Residential Pesticide Study: Evaluation of Residual Organochlorine Pesticides Around Residential Properties in California

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ABSTRACT

Chlordane and other organochlorine pesticides (OCPs) were commonly used as termiticides around structures until 1988. Above-ground use of chlordane was phased out between 1978 and 1983 by the USEPA, although chlordane was used as a termiticide for wooden structures until it was prohibited in 1988.

The California Department of Toxic Substances Control (DTSC) conducted a study in 2004 on these termiticides. In the DTSC Study, three proposed school sites, located in Los Angeles, San Diego and San Bernardino Counties, were selected for evaluation for the presence of OCPs. Each proposed school site had multiple residential properties. DTSC collected a total of 176 soil samples at three depths around building perimeters. Samples were analyzed for OCPs by a California certified laboratory using U.S.EPA method 8081A.

OCPs were most frequently detected in the surface soil samples (0 to 0.5 feet below ground surface). The highest frequencies of detection of OCPs were chlordane (98 percent), DDT (95 percent), DDE (91 percent), and dieldrin (71 percent). Risk-screening evaluation results indicated elevated risks and hazards to human health at all three proposed school sites, associated primarily with chlordane and dieldrin in surface soils. Approximately 50 percent of the chlordane and dieldrin detections had an associated risk greater than 1 in a million (>1E-06), and approximately 20 percent of the chlordane and dieldrin detections had an associated risk greater than 1 in 100,000 (>1E-05). In addition, DTSC investigated OCPs at additional residential properties proposed for school sites in 18 California counties and found similar results.

Based on results of the Study and investigation results at these additional proposed school sites, DTSC recommends sampling and analyses for OCPs be routinely conducted at proposed school sites where historically residential structures have been present.

INTRODUCTION

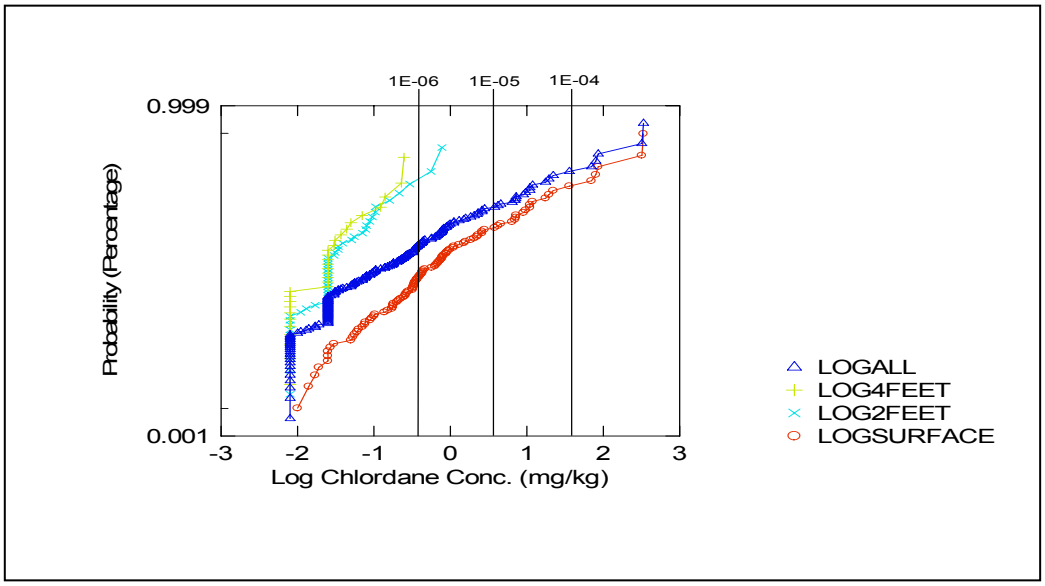
For the DTSC OCP Study in 2004, three proposed school sites in three southern California counties [Los Angeles (Weemes Elementary School Expansion), San Diego (Cherokee Point Elementary School) and San Bernardino (Jones Elementary School)], were selected to evaluate OCPs at former residential properties in California. The school sites were selected to study variations in location, acreage and number of residential properties. The size of the proposed school sites ranged from 0.6 acres at Weemes to 11 acres at Jones; the number of residential properties ranged from four homes at Weemes to 51 lots with multiple unit dwellings at Jones. There was no previous agricultural, industrial or commercial use at any of the proposed school sites.

Table 1: Summary of Detection Frequencies – All Sites Combined

OCP DETECTED	DETECTION FREQUENCY AT 0.5-FEET	DETECTION FREQUENCY AT 2-FEET	DETECTION FREQUENCY AT 4-FEET
Aldrin	1/98 (1%)	0/48 (0%)	0/30 (0%)
Chlordane	96/98 (98%)	20/48 (42%)	10/30 (33%)
DDD	45/98 (46%)	6/48 (13%)	1/30 (3%)
DDE	89/98 (91%)	15/48 (31%)	4/30 (13%)
DDT	93/98 (95%)	17/48 (35%)	5/30 (17%)
Dieldrin	70/98 (71%)	16/48 (33%)	4/30 (13%)
Endosulfan I	1/98 (1%)	0/48 (0%)	0/30 (0%)
Endrin	2/98 (2%)	0/48 (0%)	0/30 (0%)
Endrin Aldehyde	1/98 (1%)	0/48 (0%)	0/30 (0%)
Heptachlor	17/98 (17%)	0/48 (0%)	0/30 (0%)
Heptachor Epoxide	9/98 (9%)	0/48 (0%)	0/30 (0%)
Lindane (γ-HCH)	6/98 (6%)	0/48 (0%)	0/30 (0%)

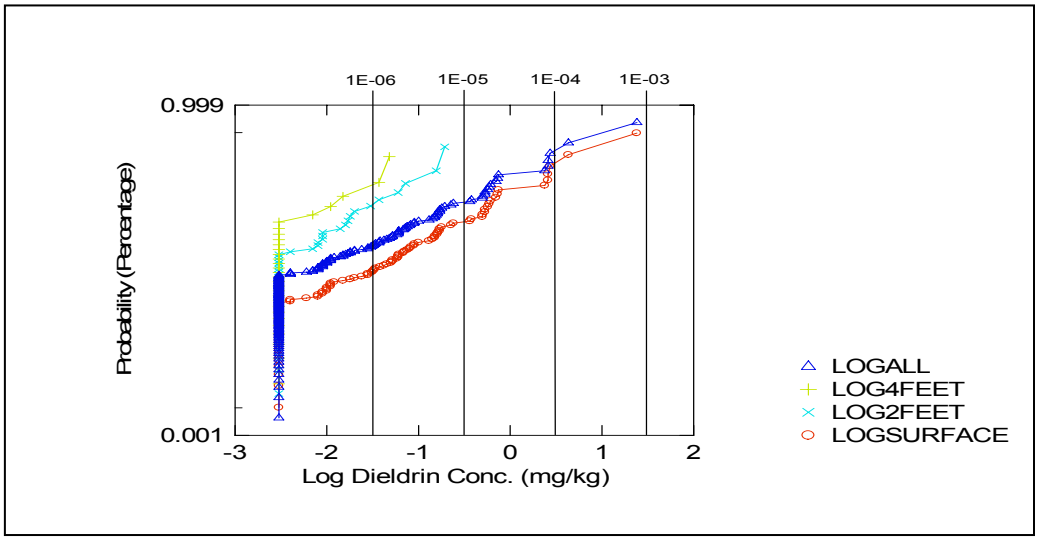
The most frequently detected OCPs in southern California were chlordane, DDT, DDE and dieldrin.

Figure 1: Normality Plot of the Chlordane Data
Combined Data Set



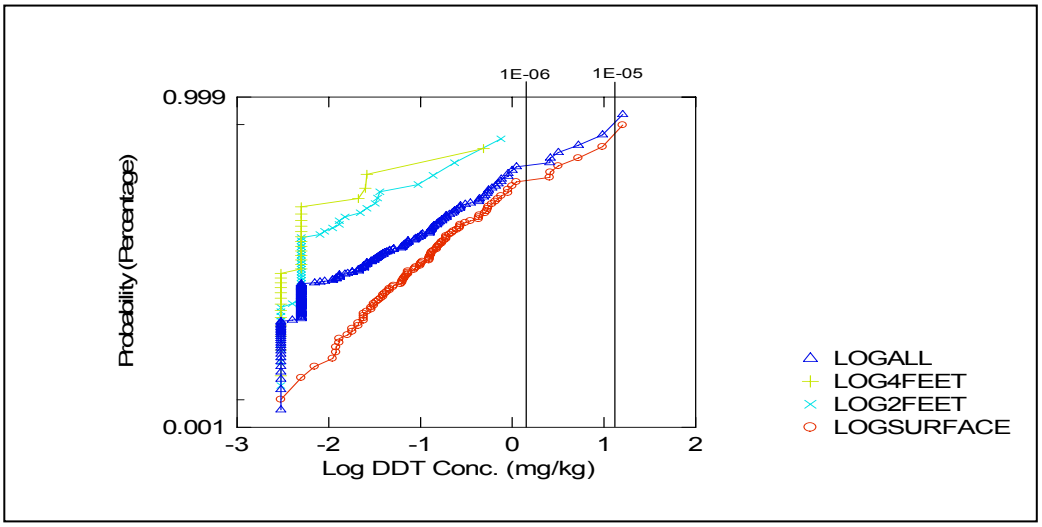
Risks attributed to chlordane were primarily associated with surface soils (0- to 0.5-feet bgs). Approximately 50% of the chlordane detections in surface soils were above a 1E-06 risk. Approximately 19% of the chlordane detections in surface soils were above a 1E-05 risk. Only 4% of the chlordane detections at 2-feet were above a 1E-06 risk.

Figure 2: Normality Plot of the Dieldrin Data
Combined Data Set



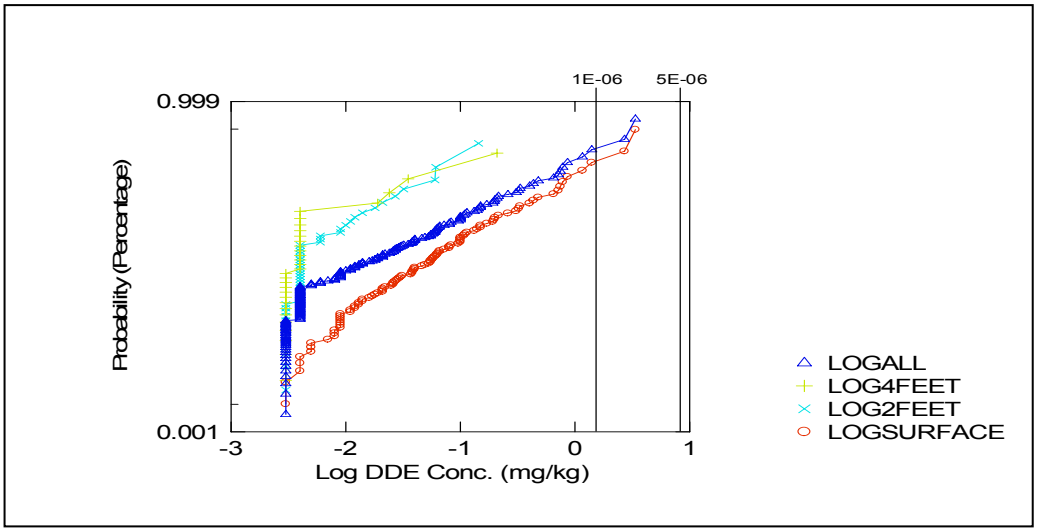
Risks attributed to dieldrin were primarily associated with surface soils (0- to 0.5-feet bgs). Approximately 47% of the dieldrin detections in surface soils were above a 1E-06 risk. Approximately 18% of the dieldrin detections in surface soils were above a 1E-05 risk. Only 8% of the dieldrin detections at or below 2-feet were above a 1E-06 risk.

Figure 3: Normality Plot of the DDT Data
Combined Data Set



Approximately 6% of the DDT detections in surface soils were above a 1E-06 risk. Only one DDT detection in surface soils exceeded a risk of 1E-05. No DDT detections at or below 2-feet exceeded a 1E-06 risk.

Figure 4: Normality Plot of the DDE Data
Combined Data Set



Approximately 2% of the DDE detections in surface soils were above a 1E-06 risk. No DDE detections in surface soils exceeded a risk of 1E-05. No DDE detections at or below 2-feet exceeded a 1E-06 risk.

Summary and Conclusions

Results of the Human Health Screening Evaluation indicated that elevated site risks were primarily associated with chlordane and dieldrin detected in surface soils. Approximately 50% of the chlordane and dieldrin detections had an associated risk above 1E-06, and approximately 20% of the chlordane and dieldrin detections had an associated risk above 1E-05.

These findings indicate a high frequency of organochlorine pesticide (OCP) detections in surface soils around residential structures in three locations in southern California. DTSC investigated OCPs at additional residential properties proposed for school sites in 18 California counties and found similar results. Based on results of this Study and investigation results at these additional proposed school sites, DTSC recommends sampling and analyses for OCPs be routinely conducted at proposed school sites historically used for residential properties.

Based on the results of this study, DTSC has developed guidance to evaluate proposed school sites where OCPs from termiticide application are a potential source of soil contamination, specifically **INTERIM GUIDANCE: EVALUATION OF SCHOOL SITES WITH POTENTIAL SOIL CONTAMINATION AS A RESULT OF LEAD FROM LEAD-BASED PAINT, ORGANOCHLORINE PESTICIDES FROM TERMITICIDES, AND POLYCHLORINATED BIPHENYLS FROM ELECTRICAL TRANSFORMERS Revised 06/09/06 (non-substantive revisions made 09/12/06).**