MONITORING OF TELONE II DURING AND FOLLOWING EXPERIMENTAL APPLICATION BY SHANK INJECTION TO ESTABLISHED TREES AND GRAPE VINES IN CALIFORNIA IN 1980 AND 1981

by

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SUMMARY

Telone II is under consideration for use as a nematocide on some permanent crops to replace some uses for which DBCP was formerly registered. Monitoring of worker inhalation exposure under post-plant treating conditions was undertaken in 5 counties of the San Joaquin Valley during the fall-winter of 1980 and 1981. Monitored were: (1) breathing zones of the worker during loading and application; (2) midfield air samples post-application; and (3) soil samples for residue analysis. Twenty-four air samples were taken during loading and application with 4 samples exceeding the 1 ppm level. The 1 ppm level is the recommended threshold limit value (TLV) of American Conference of Governmental Industrial Hygienists and is a guideline for assessing worker exposures. One air sample taken at midfield post application was above 1 ppm. Surface soil residue ranged from 0.07 to 5.5 ppm.

It was concluded that Telone II can be used with low exposure hazards to workers if they are trained in the need for and use of protective equipment, the application equipment is well maintained, and there is good field preparation to eliminate trash, clods, and muddy spots that can allow Telone to volatalize from the soil.

INTRODUCTION

Telone II is a widely used preplant soil fumigant registered for use on numerous field, fruit, and vegetable crops in California. The liquid formulation contains 92 percent 1,3-dichloropropene (1,3-D) as the active ingredient. Telone II was synthesized by the Dow Chemical Company in 1956 and has been extensively used throughout the United States. The major areas of usage of 1,3-D in California have been in the San Joaquin Valley and in the coastal counties of Monterey and Santa Barbara. The primary crops that have been treated include cotton, tomatoes, sugarbeets, broccoli, alfalfa, brussel sprouts, and other field, fruit, and vegetable crops. The mode of application is usually by soil injection at a minimal depth of 6 inches, using tractor-mounted shank injection equipment.

Telone II is under consideration as a possible alternative to DBCP for use on established trees and vines. Since the suspension of the registration of DBCP in California in mid-1977, the need for alternate nematocides has become more acute. This monitoring was undertaken to obtain worker exposure data under post-plant application conditions.

Skin and eye contact with 1,3-D can result in severe irritation with possible edema, dermatitis, and necrosis of the exposed area. Gross contamination can cause nausea, vomiting, pulmonary edema, liver and kidney damage, anesthesia, and death. However, no deaths in humans have been reported from 1,3-D exposure.

Experimental applications were conducted by the Dow Chemical Company on established crops to evaluate phytotoxicity, crop response and efficacy. In conjunction with this, monitoring of the work practices during loading and application was conducted.

MATERIALS AND METHODS

Ten applications were monitored in Fresno, Merced, San Joaquin, Stanislaus, and Tulare Counties. The post-plant applications in orchards of almonds, peaches, and grape vineyards were conducted in November, December, and January of 1980-81. Closed system transfer of the pesticide to the tractor supply tank was used. Tank venting was accomplished by tubing from the tank to a shank mounted to the rear of the tractor which was also used to inject Telone II into the soil. Six rear-mounted shanks set 6 to 12 inches deep in the soil were used for injection.

Air samples were collected using Dupont Model P.4000 and MSA Model #S# personnel air pumps. The air samples were collected for the duration of the work practice using charcoal tubes (SKC West Catalog No. 226-09). Analysis of the charcoal tubes was performed by procedures outlined in Appendix 1. The sensitivity of the analytical method used to recover 1,3-D from charcoal tubes was 0.002 ppm. Air pumps were attached to the loader/tractor driver collecting air in his breathing zone. Air samples were also collected at midfield after the applications.

To determine residues in the soil a worker may be exposed to when entering a treated field, the top 10 millimeters of soil were sampled 24 and 48 hours post-application.

RESULTS

The worker's breathing zone exposure was monitored during 14 loadings of the tractor tank and 10 of the 14 air samples had levels of Telone below 1 part per million. The 1 ppm level is being used as a guideline by this unit to evaluate hazardous exposure and is the threshold limit valve recommended by the American Conference of Governmental Industrial Hygienists.

Ten samples were taken from the workers breathing zone during applications of the fumigant and none exceeded 0.5 ppm.

Air samples drawn at midfield immediately following the applications exceeded the 1 ppm level once, and the level was 2.15 ppm. None of the air samples taken midfield at 24 and 48 hours exceeded 0.12 ppm.

Soil samples taken following the application of Telone II ranged from: 5.5 - 0.07 ppm immediate post-application, 4.7 - 0.09 at 24 hours, and 4.4 - 0.07 at 48 hours.

DISCUSSION

The ambient air concentrations were the highest during the transfer of the Telone II from the storage tank to the tractor tank. One recurring problem was the deterioration of the gaskets within the valves that were used during transfer. Leaks developed when the material was being transferred to the tractor tank; this necessitated lengthy repairs during which time, potential for exposure increased. When the closed transfer system operated properly, the air concentrations of 1,3-D dropped below 0.5 ppm.

Air concentrations around the worker's breathing zone during the application stayed below 0.5 ppm even when fields were not in good tilth. Plant debris that would collect in front of the shanks would cause a poor seal on the soil surface. This may have been the reason for the air concentration being greater at midfield following the applications. All air levels of Telone dropped significantly in 24 hours.

Data obtained from soil samples indicate that soil surfaces residues are affected adversely by the amount of plant debris and poorly prepared soils.

CONCLUSIONS

It appears that Telone II can be applied with reasonable safety to the worker provided the soil is well tilled and there is minimal plant debris. To prevent risk of exposure, any gasket that comes into contact with Telone II should be resistant to it. All workers who handle Telone II should know the toxic nature of the chemical and the need for and use of protective equipment.