Shaughnessy #: 029001

Date out of EAB: MAR 03 1986

Signature: [signature]

To: H. Jacoby
Product Manager # 21
Registration Division (TS-767)

From: Joseph C. Reinert, Chief Robert K. Hitch for
Special Review Section
Exposure Assessment Branch
Hazard Evaluation Division (TS-769)

Attached please find the EAB review of:

Reg./File No.: 464-511

Chemical: 1,3-Dichloropropene

Type Product:

Product Name: TELONE

Company Name:

Submission Purpose:

Date In: 10/11/85

Date Completed:

Monitoring Requested:

Monitoring Voluntarily Done

Action Code: 400

EAB # 6036

TAIS (level II) Days

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

_____ Benefits and Use Division

Evaluation of Applicator Exposure Data from Use of Telone

prepared by: Harold R. Day
Hazard Evaluation Division

## I. Introduction

On August 22, 1985, Dow Chemical Company submitted exposure data from use of Telone. These data are contained in field monitoring reports for Telone II, a soil fumigant (EPA Registration Number 464-511. The compositon of Telone II is 92% 1,3 dichloropropene and [redacted]

This submission contains an extensive amount of exposure data. There are 10 separate submissions. Each submission contains exposure data and in some cases each submission is itself a compilation of multiple studies.

With such a multitude of data, each submission will be summarized with respect to exposure to various use situations. While the study summaries do contain ancillary information on analysis, methods, etc., these will not be evaluated. A brief summary of the general analytical method and sample collection procedures will be provided, although the same method may not have been used in all cases. The procedures, methods, and data integrity will, for the moment, be considered valid.

Finally, a summary of data submitted will be made which will provide a basis for a comparision of the data and conclusions drawn as to the expected exposure from the use of Telone under various exposure situations.

## II. Sample Collection

Sample collection is accomplished by pulling air through charcoal-containing tubes with a personal air pump. The inlet for the system is placed in the breathing zone of applicator or in stationary location in a treated field. The time of exposure and volume of air collected is recorded.

Since most air concentrations were given in ppm Telone, this value was converted to mg/liter by the formula:

$$mg/l = \frac{ppm \times 111\ (MW)}{24,450}$$

## III. Analysis

The charcoal-containing tubes were then treated with chilled carbon disulfide to desorb the collected Telone. The collected extract was then analyzed by gas chromatography using a flame ionization detector. The detection limit was 0.5 mg for each sample.

IV. Studies

1. Evaluation of Work Exposure to Telone II Soil Fumigant During Bulk Distribution and Field Application-Issue Date 2/14/76

Activities Measured and Results

The results are reported in ppm Telone, but the actual air volumes are not given.

| Activity | No. of Samples | Range ppm | Mean ppm | Mean mg/l |
|---|---|---|---|---|
| Bulk transfer | 5 | 2-20 | 6.1 | 0.03 |
| Storage facility areas | 5 | 0.05-47 | 12.2 | 0.06 |
| Loading truck | 2 | 2.2-6.1 | 4.2 | 0.02 |
| Highway transport | 1 | 0.01 | 0.01 | 0.00005 |
| Application-tractor driver | 3 | 0.36-3 | 1.3 | 0.006 |
| Fumigated fields post treatment | 3 | 0.02-0.06 | 0.04 | 0.0002 |
| Downwind areas during fumigation | 2 | 0.42-0.52 | 0.5 | 0.002 |

2. Air Concentrations of 1.3 Dichloropropene over Treated Fields up to Seventy-two Hours after Fumigating with Telone II Soil Fumigant-Issue Date 3/14/86

Activities Measured

Field monitoring with pumps and sampler were mounted on stakes four feet above the treated field. Also, sample pumps were worn by tractor drivers during the application.

Results

The results are reported in ppm Telone, but the actual air volumes are not reported.

| Activity | No. of Samples | Range ppm | Mean ppm | Mean mg/l |
|---|---|---|---|---|
| Tractor Driver | 2 | 1-3 | 2.5 | 0.01 |
| Field Samples | | | | |
| @ 0 hour | 5 | 0-0.12 | 0.06 | 0.0003 |
| 24 hrs. | 5 | 0 | - | - |
| 48 hrs. | 5 | 0 | - | - |
| 72 hrs. | 5 | 0 | - | - |

3. Studies Concerning the Field Applications of Telone and DD in California in 1979 and Ambient Air Concentrations of These Pesticides During and Following Application by Shank Injection into Soil in Fields. Prepared by Maddy, K. et al Worker Health and Safety Unit, California Department of Agriculture, Sacramento, CA.

Activities Measures and Results

The results are tabulated as 19 studies. The table provides date, Telone in ppb, application rate, product used, and air sampler location. This table will not be reproduced in this evaluation. The data can be summarized as the authors discussed.

| Site | Telone ppb Average | ppm | mg/l |
|---|---|---|---|
| Tractor driver | 380 (average) | 0.3 | 0.001 |
| Field (center) | 165 | 0.2 | 0.001 |
| Field (edge) | 224 | 0.2 | 0.001 |
| Field (downwind-100ft)* | 53 | 0.005 | 0.00002 |

* Level at time of application. At 24 and 48 hours post application level remained similar.

4. Airborne Concentrations of 1,3 Dichloropropene During Fumigation of Established Grapevines and Almond and Peach Trees. California-December, 1980-Janauary, 1981. Dow Chemical, USA.

Activiities Measured and Results

The following activities and Telone concentrations were determined.

| Activities (main) | Telone ppm | Telone mg/l |
|---|---|---|
| Tank filling | 0.4 | 0.002 |
| Tractor driving | 0.2 | 0.001 |
| General area | 0.1 | 0.0005 |
| Roller ( just after appl.) | 0.3 | 0.001 |
| Tank filling (55 gal.) | 2.4 | 0.01 |
| Tank filling (5 gal.) | 2.1 | 0.01 |

5. Monitoring of Telone II During and Following Experimental Application by Shank Injection to Established Trees and Grape Vines in California in 1980 and 1981.

Activities Measured and Results

| Activity | Sample Number | Telone ppm | Telone mg/l |
|---|---|---|---|
| Loading | 14 | * | 0.005 |
| Application | 10 | ** | 0.002 |
| Mid-field Soil Samples | NG+ | NG | - |
| Time 0 | NG | 0.07-5.5 | 0.03 |
| 24 hrs | NG | 0.09-4.7 | 0.02 |
| 48 hrs | NG | 0.07-4.4 | 0.02 |

*10 of the 14 samples were below 1 ppm
**None exceeded 0.5 ppm
NG=not given

6. Fumigator's Exposure to Airborne 1,3 Dichloropropene During Fumigation Operation of Telone II Soil Fumigant. January 4, 1983. Dow Chemical Company.

Activities Measured and Results

The sampling time was provided, but not the volume of air sampled or the number of samples taken for each activity.

| Activity | Telone ppm | Telone mg/l |
|---|---|---|
| Fumigator TWA* | 1.4 | 0.006 |
| Tractor Driver | 0.9** | 0.004 |
| Loading | 2.5 | 0.01 |

* Time weighted average
** Using special filter system, concentration was reduced to 0.6 ppm

7. Employee Exposure to Airborne 1,3 Dichloropropene During Application of Telone C-17 Soil Fumigant on October 15, 1981. Issue Date August 12, 1982. Dow Chemical Company.

Activities Measured

Activities of driving a tractor while fumigating and laying plastic or ditching.

Results

The Table in this report indicates all samples were undetectible (levels were less than detaction at 0.5 ppm. The Table also indicates air samples were all less than 50 liters per sample. This low volume (about two minutes of breathing) is much too low to be of value in an exposure study. This study should be regarded as invalid.

8. California Department of Agriculture, Worker Health and Safety Unit. Submission dated July 22, 1983.

Activities Measured and Results (four studies)

Study A

| Ativity | ppm Telone | Telone mg/l |
|---|---|---|
| Driver | 0.2 | 0.001 |
| Driver | 1.3 | 0.006 |
| Driver | 0.6 | 0.003 |
| Loading | 0.4 | 0.002 |
| Loading | 0.4 | 0.002 |
| Loading | 0.1 | 0.0005 |
| Loading | 0.8 | 0.004 |

Study B

| | | |
|---|---|---|
| Driver | 0.4 | 0.002 |
| Driver | 0.1 | 0.0005 |
| Driver (closed cab) | 0.4 | 0.002 |
| Driver (closed cab) | 0.1 | 0.0005 |
| Loading | ND | - |

Study C

| | | |
|---|---|---|
| Driver | 0.5 | 0.002 |
| Driver | 0.8 | 0.004 |
| Driver | 0.7 | 0.003 |
| Loading | 0.03 | 0.0001 |
| Loading | 0.6 | 0.003 |
| Loading | 1.5 | 0.007 |

Study D

| | | |
|---|---|---|
| Driver | 4.0 | 0.02 |
| Driver | 6.3 | 0.03 |
| Driver (closed cab) | 7.6 | 0.03 |
| Loading | 2.0 | 0.01 |

9. California Department of Agriculture. Letter dated October 7, 1983. Results of Sampling at Winton, CA.

Activities Measured and Results

| Activity | Sample Number | Mean ppm Telone | Mean mg/l Telone |
|---|---|---|---|
| Loading | 12 | 0.6 | 0.003 |
| Application* | 13 | 0.3 | 0.001 |
| Transfers** | 3 | 1.34 | 0.006 |

*Includes time spent in flow adjustments of repair.
**Transfers from bulk to smaller container. Three data points (about 0.4 ppm) are not included because it is not possible to interpret both an application and transfer function.

10. Air Exposure Monitoring of EHAP Personnel During A Telone II Soil Translocation Study in Fresno County Study HS-1299, February 1, 1985.

Activites Measured and Results

Telone air concentration while taking soil cores. This activity was experimental, but the resluts were believed to be indicative of off-gassing of Telone in the field and exposure to field workers.

| Activity | Sample Number | Mean ppm Telone | Mean mg/l Telone |
|---|---|---|---|
| Background | 1 | ND | - |
| Field Walk | 1 | ND | - |
| Pre-drilling | 1 | 0.07 | 0.0003 |
| Drilling | | | |
| Hour 1 | 2 | 0.07 | 0.0003 |
| Hour 2 | 2 | 0.02 | 0.0001 |
| Hour 3 | 2 | 0.3 | 0.001 |
| Hour 4 | 2 | 0.25 | 0.001 |
| Hour 5 | 2 | 0.2 | 0.001 |
| Hour 6 | 2 | 0.14 | 0.0006 |

Average Concentration of Telone in the field situation would be an average of the values. This level might be considered a possible air level for exposure to field workers, although it would probably be the upper reasonable level. As would be expected, the levels of Telone increase as the day progresses and the temperature of the air rises.

Sum of hours 1 through 6/6 = 0.16 ppm or 0.0007 mg/liter

V. Discussion

The studies enumerated and summarized represent a heterogeneous collection of data. All sampling was done in California which may or may not be represenative of Telone use in other parts of the US. In some case the data was combined and thus the extreme ranges of values for the samples are not represented or cannot be calculated. Excursions of Telone levels to high levels are posssible in the case of accidents or faulty equipment.

The studies presented are believed to be valid with respect to analytical methodology and sampling procedures with the exception of Study 7 which should not be used at all.

VI. Calculation of Exposure

All the exposure in these studies is expressed in ppm or mg/liter in air; thus, exposure will be estimated for the inhalation route. Dermal exposure is also possible with Telone, but exposure cannot be estimated, even though it can be very substantial, especially if a spill occurs.

The following summary of the previous data is provided so that it can be compared. It is arranged according to job function or field monitoring. From this data, a reasonable level of exposure will be deduced and an exposure estimate made. For inhalation exposure, a breathing rate of 29 liters per minute will be assumed. Also the following times will be assumed for the various work functions in one day.

## Matrix for Summary of Exposure Data and Exposure Estimate

| | Exposure in mg/liter for Each Numbered Study* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Activity | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 9 | 10 |
| Bulk transfer | 0.03 | - | - | 0.3 | - | - | - | 0.006 | - |
| Storage areas | 0.06 | - | - | 0.0005 | - | - | - | - | - |
| Loading | 0.02 | - | - | 0.01 | 0.005 | 0.01 | 0.003 | 0.003 | - |
| Highway transport | 0.00005 | - | - | - | - | - | - | - | - |
| Applic. tractor | 0.006 | 0.01 | 0.001 | 0.001 | 0.002 | 0.004 | 0.009 | 0.001 | - |
| Post treatment | 0.0002 | 0.0003 | 0.001 | 0.001 | 0.03 | - | - | - | 0.0007 |
| After | | | | | | | | | |
| 24 hrs. | - | ND | - | - | 0.02 | - | - | - | - |
| 36 hrs. | - | ND | - | - | 0.02 | - | - | - | - |
| 72 hrs. | - | ND | - | - | - | - | - | - | - |
| Downwind | 0.002 | - | neg. | - | - | - | - | - | - |

*Study Number 7 was judged invalid.

## Exposure Estimate in mg for Above Situations based on the Above Data

| Activity | mg/l Range of Exposure | Hourly Exposure @ 29 l/min | Hours/ year* | mg/ day | Days/ year* | mg/ year | mg/kg/ year** |
|---|---|---|---|---|---|---|---|
| Bulk Transfer | 0.006-0.3 | 10.4-522 | 0.5 | 5.2-261 | 2 | 10.4-522 | 0.15-7.5 |
| Storage Areas | 0.0005-0.06 | 0.87-104 | 8 | 7-832 | 2 | 14-1664 | 0.20-11.9 |
| Loading | 0.005-0.01 | 8.7-17 | 0.5 | 4-17 | 2 | 8-34 | 0.1-0.5 |
| Highway Transport | 0.00005 | 0.1 | 8 | 1 | 10 | 10 | 0.15 |
| Applicator-Tractor | 0.001-0.01 | 1.7-17 | 5 | 9-85 | 2 | 18-170 | 0.25-2.4 |
| Post Treatment | 0.0007-0.03 | 1.2-52 | 5 | 6-260 | 2 | 12-520 | 0.17-7.4 |
| 24 hrs | 0-0.02 | 0-35 | 0 | 0 | 0 | 0 | 0 |
| 36 hrs | 0-0.02 | 0-35 | 0 | 0 | 0 | 0 | 0 |
| 72 hrs | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Downwind | 0.002 | 4 | 2*** | 8 | 2 | 16 | 0.23 |

* Use practices vary. BUD estimated a total of about 10 hours total/yr for an average crop (This can vary: cotton-60 hrs/yr, sugar beets 23 hrs/yr, and vegetables about 9 hrs/year.) At 10 hrs/year for average farm, two days would be required. The highway transport is an estimate assuming a full day of driving and 10 day/year during treatment season. The post treatment concentration is a good estimate for the roller treatment which follows the treatment immediately to seal in the fumigant. It will be assumed no significant exposure occurs during aeration and planting as these operations are done 7-14 days after application.

**Assuming limited high concentration downwind for two hours.

***Based on a 70 kg man.