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TITLE: MEASUREMENT OF POLYCHLORINATED BIPHENYLS IN SOIL CORES FROM W. G. KRUMMRICH PLANT

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ABSTRACT: Seven soil cores were sectioned by depth and analyzed for PCBs. Concentrations ranged from none detected, <1 ppm, to 200 ppm with no clear pattern of leaching or migration. Because these concentrations are significantly lower than most of the soil samples from the Dead Creek site, the W. G. Krummrich plant does not appear to be the major source of contamination.

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INTRODUCTION

Earlier analyses of surface soil samples from the Dead Creek site near Sauget, Illinois found high levels (29-13000 ppm) of polychlorinated biphenyls (PCBs) (1,2). As a follow up to determine if the W. G. Krummrich plant was a source of the contamination, soil cores were taken on plant property from a location believed to be part of the old Dead Creek bed. The bed on plant property had been landfilled, which required the cores to be taken 12-19 feet below the present surface level. This special study reports the results of our analysis of the soil cores for PCBs.

SUMMARY

Seven soil cores were sectioned by depth and analyzed for PCBs. Concentrations ranged from none detected, <1 ppm, to 200 ppm with no clear pattern of leaching or migration. Because these concentrations are significantly lower than most of the soil samples from the Dead Creek site, the W. G. Krummrich plant does not appear to be the major source of contamination.

DETAILS

Sampling

Core samples were taken by Shannon & Wilson, Inc., Geotechnical Consultants. Seven cores in stainless steel tubes and an additional sample in a glass jar were received by the Environmental Analysis Group on 1/21/81. Our sample log numbers, description, and condition of the tubes as received are listed in Table I. Samples 1012101 and 1012102 were taken from locations that "could not possibly be contaminated" and served as sampling and analysis blanks.

All of the tubes had large gaps that did not contain any soil. Two additional samples in glass jars were received on 1/26/81. Sample 1012601 was reported to be the middle section of core 1012105 and sample 1012602 was reported to be the bottom section of core 1012103.

All of the cores were divided into three 6-8" sections and labeled TOP, MIDDLE, and BOTTOM. (Tops of the stainless steel tubes had holes drilled in the sides.) The samples were air dried and processed according to standard operating procedure (3).

ANALYSIS

All of the soils were analyzed for PCBs by GC/MS using a validated analytical method (4).

RESULTS

The results for this study are contained in Table II. The concentrations were calculated in ppm (µg/g) on a dry weight basis. The "none detected" level (<1 ppm) is the lowest level at which the analytical method was validated. Numbers in parentheses are below the lowest validated level but do represent positive detection of PCBs.

Only about half of the soil samples contained measurable levels of PCBs. Because of the poor condition of the cores (gaps and empty sections) it is difficult to draw conclusions about PCBs leaching through the soil. However, there does not seem to be any systematic increase or decrease of concentration as a function of depth.

In comparing these results to earlier samples from the Dead Creek site, seven of the eleven Dead Creek soils had higher levels of PCBs (ranging from 1.2 to 65 times higher) than the most contaminated soil from the Krummrich plant. Therefore, it appears that the Krummrich plant is not a source of PCB contamination for the Dead Creek site.

QUALITY ASSURANCE

Two of the soil samples, 1012103 TOP and 1012106 MID, were analyzed in triplicate. Precision was 61% and 74% respectively, calculated as relative standard deviation. The poor precision is due to the very low levels of PCBs found in those two soil samples.

Accuracy (recovery) was evaluated by spiking the soil samples with known amounts of Aroclore 1242 and 1254. Results of the spiking experiments are shown in Table III.

No PCBs were detected in any of the subsamples from either of the two blank samples, 1012101 and 1012102.

Table 1. Description of Soil samples from W. G. Krummrich Plant

Environmental Analysis Log No.	Sample Description*	Condition of Tube as Received
1012101	Boring #4 #1 12-13.5'	top 10.5" empty
1012102	Boring #4 #2 15-17'	top 7.5" empty
1012103	Boring B-1 #1 12-14'	top 4" empty, bottom 15.5" empty
1012104	Boring B-1 #2 15-17'	top 5" empty, bottom 15.5" empty
1012105	Boring B-2A #1 12-14.5'	tube completely empty except for 2" plug at top and 2" plug at bottom
1012106	Boring B-2B #2 15-17'	top 8" empty
1012107	Glass jar B-3 #1A 15-16.5'	-
1012108	Boring B-3 #2 17-19'	top 7.5 empty
1012601	Glass jar B2B-1 12-14'	-
1012602	Glass jar B1-1 12-14'	-

*All borings 3" o.d. and 30" long except for sample 1012106 which was 36" long.

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Table II. Concentrations in ppm of PCBs in Soils from W. G. Krummrich Plant.

Sample Number		PCBs (Cl_2 to Cl_7 Homologs)
1012101	TOP	ND
	MIDDLE	ND
	BOTTOM	ND
1012102	TOP	ND
	MIDDLE	ND
	BOTTOM	ND
1012103	TOP	(0.9)
	MIDDLE	9.6
1012602	BOTTOM	(0.7)
1012104	TOP	(0.8)
	MIDDLE	ND
	BOTTOM	no sample
1012105	TOP	ND
1012601	MIDDLE	1.4
1012105	BOTTOM	(0.6)
1012106	TOP	(0.7)
	MIDDLE	12
	BOTTOM	ND
1012107	-	130
1012108	TOP	200
	MIDDLE	11
	BOTTOM	(0.6)

ND - None detected, lowest validated level = 1 ppm.

( ) Numbers in parentheses represent positive detection of PCBs, however, precision and recovery values have not been established for the method at these levels.

Table III. Recovery of PCBs from Soils

Soil Sample		Spiking Level (ppm) of Aroclor® 1242 and 1254	% Recovery
1012103	TOP	2	61
1012106	MID	10	56
1012106	TOP	100	66

REFERENCES

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2. R. G. Kaley, Special Study ES-80-SS-26, Measurement of Selected Chemicals in Soil from the Dead Creek Site - W. G. Krummrich Plant Samplings.

3. O. Hicks, Standard Operating Procedure EAN-80-SOP-006, Homogenizing, Subdividing and Preserving Sediment Samples.

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