UNITED S (9))TECTION AGENCY
160

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Updated exposure and risk estimates for workers handling 1,3 dichloropropene (telone), reflecting new study data on "traveler" cylinders

TO: Jack Housenger, Branch Chief
Special Review Branch
Special Review and Reregistration Division (7508W)

FROM: Jim Carleton, Chemist

THRU: Francis B. Suhre, Section Head
Special Review and Reregistration Section

Larry C. Dorsey, Chief
Occupational and Residential Exposure Branch
Health Effects Division (7509C)

DP Barcode:	D221773
Pesticide Chemical Codes:	029001 dichloropropene
EPA Reg. Nos.:	N/A
EPA MRID Nos.:	43880401
Review Time:	5 days
PHED:	N/A

I. INTRODUCTION

Previous OREB memos (5/31/95 and 9/14/95, J. Carleton) presented exposure and risk estimates for bystanders and handlers (loaders and applicators) of telone based upon air monitoring studies conducted by telone registrant Dow Elanco in 1992 and 1993. These studies involved the two loading methods in common use at the time: "bulk" loading, in which the tractor tank is loaded directly from a nurse truck tank, and "drum" loading, in which telone packaged in 55 gal drums is transferred to the tractor tank via a probe which is inserted into the drums. A typical tractor tank may hold 100 to 200 gallons, so multiple drums may be required to fill up one tank. This increases the potential for exposure, as the probe must be removed after each drum is emptied, and inserted into the next drum. A new loading method, which employs telone packaged in 1000 gal cylinders known as "travelers" (aka "mini-bulk"), is replacing the use of drums in some regions of the United States. Dow Elanco has indicated that they plan to phase out the selling of drums completely by 1997, so that all future telone usage will involve either bulk loading or travelers. Dow has submitted to EPA the results of a recent study on exposures to loaders and applicators handling telone packaged in travelers. OREB has reviewed the study and used the data therein to update the estimated exposures and risks to future handlers of telone.

In addition to phasing out the use of drums, in recent negotiations with EPA Dow agreed to implement several label changes designed to reduce exposure to handlers of telone and residents living near fumigated fields (2/7/96, L. Rossi). Where these measures provide quantifiable exposure reductions, OREB has incorporated these changes into the risk and exposure calculations provided in this document.

II. DETAILED CONSIDERATIONS

A. Methods

The new study involved row application of telone C-17 to tobacco fields in Ainger, North Carolina on April 3-5, 1995. Application rate was approximately 10 gal/acre, and treated areas ranged in size from 1 to 12 acres. In accordance with current telone labeling, dry disconnects and end-row spillage control were used. Worker breathing zone air was monitored using personal air sampling pumps which drew air through activated carbon sorbent tubes at a measured flow rate. Unlike previously submitted telone studies, which also included four hour (time weighted average) samples, in this study samples were collected only while the specified tasks were being performed, i.e. only while the loaders were actively engaged in loading.

B. Results

The geometric mean air concentration for loaders using travelers was 359 $\mu g/m^3$ (std. dev. = 306), which is significantly less than previously reported values for drum and bulk loading (2955 to 13673 $\mu g/m^3$ for task-specific samples using dry disconnects). The mean air concentration for applicators in this study was 1287 $\mu g/m^3$ (std. dev. = 423), which is comparable to previously reported values (394 to 1209 $\mu g/m^3$ using end-row spill control).

Tables 1 and 2 present the updated exposure and risk estimates for custom handlers and growers, respectively. These estimates have been modified to incorporate the new traveler data for crops in which most future telone usage is expected to involve traveler loading. Because 4 hour time-weighted average samples were not available for the traveler study, OREB made the conservative assumption that the task-specific loader air concentrations are experienced for the duration of a work cycle. In addition to the traveler data, estimates which previously employed air concentrations derived from drum loading study scenarios have been adjusted to now use only data from bulk loading applications. For each crop, air concentration data from the study location (WA or AZ) felt by OREB to be most geographically representative of the primary use states, was selected. For these crops, the air concentrations from the unmitigated ("no controls") trials were used, and adjusted using protection factors to account for the use of dry disconnects and end row spill control (J. Carleton, 5/31/95). Based upon conversations with BEAD, the estimated length of career for custom handlers has been adjusted from 40 years down to 20 years (C. Scheltema, personal communication). BEAD was unable to verify whether this figure is also appropriate for growers, therefore the estimates presented in this document continue to use the default assumption of 40 year careers for growers.

One of the changes Dow agreed to implement is label language requiring mandatory wearing of respirators for all telone handlers (loaders, applicators, re-entry personnel). Previous labels only required respirators for loaders. Applicators were supposed to have respirators handy, but were not required to wear them unless they smelled telone. The tables in this document therefore incorporate a protection factor (PF) of 0.10 (90% reduction in exposure) for the use of a respirator during all loading and application activities. The estimates also assume the use of dry disconnects and end-row spill control, as currently required on the label.

III. DISCUSSION

In addition to the mandatory use of respirators, Dow has agreed to implement several other protective label measures (2/7/96, L. Rossi). These are presented below, along with a brief statement by OREB regarding the likely impact on human exposures.

- *Increased Restricted Entry Interval from 72 to 120 hours for re-entry personnel.* While there is insufficient data to quantify the effect of this change, available evidence suggests this should have some protective effect. In two out of three resident/bystander exposure studies, air concentrations above treated fields reached maximum values within three days of treatment. However, detectable vapors were still present up to 14 days post-treatment. In the third case, air concentrations remained more constant over the two week period. This suggests that long term average exposures to re-entry personnel may be reduced, while short term exposures may in some instances be unaffected.

- *Buffer zones to prohibit application of telone within 300 feet of an occupied structure.* This measure should reduce exposure to the bystander subpopulation at highest risk: people living near treated fields. In all three resident/bystander studies, average telone air concentrations declined with increasing distance from the treated fields. Compared to

concentrations at 5 meters, 14-day average air concentrations at 125 meters from the fields were 45 to 72% lower, with estimated risks ranging from 1 x 10^{-6} to 9.7 x 10^{-6} for 30 years of assumed exposure from one application per year.

- *Reduced maximum application rates*.

In previous discussions with EPA, Dow has indicated that most telone handlers use less than the maximum label rate. Therefore it is not clear to what extent this change will reduce the amount of telone actually handled. Also, no quantifiable relationship between application rates and telone air concentrations has been established. It is not clear, for instance, that halving the application rate should halve the exposure. Nevertheless, some reduction in exposure should result from reduced rates.

Other measures:

- *Increased injection depth*
- *Soil moisture and temperature requirements*
- *Soil sealing*
- *Reconfiguration of shank placement to increase injection depth*

There are no data to evaluate the efficacy of any of these measures in reducing exposure. However, as all of these are designed to help retain telone in the soil, OREB believes the net result is likely to be somewhat reduced exposures to handlers and residents/bystanders. The half-life of telone due to hydrolysis in soil is given as 5.5 to 11.3 days (David Miller, Chemistry Branch), which suggests that prolonging the retention of telone in the soil may allow increased degradation to take place before volatilaztion can occur, thereby reducing overall emissions of the parent compound.

The estimated exposures and risks to handlers (loaders, applicators, and growers) of telone have been updated by OREB to incorporate new study data, and to reflect protective mitigation measures agreed to by Dow Elanco in recent negotiations with EPA. The resulting risks are somewhat lower than those presented in previous OREB documents (memos 5/31/95 and 9/14/95 by J. Carleton), all now falling below 10^{-4}. Other negotiated measures, while not quantifiable, should help reduce exposures to handlers and area residents, including the highest exposed subpopulation of people living adjacent to treated fields.

Attachments:

(1) Table 1: Updated telone custom loader and applicator exposures and risks.
(2) Table 2: Updated telone worker (grower) exposures and risks.

cc: J. Carleton/OREB w/attach
C. Sheltema/RCAB w/attach
L. Nisenson/SRRD w/attach
Chemical file-telone w/attach
Correspondence file w/attach

Table 1: Updated telone Custom Loader and Applicator exposures and risks.

Protection factor for use of respirator = 0.10
Dry disconnects and spill control assumed to be in use.

Custom Loaders

Assumptions: ventilation rate =1.74 m3/hr, lifetime exposure=20 yrs/70 yrs, body wt.=70 kg, dry disconnects used.
Hours/day = same for loaders as applicators.

Crop	Major use States	State usage data used	hr/d	d/yr	Air Conc. Data used	Air Conc. ug/m3	LADD mg/kg/day	Risk
S. Beets	WY,NE,ID,CO	WY	6	9	AZ (bulk)	1198	1.3E−04	6.7E−06
Cotton	AZ,GA,SC,AL	AZ	10	36	AZ (bulk)	1198	8.4E−04	4.5E−05
Tobacco	NC,GA,SC	NC	5	10	NC (traveler)	359	3.5E−05	1.9E−06
Potatoes	WA,ID,OR,FL,NV	WA	8	24	AZ (bulk)	1198	4.5E−04	2.4E−05
Onions	WA,OR,ID,NV	WA	8	4	AZ (bulk)	1198	7.5E−05	4.0E−06
Carrots	WA,TX	WA	8	7	AZ (bulk)	1198	1.3E−04	7.0E−06

Custom Applicators

Assumptions: ventilation rate =1.74 m3/hr, lifetime exposure=20 yrs/70 yrs, body wt.=70 kg, spill control used.
Bulk application scenarios derived from "no controls" air data, using PF=0.19 for use of spill control.

Crop	Major use States	State usage data used	hr/d	d/yr	Air conc. Data used	Air Conc. ug/m3	LADD mg/kg/day	Risk
S. Beets	WY,NE,ID,CO	WY	6	9	AZ (bulk)	5650	1.1E−04	6.0E−06
Cotton	AZ,GA,SC,AL	AZ	10	20	AZ (bulk)	5650	4.2E−04	2.2E−05
Tobacco	NC,GA,SC	NC	5	10	NC (traveler)	1287	1.3E−04	6.7E−06
Potatoes	WA,ID,OR,FL,NV	WA	8	24	WA (bulk)	1742	1.2E−04	6.6E−06
Onions	WA,OR,ID,NV	WA	8	4	WA (bulk)	1742	2.1E−05	1.1E−06
Carrots	WA,TX	WA	8	7	WA (bulk)	1742	3.6E−05	1.9E−06

Table 2: Updated telone worker (grower) exposures and risks.

Assumptions: ventilation rate =1.74 m3/hr, lifetime exposure=40 yrs/70 yrs, body wt.=70 kg; grower performs loading and application; dry disconnects and spill control used.
Protection factor for use of respirator = 0.10
Bulk scenarios derived from 'no controls' air data using PF=0.64 for dry disconnects (loading exposure only), PF=0.19 for spill control.

Crop	Major use States	State usage data used	Loader air Data Used	Loader Air Conc. ug/m3	hr/d	d/yr	Applicator Data Used	Applicator Air Conc. ug/m3	hr/d	LADD mg/kg/day	Risk
Crucifers	AZ	AZ	AZ (bulk)	18371	1.25	4	AZ (bulk)	5650	8	3.6E−04	1.9E−05
Peppers	NM	NM	NC (traveler)	359	0.5	3	NC (traveler)	1287	5	7.7E−05	4.1E−06
Cucurbits	TX,NC,SC,CT	TX	AZ (bulk)	18371	0.25	15	AZ (bulk)	5650	6	5.5E−04	2.9E−05
S. Beets	WY,NE,ID,CO	WY	AZ (bulk)	18371	0.5	1.5	AZ (bulk)	5650	8	8.4E−05	4.5E−06
Cotton	AZ,GA,SC,AL	AZ	AZ (bulk)	18371	1.25	7	AZ (bulk)	5650	8	6.3E−04	3.4E−05
Tobacco	NC,GA,SC	NC	NC (traveler)	359	0.5	3.5	NC (traveler)	1287	5	9.0E−05	4.8E−06
Potatoes	WA,ID,OR,FL,NV	WA	AZ (bulk)	18371	0.5	4	WA (bulk)	1742	10	1.4E−04	7.6E−06
Sweet Potatoes	NC,TX,SC	NC	AZ (bulk)	18371	0.5	2	AZ (bulk)	5650	5.5	9.2E−05	4.9E−06
Peanuts	GA,TX,AL	GA	NC (traveler)	359	1	5	NC (traveler)	1287	3	8.2E−05	4.4E−06
Fruit/Nut trees, Grapevines	SC	SC	NC (traveler)	359	1.5	4	NC (traveler)	1287	5	1.1E−04	5.8E−06
Onions	WA,OR,ID,NV	WA	AZ (bulk)	18371	0.5	5	WA (bulk)	1742	10	7.6E−04	4.0E−05
Tomatoes	TX,HI,FL,AL	AL	AZ (bulk)	18371	1	3	AZ (bulk)	5650	8	2.4E−04	1.3E−05
Carrots	WA,TX	WA	AZ (bulk)	18371	0.5	3	AZ (bulk)	5650	10	1.9E−04	1.0E−05
Pineapples	HI	HI	AZ (bulk)	18371	1.25	11	AZ (bulk)	5650	6	9.0E−04	4.8E−05