D-14004
6 SR-1,3Dichloropropene

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

Incident data?

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MAY 31 1995

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Revised Worker and Residential Exposure and Risk Assessments Based on the Data Submitted in Response to the Worker and Biomonitoring Data Call-In (March 1993), for the Special Review chemical: 1,3 Dichloropropene (Telone).

TO: Jack Housenger, Branch Chief
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DP Barcode: D193471; D188199

Pesticide Chemical Code: 029001 Dichloropropene

EPA Reg. No.:

EPA MRID No.: 429462-01

Review Time: 2 months

PHED: No



1819

Need summary up front



# I. INTRODUCTION

## A. Background

### 1. Chemical formulations

1,3-Dichloropropene (1,3-DCP), also known as Telone, is a highly volatile liquid which is currently registered for use as a soil fumigant on more than 120 crops and ornamentals. Commercial preparations contain approximately equal amounts of the cis and trans isomers. The available formulations are Telone II (94% 1,3-DCP, 6% inert ingredients), Telone C-17 (77.9% 1,3-DCP, 16.5% chloropicrin, 5.6% inert ingredients), and Brom 70/30 (70% methyl bromide, 30% 1,3-DCP).

### 2. History

1,3-DCP was introduced by Dow Chemical Co. in 1955, and subsequently registered in 1966. In 1986, a special review of 1,3-DCP was initiated based on carcinogenicity concerns. In 1990, CAL-EPA revoked all permits for 1,3-DCP usage in California, based on high ambient air concentrations measured near densely populated areas in Merced county. In March, 1992, EPA issued a Data-Call-In Notice to DowElanco to conduct an air and biological monitoring, and engineering controls study at three different locations. In Oct. 1993, DowElanco submitted to the agency the final reports on residential and worker exposure studies conducted at the following sites: Moses Lake, Washington; Buckeye, Arizona; and Hookerton, North Carolina. OREB completed residential/bystander exposure and risk assessments (memos 5/12/94 and 6/23/94, A. Mehta), and worker exposure and risk assessments (memos 6/17/94 and 10/6/94, A. Mehta) based on these studies. The studies and their methodologies were described in detail in these memos. Subsequent to this, changes were made in some of the assumptions underlying the calculations. The purpose of this memo is therefore to present revised exposure and risk estimates for Telone mixer/loaders and applicators, and residents living near treated fields.

# II. DETAILED CONSIDERATIONS

## A. Unit Risk

Cancer potency

A revised unit risk ($Q^*$) for humans of $5.33 \times 10^{-2}$ $(mg/kg/day)^{-1}$, was calculated based on bronchioalveolar adenoma tumor rates in male mice exposed via the inhalation route (H. Pettigrew, 12/19/94). This value was obtained using a 3/4 scaling factor, and body weights of 0.03 kg for the mice, and 70 kg for humans.

Extrapolate from inhalation → dermal?

incident Data

Cancer classification?

more info on peer Review

More TOX info — Cancer the only culprit?

2/19

## B. Air Samples

### 1. Worker Study

Personal air monitoring was conducted for product loaders, applicators, and re-entry workers. Air samples were drawn through activated carbon sorbent tubes, using battery operated pumps to collect air from the breathing zones of the workers at a measured flow rate. Samples were subsequently desorbed in an organic solvent and analyzed by GC-ECD or GC-FID. For the loaders and applicators, two kinds of samples were collected: four hour (nominal) samples, and task-specific short term (4 to 46 minutes) samples. The four hour samples provided inherently time weighted average air concentrations over a major fraction of a work day, while the short term samples measured the air concentrations associated only with high-contact activities. For product loaders, these activities were the actual loading events. The four hour loader samples included the loading events, and the time spent on site between loading events.

Re-entry exposures were examined by having workers perform a task at each site designed to be representative of activities that might follow treatment with telone. A different task was performed at each site, at a different time period post application. However, all tasks were performed within four days after application. Sampling duration was two to four hours in all cases. Because of the limited scope of the re-entry study, it is not appropriate to draw general conclusions from the results. Differences in air concentrations between the three sites may reflect the different re-entry times, the different activities performed, different soil types, or a combination of variables. It would therefore not be appropriate to calculate exposures and risks to re-entry workers on a crop by crop basis, as has been done for loaders and applicators. Example calculations for typical crops (i.e. potatoes and tobacco) are included in Table 3, only to illustrate the general magnitude of re-entry risks that might be associated with the air concentrations measured in the study.

### 2. Residential/Bystander Study

At each site, air monitoring was conducted directly above the treated field, and at distances of 5, 25, 125, 500, and 800 meters from the edge of the field, in each of four orthogonal directions. All samples were taken approximately 5 feet above the ground, using battery operated pumps to draw air through activated carbon sorbent tubes at a measured flow rate. Samples were collected during the telone application at all sampling locations, except directly above the fields. After the application was finished, sampling began at all locations, and continued for 14 days post application. The first 24 hour period following application was divided into six four-hour samples.

The next 48 hours were divided into four 12-hour samples. The remaining 11 day period was divided into 24-hour samples, one for each day.

At the Washington study site, the presence of a nearby cattle stockyard prevented the collection of a sample 800 meters south of the treated field. However, at the Arizona site, samples were collected at 1200 and 1600 meters from the field in all four directions, in addition to the distances listed above.

**C. Field Fortification Recoveries**

1. In both studies, many field blanks had detectable levels of 1,3-DCP, and many low level spikes had recoveries as high as 4500%. The registrant explained that the studies were conducted during high use season, with likely contamination with 1,3-DCP occuring from surrounding areas. In order to correct the sample concentrations for field recovery, OREB used only the mean of the two recoveries at the highest spike level for each day. Field recoveries greater than 100% were considered to be equal to 100% in this calculation, for a conservative estimate of exposure. In the worker study, each day's samples were corrected using that day's field recoveries. In the residential study, field fortification samples were not obtained on each day that samples were collected. Therefore, the overall mean field recovery at the high spike level for each site was used to correct all the samples from that site.

**D. Calculated Mean Air Concentrations**

**1. Worker Study**

a) <u>Custom Mixer/Loaders and Applicators</u>

The four hour samples were used to calculate geometric mean air concentrations for custom loaders and applicators, since these provided a better measure of average exposure than the short term samples. Information on days per year and hours per day were obtained for each crop, state by state, from DowElanco's Use and Usage Summary Report, dated 8/30/91. However, for loaders the report lists only the total hours per day spent actively engaged in loading (0.5 to 1.25 hr/d), not total hours spent on site. To estimate their exposure, OREB therefore assumes loaders to be on site for the same number of hours each day as the applicators (5 to 10 hr/d, depending on state and crop).

b) <u>Growers</u>

For growers, OREB assumes that the same person conducts both loading and application of telone. The majority of the work day will be spent conducting application, and only as much time

Am I missing something or is this obvious?



as is required to load the tank will be spent engaged in loading. Therefore, the four hour samples were used in the calculation of the portion of the exposure resulting from application, and the task-specific short term samples were used to calculate the exposure incurred while loading. These two exposures were then summed to estimate the total exposure for these individuals. Information on hours per day and days per year for each activity, were obtained from the DowElanco Use and Usage Summary Report (8/30/91).

### 2. Residential/Bystander Study

For each sampling station, a time weighted average (TWA) air concentration was calculated for the whole sampling period. This consisted of the arithmetic mean of the mean daily air concentrations. For all except the on-site samples, this calculation included the concentrations measured during the application process. This value was normalized over a 24 hour period, and incorporated into an overall 15 day TWA (the day of application plus the 14 days following). Since samples were not collected above the fields during the application process, the on-site TWA covered only the 14 day period post application. Subsequent calculation of LADDs took account of the differing numbers of days used in calculating the mean air concentrations in the different locations, by assuming 14 days of exposure for the on-site concentration, and 15 days for all the others.

## III. EXPOSURE AND RISK ASSESSMENTS

### A. TABLES

What are risks? Discuss

The attached tables provide the revised exposure and risk estimates for custom loaders and applicators, growers, and residents living at various distances from a treated field. For the off site study, exposure and risk estimates were calculated for each distance using pooled data from all four directions, which assumes random shifts in wind direction. Estimates are also provided for residents living downwind from the application site, which assumes no shifts in wind direction.

Table 1 shows the mean telone air concentrations for loaders and applicators using no controls and various mitigation options, calculated from the four hour samples. Where applicable, percent reductions and protection factors resulting from using mitigation techniques are listed. Overall mean percent reductions and protection factors for each technique were calculated by pooling replicates from all applicable sites together. Table 2 provides the same information for telone loaders calculated using the short term samples. Table 3 shows the results of calculations for re-entry workers. Tables 4 and 5 show the custom and grower exposure and risk estimates for various crops. Tables 6 through 8 provide the mean air concentrations, exposures, and risk estimates for the three residential study sites. Table 9 shows the exposure and risk estimates for various crops, for residents living 800 meters (approximately 1/2 mile) from a treated field.

Table 9 also provides exposure and risk estimates using the average air concentration inside a circular band shaped region whose inner edge is at X+5 meters, and whose outer edge is at X+1600 meters, where X is the radius of a circle with the same area as the treated field. This concentration was calculated by fitting a second order decay function to the pooled air concentration as a function of distance. A linear regression of inverse concentration vs. distance yielded the relevant coefficients, with an $r^2$ value greater than 0.96 in all three cases. For each site, the resulting function was integrated over the area of the circular band, to obtain the estimated average air concentration inside the zone. Exposures and risks derived from these concentrations would correspond to a person who moves about randomly within the band, instead of staying at a fixed location.

**B. ASSUMPTIONS**

For workers, OREB's exposure assumptions are the following:
Ventilation Rate: 1.74 $m^3$/hr
% Absorption: 100%
Lifetime Exposure: 40 yrs/70 yrs
Body Weight: 70 kg
Exposure Duration (hrs/day): dependent on crop. See tables.
Exposure Frequency (days/year): dependent on crop. See tables.

For residents/bystanders, OREB's exposure assumptions are the following:
Ventilation Rate: 0.81 $m^3$/hr
% Absorption: 100%
Lifetime Exposure: 30 yrs/70 yrs
Body Weight: 70 kg
Exposure Duration: 16 hrs/day spent in and around house.
Exposure Frequency: 15 days/application event. One or two applications per year.
Indoor air concentration: equals outdoor air concentration.

## C. EXAMPLE CALCULATIONS

### 1. Custom loader, unmitigated

**Crop: sugar beets**

$$\text{LADD (mg/kg/day)} = \frac{(4573\ \text{ug/m}^3)(1.74\ \text{m}^3\text{/hr})(6\ \text{hr/d})(9\ \text{d/yr})*(1\ \text{mg/1000 ug})(1\ \text{yr/365 d})(40\ \text{yrs/70 yrs})}{70\ \text{kg}}$$

$$= 9.6 \times 10^{-3}$$

$$\text{Risk} = \text{LADD} \times Q^* = (9.6 \times 10^{-3}) \times 0.0533 = 5.1 \times 10^{-4}$$

### 2. Custom Applicator, unmitigated

**Crop: sugar beets**

$$\text{LADD (mg/kg/day)} = \frac{(865\ \text{ug/m}^3)(1.74\ \text{m}^3\text{/hr})(6\ \text{hr/d})(9\ \text{d/yr})*(1\ \text{mg/1000 ug})(1\ \text{yr/365 d})(40\ \text{yrs/70 yrs})}{70\ \text{kg}}$$

$$= 1.8 \times 10^{-3}$$

$$\text{Risk} = \text{LADD} \times Q^* = (1.8 \times 10^{-3}) \times 0.0533 = 9.7 \times 10^{-5}$$

### 3. Custom Applicator, w. Spill Control

**Crop: sugar beets**

$$\text{LADD (mg/kg/day)} = (\text{unmitigated LADD}) \times \text{PF}$$

$$= (1.8 \times 10^{-3}) \times 0.19 = 3.5 \times 10^{-4}$$

$$\text{Risk} = \text{LADD} \times Q^* = (3.5 \times 10^{-4}) \times 0.0533 = 1.8 \times 10^{-5}$$

### 4. Grower, unmitigated

**Crop: sugar beets**

LADD (mg/kg/day) =

*loading:*

$$\frac{(16682\ \text{ug/m3})(1.74\ \text{m}^3\text{/hr})(0.5\ \text{hr/d})(1.5\text{d/yr})*(1\ \text{mg/1000 ug})(1\ \text{yr/365 d})(40\ \text{yrs/70 yrs})}{70\ \text{kg}}$$

$$= 4.9 \times 10^{-4}$$

*application:*

$$+\frac{(865\ \text{ug/m}^3)(1.74\ \text{m}^3\text{/hr})(8\ \text{hr/d})(1.5\ \text{d/yr})*(1\ \text{mg/1000 ug})(1\ \text{yr/365 d})(40\ \text{yrs/70 yrs})}{70\ \text{kg}}$$

$$= 4.0 \times 10^{-4}$$

*total*

$$= (4.9 \times 10^{-4}) + (4.0 \times 10^{-4}) = 8.9 \times 10^{-4}$$

$$\text{Risk} = \text{LADD} \times Q^* = (8.9 \times 10^{-4}) \times 0.0533 = 4.7 \times 10^{-5}$$

7819

5. **Grower, Dry Disc. + Spill Con. + Charcoal Fil. Cab**

Crop: sugar beets
LADD (mg/kg/day) =
*loading:* (unmitigated LADD)xPF
$= (4.9 \times 10^{-4})\times 0.64 = 3.1 \times 10^{-4}$

*application:* (unmitigated LADD)xPF
$= (4.0 \times 10^{-4})\times 0.19 = 7.6 \times 10^{-5}$

*total:* $= (3.1 \times 10^{-4}) + (7.6 \times 10^{-5}) = 3.9 \times 10^{-4}$

Risk = LADD x $Q^*$ = $(3.9 \times 10^{-4})\times 0.0533 = 2.1 \times 10^{-5}$

6. **Resident/Bystander**

Crop: crucifers
Residential location: 800 meters from field

$$\text{LADD (mg/kg/day)} = \frac{(6.5\ ug/m^3)(0.81\ m^3/hr)(16\ hr/day)(15\ d/yr)^* (1\ mg/1000\ ug)(1\ yr/365\ d)(30\ yrs/70\ yrs)}{70\ kg}$$

$= 2.1 \times 10^{-5}$

Risk = LADD x $Q^*$ = $(2.1 \times 10^{-5})\times 0.0533 = 1.1 \times 10^{-6}$

7. **Protection factors**

Air samples: Applicators, 4 hour samples
Mitigation technique: Spill control
Overall PF $=(394ug/m^3 \times 879ug/m^3)^{1/2}/(1742ug/m^3 \times 5650ug/m^3)^{1/2} = 0.19$
Overall % reduction = 100(1.00-0.19) = 81

why?

## IV. CONCLUSIONS

In estimating 1,3-DCP exposure to custom loaders and applicators, four hour samples in this study provided the best measure of time weighted average air concentrations. Short term samples provided an indication of the relative contribution of some specific activities to the overall exposure.

Apparent increases in exposure resulting from the use of some mitigation techniques (Table 1) may be the result of the inherent variability between replicates, and the low number of replicates (n=5) for each air concentration measurement.

Growers who load and apply 1,3-DCP by themselves can be viewed as applicators who also spend a short period of time loading the tractor tank before application. Their exposures result from a combination of the contributions from each activity. Since most of a work day is spent performing application, total exposure can be estimated by using the four hour air samples for the application portion, and the short term samples for the loading portion of the work day, and summing the two exposures.

The use of dry disconnects resulted in a 36 percent reduction in exposure to loaders only for the brief period during loading events. Over the course of a four hour period, dry disconnects provided no measurable reduction in exposure to loaders. Apparently the additional exposures incurred as a result of being on site between loading events, were significant enough to mask any overall exposure reduction provided by dry disconnects.

Because they are likely to be engaged in application activities between loading events, OREB assumes growers will realize the protection factor calculated with the short term samples (PF=64%) for the use of dry disconnects. However custom loaders, who OREB assumes to be on site during and between loading events for a 5 to 10 hour work day, will realize no overall protection from the use of dry disconnects.

The use of a charcoal filtered cab in conjunction with end row spill control provided no measurable decrease in applicator exposure compared with spill control alone. This may be because the bulk of the exposure to applicators occurred during periods when they exited the cabs to take breaks, fuel the tractor, or perform equipment maintenance.

Estimates of total exposure to people residing near treated fields must include exposures incurred during the application process, and not just exposures which occur after application has taken place. The residential exposures and risks (Tables 6 through 9) have been adjusted to take this portion of exposure into account.

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Chemical file-Telone w/attach.
Correspondence file w/attach.
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9819

**V. ATTACHMENT**

Table 1: Telone Worker Study, 4 Hour Air Samples.
Table 2: Telone Worker Study, Short Term Air Samples.
Table 3: Telone Worker Study, Re-Entry Exposures.
Table 4: Telone Worker Study, Custom Loader and Applicator Exposures and Risks.
Table 5: Telone Worker Study, Grower Exposures and Risks.
Table 6: WA Offsite Telone Exposures and Risks.
Table 7: NC Offsite Telone Exposures and Risks.
Table 8: AZ Offsite Telone Exposures snd Risks.
Table 9: Telone Residential Exposures and Risks by Crop.

**Table 1: Telone worker study, 4 hour air samples.**
n=5 replicates for each measurement.

**Loaders**

No Controls:

| State | Geo. mean ug/m3 |
|---|---|
| NC (drum) | 10196 |
| AZ (drum) | 4573 |
| AZ (bulk) | 1198 |

Dry Disconnects:

| State | Geo. mean ug/m3 | %reduc. | PF% |
|---|---|---|---|
| WA (bulk) | 335 | N/A | N/A |
| AZ (drum) | 2941 | 36 | 64 |
| AZ (bulk) | 1999 | −67 | 167 |
| Overall mean = | | −4 | 104 |

Dry Dis.+Vapor Recovery:

| State | Geo. mean ug/m3 | %reduc. | PF% |
|---|---|---|---|
| WA (bulk) | 511 | N/A | N/A |
| AZ (drum) | N/A | N/A | N/A |
| AZ (bulk) | 1170 | 2 | 98 |

**Applicators**

No Controls:

| State | Geo. mean ug/m3 |
|---|---|
| WA (bulk) | 1742 |
| AZ (drum) | 865 |
| AZ (bulk) | 5650 |

Spill Control:

| State | Geo. mean ug/m3 | %reduc. | PF% |
|---|---|---|---|
| WA (bulk) | 394 | 77 | 23 |
| NC (drum) | 1209 | N/A | N/A |
| AZ (bulk) | 879 | 84 | 16 |
| Overall mean = | | 81 | 19 |

Spill cont.+Filtered Cab

| State | Geo. mean ug/m3 | %reduc. | PF% |
|---|---|---|---|
| WA (bulk) | 270 | 84 | 16 |
| AZ (drum) | 343 | 60 | 40 |
| AZ (bulk) | 680 | 88 | 12 |
| Overall mean = | | 81 | 19 |

11819

# Table 2: Telone worker study, short term air samples.

n=5 replicates for each measurement.

Still not clear how short term air samples are used for chronic exposure

**Loaders**

**No Controls:**

| State | Geo. mean ug/m3 |
|---|---|
| NC (drum) | 29032 |
| AZ (drum) | 16683 |
| AZ (bulk) | 18371 |

**Dry Disconnects:**

| State | Geo. mean ug/m3 | %reduc. | PF% |
|---|---|---|---|
| WA (bulk) | 2955 | N/A | N/A |
| AZ (drum) | 13673 | 18 | 82 |
| AZ (bulk) | 9155 | 50 | 50 |
| Overall mean = | | 36 | 64 |

**Dry Dis. + Vapor Recovery:**

| State | Geo. mean ug/m3 | %reduc. | PF% |
|---|---|---|---|
| WA (bulk) | 2380 | N/A | N/A |
| AZ (drum) | N/A | N/A | N/A |
| AZ (bulk) | 4683 | 75 | 25 |

## Table 3: Telone worker study, re–entry exposures

Assumptions: ventilation rate=1.74 m3/hr, lifetime exposure=40 yrs/70 yrs, body wt.=70 kg.
n=5 replicates for each measurement.

| State | Approx. time (hrs) post application | Activities | Geo. mean Air conc. ug/m3 | Example Crop | hr/d | d/yr | LADD mg/kg/day | Risk |
|---|---|---|---|---|---|---|---|---|
| WA (bulk) | 85–89 | Ctr. pivot maint., winterization | 104 | Potatoes | 5 | 4 | 8.5E–03 | 4.5E–04 |
| AZ (drum) | 64–68 | Clearing rocks by 1218 hand | 62 | Tobacco | 5 | 4 | 5.1E–03 | 2.7E–04 |
| AZ (bulk) | 3 – 24 | Bed shaping | 571 | Potatoes | 5 | 6 | 4.7E–02 | 2.5E–03 |

14/19

**Table 4: Telone worker study, Custom Loader and Applicator exposures and risks.**
n=5 replicates for all measurements.

Is this required on label

**Custom Loaders**
Assumptions: ventilation rate =1.74 m3/hr, lifetime exposure=40 yrs/70 yrs, body wt.=70 kg., 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 | Unmitigated LADD mg/kg/day | Risk |
|---|---|---|---|---|---|---|---|---|
| S. Beets | WY,NE,ID,CO | WY | 6 | 9 | AZ (drum) | 4573 | 9.6E−03 | 5.1E−04 |
| Cotton | AZ,GA,SC,AL | AZ | 10 | 36 | AZ (drum) | 4573 | 6.4E−02 | 3.4E−03 |
| Tobacco | NC,GA,SC | NC | 5 | 10 | NC (drum) | 10196 | 2.0E−02 | 1.1E−03 |
| Potatoes | WA,ID,OR,FL,NV | WA | 8 | 24 | WA (bulk,DD) | 335 | 2.5E−03 | 1.3E−04 |
| Onions | WA,OR,ID,NV | WA | 8 | 4 | NC (drum) | 10196 | 1.3E−02 | 6.8E−04 |
| Carrots | WA,TX | WA | 8 | 7 | AZ (drum) | 4573 | 1.0E−02 | 5.3E−04 |

**Custom Applicators**
Assumptions: ventilation rate =1.74 m3/hr, lifetime exposure=40 yrs/70 yrs, body wt.=70 kg.

| Crop | Major use States | State usage data used | hr/d | d/yr | Air conc. Data used | Air Conc. ug/m3 | Unmitigated LADD mg/kg/day | Unmitigated Risk | Spill Con. (pf=0.19) LADD mg/kg/day | Spill Con. (pf=0.19) Risk | Spill+Cab (pf=0.19) LADD mg/kg/day | Spill+Cab (pf=0.19) Risk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. Beets | WY,NE,ID,CO | WY | 6 | 9 | AZ (drum) | 865 | 1.8E−03 | 9.7E−05 | 3.5E−04 | 1.8E−05 | 3.5E−04 | 1.8E−05 |
| Cotton | AZ,GA,SC,AL | AZ | 10 | 20 | AZ (bulk) | 5650 | 4.4E−02 | 2.3E−03 | 8.4E−03 | 4.5E−04 | 8.4E−03 | 4.5E−04 |
| Tobacco | NC,GA,SC | NC | 5 | 10 | AZ (bulk) | 5650 | 1.1E−02 | 5.9E−04 | 2.1E−03 | 1.1E−04 | 2.1E−03 | 1.1E−04 |
| Potatoes | WA,ID,OR,FL,NV | WA | 8 | 24 | WA (bulk) | 1742 | 1.3E−02 | 6.9E−04 | 2.5E−03 | 1.3E−04 | 2.5E−03 | 1.3E−04 |
| Onions | WA,OR,ID,NV | WA | 8 | 4 | AZ (drum) | 5650 | 7.0E−03 | 3.8E−04 | 1.3E−03 | 7.1E−05 | 1.3E−03 | 7.1E−05 |
| Carrots | WA,TX | WA | 8 | 7 | AZ (drum) | 5650 | 1.2E−02 | 6.6E−04 | 2.3E−03 | 1.2E−04 | 2.3E−03 | 1.2E−04 |

## Table 5: Telone worker study, 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.
n=5 replicates for all measurements.

| | | | | Loader (short term) | | | | Applicator (4 hr.) | | Unmitigated | | Spill Con. (pf=0.19) | | DD (pf=0.64) + Spill+Cab (pf=0.19) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | State usage | Loader air | Air Conc. | | | Applicator | Air Conc. | | LADD | | LADD | | LADD | |
| Crop | Major use States | data used | Data Used | ug/m3 | hr/d | d/yr | Data Used | ug/m3 | hr/d | mg/kg/day | Risk | mg/kg/day | Risk | mg/kg/day | Risk |
| Crucifers | AZ | AZ | AZ (drum) | 16682 | 1.25 | 4 | AZ (bulk) | 5650 | 8 | 1.0E-02 | 5.5E-04 | 4.6E-03 | 2.4E-04 | 3.4E-03 | 1.8E-04 |
| Peppers | NM | NM | AZ (drum) | 16682 | 0.5 | 3 | AZ (bulk) | 5650 | 5 | 4.3E-03 | 2.3E-04 | 1.6E-03 | 8.5E-05 | 1.2E-03 | 6.7E-05 |
| Cucurbits | TX,NC,SC,CT | TX | AZ (drum) | 16682 | 0.25 | 15 | AZ (bulk) | 5650 | 6 | 2.2E-02 | 1.2E-03 | 6.2E-03 | 3.3E-04 | 5.3E-03 | 2.8E-04 |
| S. Beets | WY,NE,ID,CO | WY | AZ (drum) | 16682 | 0.5 | 1.5 | AZ (drum) | 865 | 8 | 8.9E-04 | 4.7E-05 | 5.6E-04 | 3.0E-05 | 3.9E-04 | 2.1E-05 |
| Cotton | AZ,GA,SC,AL | AZ | AZ (drum) | 16682 | 1.25 | 7 | AZ (bulk) | 5650 | 8 | 1.8E-02 | 9.6E-04 | 8.0E-03 | 4.3E-04 | 6.0E-03 | 3.2E-04 |
| Tobacco | NC,GA,SC | NC | NC (drum) | 29032 | 0.5 | 3.5 | AZ (bulk) | 5650 | 5 | 5.8E-03 | 3.1E-04 | 2.7E-03 | 1.4E-04 | 2.0E-03 | 1.1E-04 |
| Potatoes | WA,ID,OR,FL,NV | WA | WA (bulk) | 2955 | 0.5 | 4 | WA (bulk) | 1742 | 10 | 2.9E-03 | 1.6E-04 | 7.5E-04 | 4.0E-05 | 6.6E-04 | 3.5E-05 |
| S. Potatoes | NC,TX,SC | NC | AZ (drum) | 16682 | 0.5 | 2 | AZ (bulk) | 5650 | 5.5 | 3.1E-03 | 1.6E-04 | 1.1E-03 | 5.9E-05 | 8.8E-04 | 4.7E-05 |
| Peanuts | GA,TX,AL | GA | AZ (bulk) | 18373 | 1 | 5 | AZ (drum) | 865 | 3 | 4.1E-03 | 2.2E-04 | 3.7E-03 | 2.0E-04 | 2.4E-03 | 1.3E-04 |
| F/N trees, Grapevines | SC | SC | NC (drum) | 29032 | 1.5 | 4 | AZ (drum) | 865 | 5 | 7.5E-03 | 4.0E-04 | 6.9E-03 | 3.7E-04 | 4.5E-03 | 2.4E-04 |
| Onions | WA,OR,ID,NV | WA | NC (drum) | 29032 | 0.5 | 5 | AZ (drum) | 865 | 10 | 4.5E-03 | 2.4E-04 | 3.1E-03 | 1.7E-04 | 2.1E-03 | 1.1E-04 |
| Tomatoes | TX,HI,FL,AL | AL | AZ (drum) | 16682 | 1 | 3 | AZ (bulk) | 5650 | 8 | 7.2E-03 | 3.9E-04 | 3.0E-03 | 1.6E-04 | 2.2E-03 | 1.2E-04 |
| Carrots | WA,TX | WA | AZ (drum) | 16682 | 0.5 | 3 | AZ (drum) | 865 | 10 | 2.0E-03 | 1.1E-04 | 1.2E-03 | 6.2E-05 | 8.2E-04 | 4.3E-05 |
| Pineapples | HI | HI | NC (drum) | 29032 | 1.25 | 11 | AZ (bulk) | 5650 | 6 | 3.0E-02 | 1.6E-03 | 1.8E-02 | 9.7E-04 | 1.3E-02 | 6.8E-04 |

## Table 6: WA offsite Telone exposures and risks

Application method: Broadcast, 25 gal/acre
Field size: 20 acres
Soil type: sand

Assumptions: ventilation=0.81 m3/hr, 16 hr/day for 30 years at residence, lifetime=70 yrs., 15 days/application event, 1 or 2 applications/yr., conc. indoor = conc. outdoor, Q*=0.0533, air conc. are arithmetic means.

**Exposure Estimates using Pooled Data**

| Distance (m) | Mean air conc. ug/m3 | LADD 1 mg/kg/day | LADD2 mg/kg/day | RISK1 1 app/yr | RISK2 2 app/yr |
|---|---|---|---|---|---|
| 800 | 14.6 | 4.8E−05 | 9.5E−05 | 2.5E−06 | 5.1E−06 |
| 500 | 17.2 | 5.6E−05 | 1.1E−04 | 3.0E−06 | 6.0E−06 |
| 125 | 40.2 | 1.3E−04 | 2.6E−04 | 7.0E−06 | 1.4E−05 |
| 25 | 62.1 | 2.0E−04 | 4.0E−04 | 1.1E−05 | 2.2E−05 |
| 5 | 73.6 | 2.4E−04 | 4.8E−04 | 1.3E−05 | 2.6E−05 |
| onsite | 115.5 | 3.5E−04 | 7.0E−04 | 1.9E−05 | 3.7E−05 |

**Exposure Estimates using Downwind Data**

| Distance (m) | Mean air conc. ug/m3 | LADD 1 mg/kg/day | LADD2 mg/kg/day | RISK1 1 app/yr | RISK2 2 app/yr |
|---|---|---|---|---|---|
| 800 | 21.6 | 7.1E−05 | 1.4E−04 | 3.8E−06 | 7.5E−06 |
| 500 | 18.3 | 6.0E−05 | 1.2E−04 | 3.2E−06 | 6.4E−06 |
| 125 | 47.0 | 1.5E−04 | 3.1E−04 | 8.2E−06 | 1.6E−05 |
| 25 | 75.7 | 2.5E−04 | 4.9E−04 | 1.3E−05 | 2.6E−05 |
| 5 | 90.9 | 3.0E−04 | 5.9E−04 | 1.6E−05 | 3.2E−05 |
| onsite | N/A | N/A | N/A | N/A | N/A |

## Table 7: NC offsite Telone exposures and risks

Application method: Broadcast, 20 gal/acre
Field size: 10 acres
Soil type: sandy loam

Assumptions: ventilation=0.81 m3/hr, 16 hr/day for 30 years at residence, lifetime=70 yrs., 15 days/application event, 1 or 2 applications/yr., conc. indoor = conc. outdoor, Q*=0.0533, air conc. are arithmetic means.

**Exposure estimates using pooled data**

| Distance (m) | Mean air conc. ug/m3 | LADD1 mg/kg/day | LADD2 mg/kg/day | Risk1 1 app/yr | Risk2 2 app/yr |
|---|---|---|---|---|---|
| 800 | 1.3 | 4.1E−06 | 8.3E−06 | 2.2E−07 | 4.4E−07 |
| 500 | 1.5 | 5.0E−06 | 9.9E−06 | 2.6E−07 | 5.3E−07 |
| 125 | 6.0 | 2.0E−05 | 3.9E−05 | 1.0E−06 | 2.1E−06 |
| 25 | 15.1 | 4.9E−05 | 9.8E−05 | 2.6E−06 | 5.2E−06 |
| 5 | 21.7 | 7.1E−05 | 1.4E−04 | 3.8E−06 | 7.5E−06 |
| onsite | 40.4 | 1.2E−04 | 2.5E−04 | 6.6E−06 | 1.3E−05 |

**Exposure estimates using downwind data**

| Distance (m) | Mean air conc. ug/m3 | LADD1 mg/kg/day | LADD2 mg/kg/day | Risk1 1 app/yr | Risk2 2 app/yr |
|---|---|---|---|---|---|
| 800 | 1.7 | 5.5E−06 | 1.1E−05 | 2.9E−07 | 5.9E−07 |
| 500 | 1.8 | 5.9E−06 | 1.2E−05 | 3.1E−07 | 6.3E−07 |
| 125 | 9.8 | 3.2E−05 | 6.4E−05 | 1.7E−06 | 3.4E−06 |
| 25 | 35.8 | 1.2E−04 | 2.3E−04 | 6.2E−06 | 1.2E−05 |
| 5 | 55.7 | 1.8E−04 | 3.6E−04 | 9.7E−06 | 1.9E−05 |
| onsite | N/A | N/A | N/A | N/A | N/A |

## Table 8: AZ Telone offsite exposures and risks

Application method: Row, 12 gal/acre
Field size: 20 acres
Soil type: sandy loam

Assumptions: ventilation=0.81 m3/hr, 16 hr/day for 30 years at residence, lifetime=70 yrs., 15 days/application event, 1 or 2 applications/yr., conc. indoor = conc. outdoor, Q*=0.0533, air conc. are arithmetic means.

### Exposure Estimates using pooled data

| Distance (m) | Mean air conc. ug/m3 | LADD1 mg/kg/day | LADD2 mg/kg/day | Risk1 1 app/yr | Risk2 2 app/yr |
|---|---|---|---|---|---|
| 1600 | 2.4 | 7.8E−06 | 1.6E−05 | 4.2E−07 | 8.3E−07 |
| 1200 | 3.8 | 1.3E−05 | 2.5E−05 | 6.7E−07 | 1.3E−06 |
| 800 | 6.5 | 2.1E−05 | 4.2E−05 | 1.1E−06 | 2.3E−06 |
| 500 | 11.8 | 3.9E−05 | 7.7E−05 | 2.1E−06 | 4.1E−06 |
| 125 | 55.6 | 1.8E−04 | 3.6E−04 | 9.7E−06 | 1.9E−05 |
| 25 | 112.4 | 3.7E−04 | 7.3E−04 | 2.0E−05 | 3.9E−05 |
| 5 | 104.7 | 3.4E−04 | 6.8E−04 | 1.8E−05 | 3.6E−05 |
| onsite | 171.1 | 5.2E−04 | 1.0E−03 | 2.8E−05 | 5.5E−05 |

### Exposure Estimates using downwind data

| Distance (m) | Mean air conc. ug/m3 | LADD1 mg/kg/day | LADD2 mg/kg/day | Risk1 1 app/yr | Risk2 2 app/yr |
|---|---|---|---|---|---|
| 1600 | 4.7 | 1.5E−05 | 3.1E−05 | 8.2E−07 | 1.6E−06 |
| 1200 | 6.8 | 2.2E−05 | 4.4E−05 | 1.2E−06 | 2.4E−06 |
| 800 | 11.5 | 3.8E−05 | 7.5E−05 | 2.0E−06 | 4.0E−06 |
| 500 | 22.1 | 7.2E−05 | 1.4E−04 | 3.8E−06 | 7.7E−06 |
| 125 | 98.3 | 3.2E−04 | 6.4E−04 | 1.7E−05 | 3.4E−05 |
| 25 | 194.3 | 6.3E−04 | 1.3E−03 | 3.4E−05 | 6.8E−05 |
| 5 | 191.3 | 6.2E−04 | 1.2E−03 | 3.3E−05 | 6.6E−05 |
| onsite | N/A | N/A | N/A | N/A | N/A |

## Table 9: Telone residential exposures and risks by crop

**Assumptions: ventilation=0.81 m3/hr, 16 hr/day for 30 years at residence, conc. indoor = conc. outdoor, lifetime=70 yrs., 15 days/application event, 1 application/year.**

| | | At 800 m: | | | Inside r+5 m to r+1600 m zone: | | |
|---|---|---|---|---|---|---|---|
| Crop | Rep. State | Mean air conc. ug/m3 | LADD mg/kg/day | Risk 1 app/yr | Mean air conc. ug/m3 | LADD mg/kg/day | Risk 1 app/yr |
| Crucifers | AZ | 6.5 | 2.1E−05 | 1.1E−06 | 4.7 | 1.5E−05 | 8.1E−07 |
| Peppers | AZ | 6.5 | 2.1E−05 | 1.1E−06 | 4.7 | 1.5E−05 | 8.1E−07 |
| Cucurbits | AZ | 6.5 | 2.1E−05 | 1.1E−06 | 4.7 | 1.5E−05 | 8.1E−07 |
| S. Beets | AZ | 6.5 | 2.1E−05 | 1.1E−06 | 4.7 | 1.5E−05 | 8.1E−07 |
| Cotton | AZ | 6.5 | 2.1E−05 | 1.1E−06 | 4.7 | 1.5E−05 | 8.1[illegible]07 |
| Tobacco | NC | 1.3 | 4.1E−06 | 2.2E−07 | 1.0 | 3.3E−06 | 1.[illegible]-07 |
| Potatoes | WA | 14.6 | 4.8E−05 | 2.5E−06 | 11.3 | 3.7E−05 | 2.0[illegible]06 |
| S. Potatoes | AZ | 6.5 | 2.1E−05 | 1.1E−06 | 4.7 | 1.5E−05 | 8.1E−07 |
| Peanuts | AZ | 6.5 | 2.1E−05 | 1.1E−06 | 4.7 | 1.5E−05 | 8.1E−07 |
| F/N trees, Grapevines | NC | 1.3 | 4.1E−06 | 2.2E−07 | 1.0 | 3.3E−06 | 1.8E−07 |
| Onions | NC | 1.3 | 4.1E−06 | 2.2E−07 | 1.0 | 3.3E−06 | 1.8E−07 |
| Tomatoes | AZ | 6.5 | 2.1E−05 | 1.1E−06 | 4.7 | 1.5E−05 | 8.1E−07 |
| Carrots | AZ | 6.5 | 2.1E−05 | 1.1E−06 | 4.7 | 1.5E−05 | 8.1E−07 |
| Pineapples | NC | 1.3 | 4.1E−06 | 2.2E−07 | 1.0 | 3.3E−06 | 1.8E−07 |

I. Introduction
- A. Legal
- B. Regulatory Background

II. Summary of Tox concerns.
- A. Carcinogenicity
  - 1. oral studies
  - 2. Inhalation studies
  - 3. Dermal Studies
  - 4. Structure-Activity Relat.
- B. Mutagenicity
- C. Human Data.
- D. Weight of Evidence & Carc. Summary
- E. Dose Response Assessment
- F. Risks Ass. of 1,3-D Alternatives
  - 1. MeBr
  - 2. metam sodium
  - 3. Aldicarb
  - 4. Fenamiphos
- G. Comments

III. Summary of Exposure
- A. Dietary Exposure
- B. Non Dietary Exposure & Mitigation
  - 1. Studies & Mitigation from 1992 Neg.
    - a. Mosco Lab
    - b. Buckley Ag
    - c. NC
    - d. Resident/Bystander
  - 2. ~~[illegible]~~ Studies & Mit from 1995 Neg.

IV. Discussion of Worker & Area Res. Risk
- 1. Cancer potency est.
- 2. Exposure Data & Mitigation
- ~~3. Assumptions & Sample equation~~
- ~~a. Assump. in Cancer Dose-Response Calc.~~
- 4. Strengths/Weakness/Uncertainties in Risk Ass.

V. Summary of GW concerns
- A. GW Data
- B. Comments from PDI

VI. BENEFITS SUMMARY

VII. RISK/BENEFIT ANALYSIS
- A. Ratio of 48
- B. Summary of Risk
- C. Summary of Benefits
- D. Cost Eff