^{-5}	1.8×10^{-6}

*Possible contamination.

*Cancer risk estimates were calculated using the following equation:

Cancer risk = (drinking water exposure, mg/kg/day) X Q_1*, (mg/kg/day)-1

Where oral Q_1 * = 1.22×10^{-1} $(mg/kg/day)^{-1}$ for Telone and 3.69×10^{-2} $(mg/kg/day)^{-1}$ for 1,2-Dichloropropane

** Possible contamination.

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Conclusions

Because of both the levels of Telone, its degradates, and 1,2-D detected in the prospective ground water monitoring studies and the persistence of these compounds in ground water, OPP is concerned that populations in the Telone use area who rely on rural wells may have unacceptable drinking water exposures and risks. Available monitoring data indicate that Telone and its degradates can migrate to ground water under various conditions. The available data suggest that Telone and its degradates are persistent in ground water, in both warm and cold climates. The contaminant 1,2-dichloropropane also leaches to ground water, where it is persistent. The concentrations of Telone and/or 1,2-dichloropropane in ground water in the Wisconsin and Florida prospective monitoring studies are associated with cancer risks of concern. Data from these prospective ground water monitoring studies are the best quality data available to OPP. Ground water monitored in these studies may be used for drinking water by small subpopulations. OPP is making the conservative assumption that Telone and its degradates'concentrations will be similar for ground water used for drinking water.

Additional ground water monitoring data are necessary to determine the extent of exposure to Telone and its degradates in ground-water sourced drinking water.

Telone is not expected to persist in surface waters because of its volatility, and therefore, is not expected to pose a chronic exposure scenario in surface waters used for drinking water on which to base a human health risk assessment. Telone may migrate to surface water through diffusion, lateral flow from ground water to surface water, and through runoff.

Telone's degradates may be formed in surface water from the parent; however, it is unknown whether the degradates persist long enough in surface water to pose a chronic exposure scenario for consideration in a human health risk assessment. Modeling suggests that long-term average annual concentrations of Telone's degradates in surface water may reach the acceptable upper limit in drinking water. The DWLOC for cancer effects of Telone or any combination of its degradates is 0.3 ug/L, and conservative mean concentrations estimated in surface water by the model for the degradates is 0.34 ug/L.

Additional monitoring to detect the presence of Telone and its degradates (3-chloroallyl alcohol and 3-chloroacrylic acid) in surface water after application of Telone are needed to determine the extent to which Telone's degradates may form and persist in surface waters.

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DP BARCODE: D241644

CASE: 838282
SUBMISSION: S534884

DATA PACKAGE RECORD
BEAN SHEET

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: SPECIAL REVIEW   ACTION: 820 SPECIAL REVIEW DATA
CHEMICALS: 029001 1,3-Dichloropropene   100.00 %

ID#: 029001
COMPANY:
PRODUCT MANAGER: 60 ROBERT MCNALLY   ROOM: CS1
PM TEAM REVIEWER: LISA NISENSON   703-308-8031   ROOM: CS1   2N6
RECEIVED DATE: 12/16/97   DUE OUT DATE: 01/15/98

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 241644   EXPEDITE: Y   DATE SENT: 12/16/97   DATE RET.: 06/10/98
CHEMICAL: 029001 1,3-Dichloropropene
DP TYPE: 999
CSF: N   LABEL: N

ASSIGNED TO	DATE IN	DATE OUT
DIV : HED	12/17/97	06/10/98
BRAN: RCAB	12/17/97	06/10/98
SECT: IO	12/17/97	06/10/98
REVR : CSCHELTE	12/17/97	06/10/98
CONTR:	/ /	/ /

ADMIN DUE DATE: 01/15/98
NEGOT DATE: / /
PROJ DATE: / /

* * * DATA REVIEW INSTRUCTIONS * * *

Please review the submission on 1,3-D, 1,2-D and metabolite levels from the cold weather ground water study (4th installment). I understand this review will take place together with Estella Waldman in EFED. Please call Lisa Nisenson at 308-8031 if you have any questions.

* * * DATA PACKAGE EVALUATION * * *

No evaluation is written for this data package

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
244941	FMB/IO	04/06/98	04/20/98	Y	N	N

27827