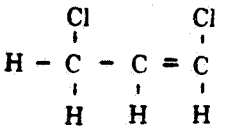
1. CHEMICAL: Dichloropropene (Telone II)

Chemical name: 1,3-Dichloropropene
Common name: Telone II; 1,3-D
Structure:



2. TEST MATERIAL:

Not Applicable.

3. STUDY/ACTION TYPE:

Review final report for small-scale retrospective ground-water monitoring study in Monterey County, California.

4. STUDY IDENTIFICATION:

1) Title: Small-Scale Retrospective Ground-Water Monitoring Study for Telone Brand Soil Fumigants: Final Report on Study Site in Monterey County, California

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Telone II is composed of 94 percent by weight 1,3-dichloropropene which exists in two isomeric forms : cis-1,3-D and trans-1,3-D, generally present in a 50:50 ratio. In the environment, the dissipation of 1,3-D occurs by three mechanisms which include gaseous diffusion through the soil, hydrolysis in aqueous solution, and biological metabolism by soil microorganisms (Peterson, 1989).

Supplemental information indicates that 1,3-D is a very mobile compound with Kd's ranging from 0.23 (loamy sand) to 1.09 (clay). Validated laboratory half-lives for 1,3-D range from 2.4 - 9.1 days for the anaerobic soil metabolism, a nd 13.5 days for the hydrolysis half-life at pH 5, 7, and 9 at 20°. Hydrolysis studies done at pH 5.5 with varying temperatures illustrate that the half-life of 1,3-D can be extremely variable:

temperature (°C)	half-life (days)
2	90-100
15	11-13
29	2

The above data indicate that decreasing temperatures combined with low pH lengthen the half-life of the compound.

1,2-dichloropropane (1,2-D) is present in current Telone formulations in trace quantities of less than 0.1% by weight. 1,2-D is similar to 1,3-D in structure but there are differences in their environmental properties. 1,2-D possesses a higher affinity for the vapor phase over either soil organic matter or water than does 1,3-D; and 1,2-D is less prone to degradation in soil than 1,3-D (Peterson, 1989).

The EPA has categorized the active ingredient (1,3-D) as a B1 oncogen and a B2 carcinogen. The impurity 1,2-D, has been classified as a Group B2 carcinogen. 1,3-D does not yet have an MCL or HAL; 1,2-D has an MCL of 5 ppb. There are two degradates of 1,3-D: 3-chloroallyl alcohol and 3-chloroacrylic acid.

1,3-D has been detected in ground water in four states in the U.S. (New York, Nebraska, Florida, and California), and in The Netherlands. Concentrations of 1,3-D in ground-water from normal field use in the U.S. range from 0.279 to 270 ppb. In Riverside, California, illegal use of Telone in 1986 and 1987 resulted in six detections in one irrigation well ranging from 6.8 - 31 ppb. In The Netherlands, detections of 1,3-D were found in ground water under potato and flower bulb fields with concentrations ranging from less than 0.1 ppb to 2.5 ppb. 1,2-D has been detected in the ground water in California, Connecticut, Florida, Hawaii, Massachusetts, Maryland, Nebraska, New York, Oregon, and Washington (Pesticides and Ground Water Database, 1992).

Travel Blanks. Two water travel blanks, one for alcohol analysis and one for volatile analysis, were sent from the laboratory to the field for each (?) sampling event. Analyses for all travel blanks yielded negative results.

RESULTS:

Ground Water

Ground-water samples were analyzed for both isomers of 1,3-D; the degradate 3-chloroallyl alcohol; and the impurity 1,2-D. Analyses of the ground-water samples resulted in no detections above the detection limits for 1,3-D or its metabolites. 1,2-D was detected in all of the wells at levels that ranged up to 0.48 ppb. Concentrations of 1,2-D in ground water varied throughout the duration of the study, and the concentrations were the highest in the deeper wells.

Soil

Textural analyses from soils on the site indicate that the soil is classified as sandy loam, loamy sand, and sand. No impermeable layers were identified between the surface and the water table in the original borings. The organic matter content of the soil was below 0.9 percent; pH ranged from 6.1 to 8.5. Clay lenses were encountered in borings A7 and B8 (installed in June 1990) from 17 to 20 feet. Analyses of the pre-application soil samples showed no residues of 1,3-D; 1,2-D or 3-chloroallyl alcohol.

STUDY DETAILS:

1. Ground-Water Problems

A. Well Locations. Three well clusters were installed on the test site. Well clusters A and C were located at the eastern edges of the site (see Figure 1), and well cluster B was located on the western edge. The direction of ground-water flow, during the months when water-level measurements could be taken on the site, varied from the west-southwest to northeast. Well cluster B was the only cluster which could have intercepted downgradient residues from the application on the site during most of the study. Well clusters A and C were upgradient with respect to ground-water flow for most of the study.

B. Water Table Depth/Sampling. Throughout the study, water levels dropped because of the drought in California. Between the time that the wells were installed in June 1989 and the first sampling round in October 1989, the water level had fallen below the top of the bladder pumps in the shallow wells and water levels were not able to be measured. Ground-water levels fell by about 0.5 to one foot per month until March 1990 when they were below the tops of the pumps in the deep wells, and

B. Residue Analysis. The submitted report states that samples were composited in the analytical laboratory into two composite samples per boring. The first composite sample represented the upper eight feet of soil, and the second sample represented the interval from eight to 14 feet. A significant problem is created by the fact that a large volume of soil was composited for each sample, and then a small portion was used for analysis. The larger the sample used for analysis, the greater the opportunity for dilution of any residues in the soil. In this case, samples were large enough to ensure that pesticide residues would not be detected in the soil samples.

C. Soil Texture. As the study progressed, the water table dropped consistently across the field. According to the driller's logs for wells A7 and B8, clay balls "up to two inches in diameter" were found near the water table during well installation. As the water table dropped, these clay layers may have impeded the movement of water to the water table, assuming any recharge took place.

4. Instrumentation Problems.

No analyses were done for 1,3-D or 1,2-D for sampling rounds on September 10th or October 2nd, 1990 because of equipment failure.

No onsite precipitation data were obtained from October 1989 through May 1990 because of equipment failure.

REFERENCES

Peterson, J.R. 1989. The Environmental Fate of 1,3-Dichloropropene. Dow Chemical U.S.A. North American Agricultural Products Department. Midland, Michigan. January 20, 1989.

USEPA. 1992. Pesticides in Ground Water Database - A Compilation of Monitoring Studies: 1971-1991. EPA 734-12-92-001. Office of Prevention, Pesticides, and Toxic Substances. September 1992.

Williams, W. Martin, Holden, P.W., Parsons, D.W., and Lorber, M.N. 1988. Pesticides in Ground Water Data Base - 1988 Interim Report. U.S. EPA, Office of Pesticides Programs. December 1988.