Shaughnessy Number: 009001

Date Out of EAB: SEP 19 1988

1988

To: George LaRocca
Product Manager Team #15
Registration Division (TS-767C)

From: Paul Mastradone, Acting Chief
Environmental Chemistry Review Section #1
Environmental Fate and Ground Water Branch/EFED (TS-769C)

Thru: Paul F. Schuda, Chief
Environmental Fate and Ground Water Branch/EFED (TS-769C)

Attached, please find the EAB review of:

Reg./File Number: 52904-C

Chemical Name: Lindane

Type Product: Insecticide/Acaricide

Company Name: Centré International d'Etudes du Lindane

Purpose: Review Three Leaching Studies

Date Received: 08/08/88

Action Code: 660

Date Completed: 09/15/88

EAB Number: 70468

Monitoring Study Requested: _____

Total Reviewing Time: 3 days

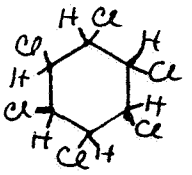
Monitoring Study Volunteered: _____

Deferrals To: _____ Ecological Effects

_____ Dietary Exposure Branch

_____ Toxicology Branch

1. Chemical: Lindane



Trade Name: Isotox®
Chemical Name: hexachlorocyclohexane
Type Pesticide: insecticide, acaricide

2. Test Material: see individual reviews

3. Study/Action Type: review 3 leaching studies (unaged and aged)

4. Study Identification:

Study 1:

INSECTICIDES: LINDANE-^{14}C: Adsorption/Desorption on Four Soils. D. Hobbs, P. J. Godward, D. A. England, and E. A. Savage. Performed by May and Baker, Ltd. October 1986. Submitted by CIEL (Centre International d'Etudes du Lindane). ~~No~~ Accession Number. 00164346

Study 2:

INSECTICIDES: LINDANE-^{14}C: Leaching Study with Two Soils. Performed by May and Baker Ltd. G. L. Reeves and E. A. Savage. November 1986. Submitted by CIEL (Centre International d'Etudes du Lindane). Accession #400673-01.

Study 3:

INSECTICIDES: LINDANE-^{14}C: Leaching Study with Four Soils. Performed by May and Baker Ltd, Essex, England. October 1986. Submitted by CIEL (Centre International d'Etudes du Lindane). ~~No~~ Accession Number. 00164638

5. Reviewed By:

Pat Ott
Chemist
Environmental Chemistry Review Section #1

Signature: Pat Ott
Date: 9/19/88

6. Approved By:

Paul Mastradone
Acting Chief
Environmental Chemistry Review Section #1

Siganture: Paul J Mastradone
Date: SEP 21 1988

7. Conclusions:

These 3 studies meet the Subpart N Environmental Chemistry data requirements for unaged and aged leaching for lindane.

The only compound present in both the unaged and aged soil leaching studies was lindane. In both unaged and aged soil, lindane is immobile in loam, clay loam, loamy sand and sand.

8. Recommendations:

The Enviornmental Fate and Ground Water Branch (EFGWB), formerly the Exposure Assessment Branch (EAB), considers the leaching data requirement of the Subpart N Environmental Chemistry Guidelines to be satisfied, both for aged and unaged leaching.

9. Background:

The 3 submitted leaching studies were submitted in response to the Lindane Registration Standard (May 1985).

Lindane's behavior in the environment appears to be that of a chemical that does not leach, bioaccumulates to an appreciable degree in fish but rapidly depurates, and persists in soil.

10. Review of Individual Studies: see Data Evaluation Records

11. Completion of One-Liner: attached

12. CBI Appendix: N/A

DATA EVALUATION RECORD

Lindane Study #1

INSECTICIDES: LINDANE-^{14}C: Adsorption/Desorption on Four Soils. D. Hobbs, P. J. Godward, D. A. England, and E. A. Savage. Performed by May and Baker Limited. October 1986. Submitted by CIEL (Centre International d'Etudes du Lindane). No Accession Number

Reviewed By: Patricia Ott
Title: Chemist
Org: Environmental Chemistry Review Section #1
Signature: Pat Ott
Date: 9/19/88

Approved By: Paul Mastradone
Title: Acting Chief
Org: Environmental Chemistry Review Section #1
Signature: Paul J Mastradone
Date: SEP 21 1988

Conclusions:

This study satisfies the Subpart N Environmental Chemistry Guidelines data requirement for an unaged leaching study for lindane by providing a quantitative estimate of mobility for 4 soils, including adsorption and desorption constants.

Lindane has a low mobility in loam, clay loam, and loamy sand, and a moderate mobility in sand (<1% organic matter and 5% clay). In general, lindane will not be mobile except in soils containing very little clay or organic matter.

Materials and Methods:

The adsorption/desorption of ^{14}C-lindane (uniformly ring-labelled and ≥96% pure) was studied using 4 soils: loam, clay loam, loamy sand (soil used in the aerobic soil metabolism study), and sand. Each soil was air dried to constant weight and seived before use. Soil characteristics were:

Component	Composition of Soil (%)			
	Clay-loam	Loam	Loamy-sand	Sand
Clay <0.002 mm	29	25	10	5
Silt 0.002-0.06 mm	25	29	8	7
Sand 0.06-2.0 mm	46	46	82	88
Organic Matter	1.98	3.17	3.15	0.73
pH	7.84	7.22	6.90	7.75
CEC (meq/100gm)	19.4	22.2	18.2	8.9
Classification	Clay-loam	Loam	Loamy-sand	Sand
Origin	Dunmow, Essex, England.	Boarded Barns Farm, Ongar, Essex, England.	Rhone-Poulenc Mid-Atlantic Research Farm, Columbus, New Jersey, U.S.A.	Weatherhill Farm, Icklingham, Suffolk, England.

The pure radiolabelled parent was dissolved in 0.01 M aqueous calcium chloride and 4 concentrations per soil type were used, ranging from 0.004 to 1.02 ppm. Air-dried soil (2.5 gm on an oven dried basis) was placed in screw-top tubes and fortified with ^{14}C-lindane. The tubes were wrapped with aluminum foil (to avoid possible photodegradation) and shaken vigorously for 24 hours. (This time was selected based on a preliminary equilibrium study which showed the level in the supernatant remained constant at 24 and 30 hours.

Total radioactivity in the samples was determined by liquid scintillation counting. Adsorption studies were done in duplicate.

After shaking, samples were centrifuged. Duplicate aliquots were taken for radioassay. For the desorption experiment, supernatants were removed and 0.01 M aqueous calcium chloride solution was added to each tube. Tubes were shaken, centrifuged, and supernatants were removed. Duplicate aliquots were taken for radioassay by LSC. This procedure was repeated 4x, to give a total of 5 desorption solutions. Subsequently, the soil was extracted with acetone.

Radioassay for the adsorbates, desorbates, and acetone extracts from the loamy-sand and sand soils showed that some radioactivity still remained in the soil, so it was combusted and radioassayed. Combustion efficiency was 74% for both soils (average).

HPLC analysis (detection by a Ramona LS Radioactivity Monitor) was performed on adsorbates and the first and third desorption solution (referred to as "desorbates" in the report) from the 10 ug/ml treatment solution* and the first desorbate from the 0.5 ug/ml treatment of 2 of the soils. Also, HPLC was done on the acetone extracts (1 from each replicate pair) from the 1, 0.5, and 0.05 ug/ml treatments of 2 soils.

Reported Results:

Lindane adsorbs strongly to soils containing >5% clay and more than about 1% organic matter. K_d's found were: 16.5 (clay loam), 14.4 (loam), 25.4 (loamy sand), and 3.2 (sand). Desorption constants (K_{des}) were: 16.8 (clay loam), 14.9 (loam), 28.4 (loamy sand), and 3.8 (sand) for the first cycle. See attached tables for more detail, including K_{oc}'s.

Discussion:

1. Lindane did not readily adsorb to sand, yet the authors state that combustion of the soil residue was necessary because not all the radioactivity was found in the adsorption/desorption solutions (referred to as adsorbates/desorbates) and acetone extracts. This was also true for loamy sand, which readily adsorbed the lindane. A breakdown of the percent applied which was found in the adsorption/desorption solutions, acetone extracts, and soil residue would have been useful. Also, the agency would have been interested in information explaining why there was still radioactivity in the sand soil residue, considering lindane had a K_d of 3.2, indicating low adsorptivity to sand.

*This may be a typographical error, since the highest concentration used was 1 ug/ml.

3.3. Radiochemical Balance

The amount of radioactivity in each adsorbate, desorbate, acetone extract and, for loamy-sand and sand, the soil residue, was calculated (see Appendix VII) and summed to obtain the total recovered radioactivity. This was then expressed as a percentage of the original dose radioactivity to give the percentage recovery per sample; these recoveries are shown in Table 27.

TABLE 27 Recovery of Radioactivity

Clay-loam		Loam		Loamy-sand		Sand	
Tube	Recovery (%)	Tube	Recovery (%)	Tube	Recovery (%)	Tube	Recovery (%)
13	96.7	5	103.8	21	108.5	29	104.8
14	94.4	6	101.5	22	107.3	30	106.0
15	100.6	7	96.3	23	114.2	31	105.8
16	97.7	8	96.1	24	109.8	32	104.8
17	103.5	9	99.8	25	102.5	33	98.5
18	100.0	10	98.1	26	109.0	34	98.6
19	98.8	11	98.7	27	97.2	35	93.7
20	97.9	12	98.6	28	97.6	36	96.0
$\bar{x}$	98.7	$\bar{x}$	99.1	$\bar{x}$	105.8	$\bar{x}$	101.0

The values show that, within experimental limits, the recovery of radioactivity was quantitative for each soil studied.

3.4. Stability

Stability studies carried out on two soils showed lindane-^{14}C to be stable under the conditions used throughout the course of the study. The chromatograms (see Appendix V) show adsorbates, selected desorbates and soil residue extracts to contain principally lindane-^{14}C.

TABLE 28 Freundlich Adsorption Constants Derived for the Adsorption of Lindane-^{14}C

Soil	K	$\frac{1}{n}$	% Clay	% Silt	% Sand	Soil organic carbon content (%)	Koc
Clay-loam	16.539	0.980	29	25	46	0.99	1670.6
Loam	14.373	0.939	25	29	46	1.58	909.7
Loamy-sand	25.357	0.934	10	8	82	1.58	1604.9
Sand	3.222	0.889	5	7	88	0.37	870.8

TABLE 29 Freundlich Desorption Constants (1st cycle) Derived for the Desorption of Lindane-^{14}C

Soil	K	$\frac{1}{n}$	% Clay	% Silt	% Sand	Soil organic carbon content (%)	Koc
Clay-loam	16.786	0.955	29	25	46	0.99	1695.6
Loam	14.891	0.915	25	29	46	1.58	942.5
Loamy-sand	28.405	0.934	10	8	82	1.58	1797.8
Sand	3.838	0.888	5	7	88	0.37	1037.3

TABLE 30 Freundlich Desorption Constants (2nd cycle) Derived for the Desorption of Lindane-^{14}C

Soil	K	$\frac{1}{n}$	% Clay	% Silt	% Sand	Soil organic carbon content (%)	Koc
Clay-loam	16.919	0.948	29	25	46	0.99	1709.0
Loam	15.021	0.884	25	29	46	1.58	950.7
Loamy-sand	27.720	0.917	10	8	82	1.58	1754.4
Sand	3.468	0.838	5	7	88	0.37	937.3

TABLE 31 Freundlich Desorption Constants (3rd cycle) Derived for the Desorption of Lindane-^{14}C

Soil	K	$\frac{1}{n}$	% Clay	% Silt	% Sand	Soil organic carbon content (%)	Koc
Clay-loam	18.718	0.937	29	25	46	0.99	1890.7
Loam	17.195	0.904	25	29	46	1.58	1088.3
Loamy-sand	29.689	0.919	10	8	82	1.58	1879.1
Sand	2.942	0.785	5	7	88	0.37	795.1

TABLE 32 Freundlich Desorption Constants (4th cycle) Derived for the Desorption of Lindane-^{14}C

Soil	K	$\frac{1}{n}$	% Clay	% Silt	% Sand	Soil organic carbon content (%)	Koc
Clay-loam	22.014	0.954	29	25	46	0.99	2223.6
Loam	16.764	0.887	25	29	46	1.58	1061.0
Loamy-sand	30.311	0.909	10	8	82	1.58	1918.4
Sand	2.099	0.701	5	7	88	0.37	567.3

TABLE 33 Freundlich Desorption Constants (5th cycle) Derived for the Desorption of Lindane-^{14}C

Soil	K	$\frac{1}{n}$	% Clay	% Silt	% Sand	Soil organic carbon content (%)	Koc
Clay-loam	23.842	0.948	29	25	46	0.99	2408.3
Loam	19.866	0.906	25	29	46	1.58	1257.3
Loamy-sand	31.081	0.905	10	8	82	1.58	1967.2
Sand	1.220	0.606	5	7	88	0.37	329.7

DATA EVALUATION RECORD

Lindane Study 2(Aged Leaching Study in Sand and Loamy Sand)

INSECTICIDES: LINDANE-^{14}C: Leaching Study with Two Soils. Performed by May and Baker Limited. G. L. Reeves and E. A. Savage. November 1986. Submitted by CIEL (Centre International d'Etudes du Lindane). Accession #400673-01.

Reviewed By: Patricia Ott
Title: Chemist
Org: Environmental Chemistry Review Section #1
Signature: Pat Ott
Date: 9/19/88

Approved By: Paul Mastradone
Title: Acting Chief
Org: Environmental Chemistry Review Section #1
Signature: Paul J Mastradone
Date: SEP 21 1988

Conclusions:

This study satisfies the Subpart N Environmental Chemistry data requirements for an aged leaching study for lindane by giving a quantitative estimate of its mobility in aged soil.

Aged soil column studies with soil aged aerobically for 31 days showed that only lindane was present and that the parent compound is immobile in loamy sand and has a low mobility in sand.

Materials and Methods:

The leaching of ^{14}C-lindane in loamy sand and sand soil at 2.08 lb ai/A after aerobic incubation in darkness for 31 days (22°C) was studied. All experiments were conducted in duplicate. Soil characteristics are:

	% Clay	%Silt	%Sand	%OM	pH	CEC(meq/100 gm)
Loamy Sand (NJ)	10	8	82	3.2	6.9	18.2
Sand (England)	5	7	88	0.73	7.8	8.9

^{14}C-Lindane (uniformly ring-labelled and ≥98% pure) was added to soil and aerobically incubated for 31 days. During incubation, samples were analyzed at 0, 14, and 31 days by extraction and combustion, to determine the extraction efficiency and the amount of radioactivity in the soil at each sampling time. The extracts were also analyzed by HPLC (radioactivity detector) to profile the metabolic fate of lindane.

Untreated soil (31 cm long column) in a segmented glass column (3.8 i.d.) was prepared. The length of the segments was 2 cm. Following packing of the untreated soil, 500 ml of water was percolated through the soil column to pre-wet the soil and reduce channelling.

At day 31, 20 gm of untreated soil was removed from the top of the column and replaced with 20 gm of incubated treated soil. Columns were leached with 576 ml of distilled water (correct volume as calculated by reviewer). The leachate was

collected over a 24 hour period. Columns were then dismantled into 6 cm segments (0-6, 6-12, 12-18, 18-24, and 24-30 cm), the soil extruded and extracted, followed by combustion.

Leachate volumes were recorded and triplicate samples taken for radioassay by LSC.

Extraction and cleanup procedures included sequential extraction with acetone, methanol, and ether (unspecified). The extracts were combined and an aliquot radioassayed by LSC. Extracts containing sufficient radioactivity were analyzed by HPLC, followed by GC/MS on selected extracts.

Following solvent extraction, the soil residue was combusted and radioassayed (LSC). Combustion efficiency for loamy sand and sand was 74% (average).

Reported Results:

Material Balance

Good material balance of ^{14}C-radioactivity (about 99%) was obtained for the loamy sand samples (0, 14, and 31 days of incubation), based on the radioactivity found in the solvent extracts plus combustion of the soil residue. However, only 77 and 78% of the total radioactivity could be accounted for in sand. The authors hypothesize that the remaining radioactivity (about 23%) probably volatilized. About 5-6% of the applied radioactivity was found in the soil residue of both soils (referred to as bound residues). Further extraction of the soil residue with hexane, methanol/water, and water failed to extract the bound residue.

Column Leaching Profile (Soil Column = 30 cm)

Less than 1% of the applied radioactivity was found in the leachate of both loamy sand and sand columns. In the loamy sand column, most of the radioactivity was found in the top 6 cm of the column. The only compound present was lindane, as confirmed by HPLC and GC/MS.

In the sand column, most of the radioactivity was found in the top 18 cm of the column.

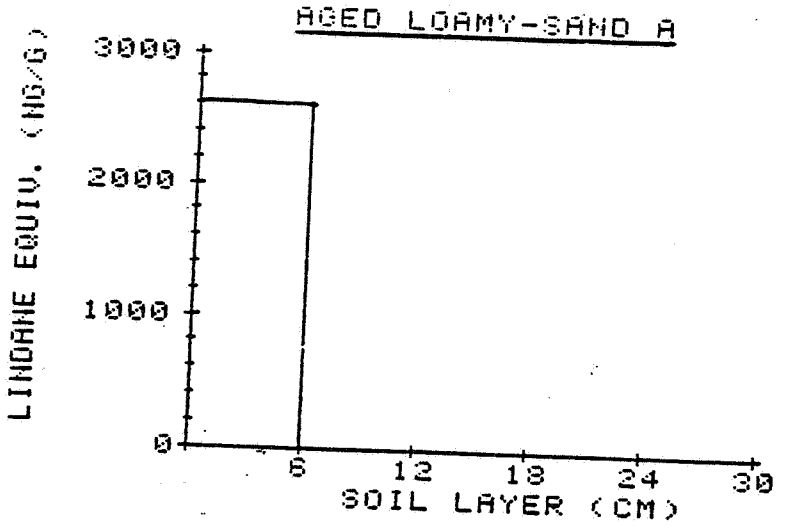
Discussion:

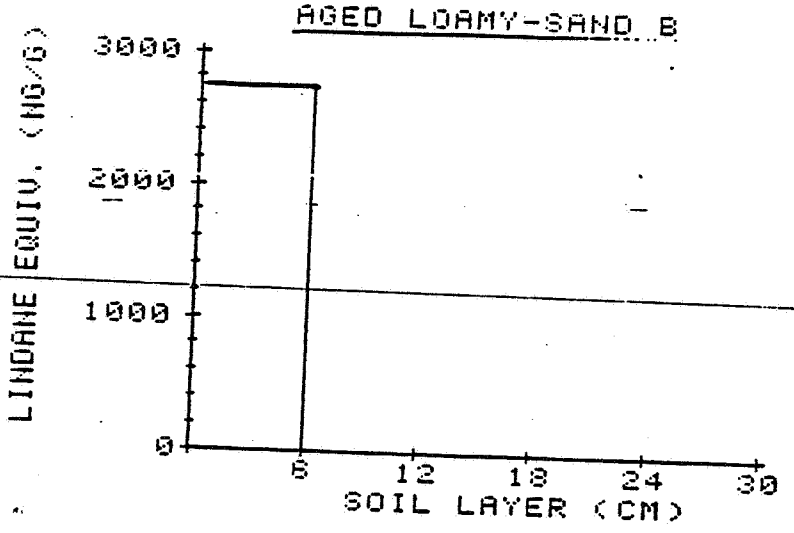
1. A table showing the percent of applied radioactivity found in each 6 cm soil segment would have more clearly depicted the leaching behavior of lindane.

11

Study 2

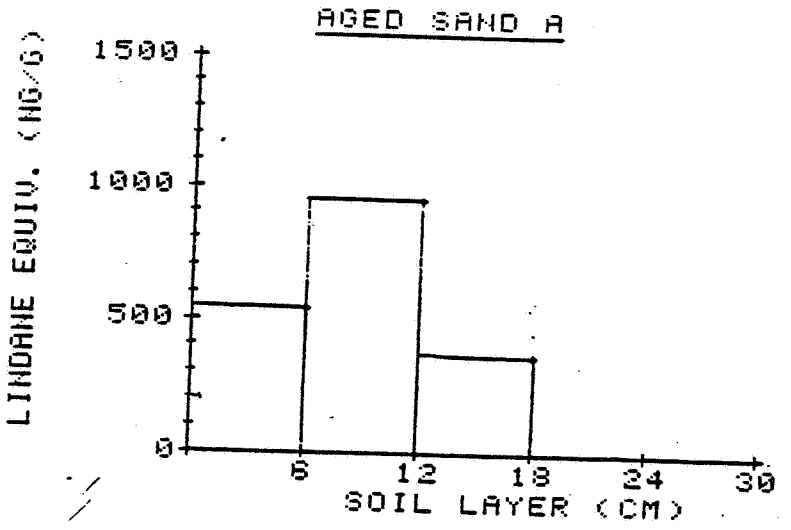
FIGURE 3 Profile of Radioactivity in the Columns

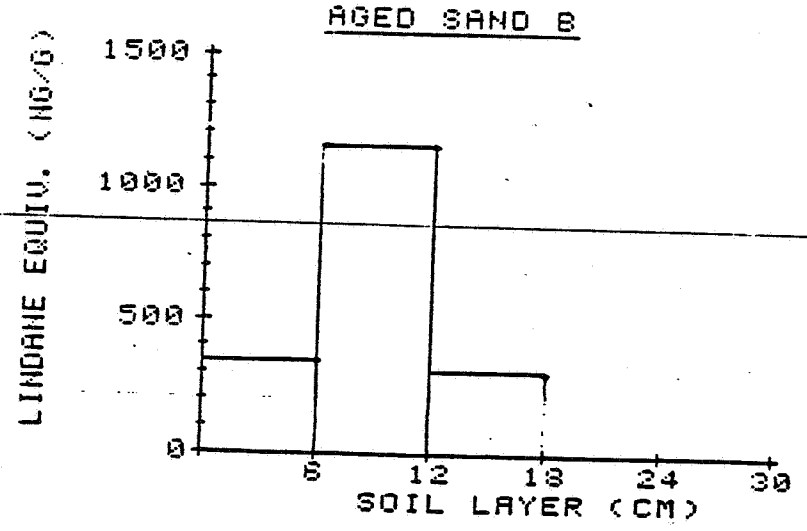




Study 2

FIGURE 4 Profile of Radioactivity in the Columns





DATA EVALUATION RECORD

Lindane Study 3(Aged and Unaged Soil Column Study)

INSECTICIDES: LINDANE--^{14}C: Leaching Study With Four Soils. Performed by May and Baker Limited, Essex, England. October 1986. Submitted by CIEL (Centre International d'Etudes du Lindane). No Accession Number

Reviewed By: Patricia Ott
Title: Chemist
Org: Environmental Chemistry Review Section #1
Signature: Pat Ott
Date: 9/19/88

Approved By: Paul Mastradone
Title: Acting Chief
Org: Environmental Chemistry Review Section #1
Signature: Paul J Mastradone
Date: SEP 21 1988

Conclusions:

Unaged Leaching Experiment

This study satisfies the Subpart N Environmental Fate Guidelines data requirements for an unaged leaching study for lindane by providing a quantitative estimate of lindane's mobility in 4 soils (soil columns).

The data indicate that lindane is immobile in clay loam, loam, loamy sand and sand.

Aged Leaching Experiment

This study satisfies the Subpart N Environmental Fate Guidelines data requirements for an aged leaching study for lindane by providing a quantitative estimate of mobility in 2 aged soils (soil columns).

The data indicate that lindane (only compound present) is immobile in aged clay loam and loam soils.

Materials and Methods:

Unaged Leaching Experiment

^{14}C-Lindane (uniformly ring-labelled and $\geq$98% pure) was applied to soil at a rate equivalent to 2.07 lb ai/A. Soil columns were prepared using 30 cm x 3.8 cm (i.d.) glass segmented columns. Air dried soil was added and 500 ml distilled water was added to prewet the soil and reduce channelling. An aliquot of the dosing solution (160 ul) was applied to the top of the soil. Four soils were used: clay loam, loam, loamy sand, and sand.

Aged Leaching Experiment

Aged clay loam and loam soils were used for the aged leaching studies.

^{14}C-Lindane (uniformly ring-labelled and ≥98% pure) was applied at a rate equivalent to 2.07 lb ai/A. Treated soil was aerobically stored in the dark (22°C). Sampling occurred on days 0, 14, and 31. Duplicate portions (20 gm) were removed, extracted, and the soil residue was combusted. Solvent extracts were analyzed by HPLC with a radiation detector. At day 31, soil columns were prepared using untreated soil. A portion (20 gm) was removed and replaced with an equivalent portion of aged treated soil.

Recovery data for incubated soil samples gave 93% for clay loam and 85% for loam, based on percent of applied radioactivity. The registrant hypothesized that the rest of the radioactivity probably volatilized.

Both Experiments

Soil characteristics are:

Soil	% Clay	%Silt	%Sand	%OM	pH	CEC(meq/100 gm)
Clay Loam (England)	29	25	46	1.98	7.84	19.4
Loam (Essex, Eng.)	25	29	46	3.17	7.22	22.2
Loamy Sand (NJ)	10	8	82	3.15	6.90	18.2
Sand (Suffolk, Eng)	5	7	88	0.73	7.75	8.9

Columns were leached with 576 ml water (correct volume as calculated by reviewer over a 24 hour period. Then columns were dismantled in 6 cm segments (0-6, 6-12, 12-18, 18-24, and 24-30 cm); the soil was removed, extracted, and the soil residue was combusted. Leachate volumes were recorded and triplicate aliquots taken for radioassay by liquid scintillation counting.

The extraction and cleanup scheme briefly involved sequential extraction with acetone, ether (unspecified but assumed to be ethyl ether), and methanol. The extracts were combined and radioassayed by LSC. Extracts containing sufficient radioactivity were analyzed by HPLC followed by GC/MS on selected extracts. To further attempt to extract bound residues, the soil residue (after extraction) was further extracted with hexane, methanol/water, and water.

To follow the metabolic degradation in soil, samples were taken on days 0, 14 and 31 and extracted with acetone and ether and treated as above.

Combustion efficiencies (soil residue) for clay loam and loam was about 100% (average) and 74% for sand and loamy sand.

Results:

Unaged Leaching Experiment

Less than 1% of applied ^{14}C-lindane was found in the leachate for all 4 soils. About 2-3% of the applied radioactivity was found in the soil residue and most of the applied radioactivity (78-98%) was found to have remained on the soil columns. Material balance ranged from 80-100% of the applied amount.

With regard to where along the column the lindane was after leaching, most

of the radioactivity remained in the top 12 cm for clay loam and loam, in the top 6 cm for loamy sand, and in the top 18 cm for sand.

Aged Leaching Experiment

Data from leaching 2 clay loam and 2 loam aged soil columns showed that <1% of the applied amount was present in the leachate, 5-8% was in the soil residue (bound) and 83 to 96% remained on the column, accounting for a total of 91-101% of the applied radioactivity.

Analysis of each 6 cm soil column segment indicates that most of the radioactivity remained in the top 12 cm for the clay loam and loam soils.

The additional extractions performed on the previously extracted soil residue were not effective in removing the bound residue.

HPLC analysis of the radioactivity in the soil segments indicated that the only compound present was lindane. This was confirmed by GC/MS.

Discussion:

1. A table showing the percent of the applied radioactivity present in each soil segment would have been more helpful than giving total dpm's.

Study 3

TABLE 12 Distribution of Radioactivity in Clay-loam Columns after Leaching of Previously-aged Lindane

Soil Layer	Column	Total Dpm in Soil Layer	Lindane Equivalent, ng	Weight of Air-dried Soil, g	ng Lindane Equivalent per g of Soil
0-6 cm	A	42637586	221106	88.1	2510
	B	43239542	224228	85.7	2616
6-12 cm	A	2866644	14866	82.8	180
	B	4115446	21342	82.8	258
12-18 cm	A	30305	157	83.9	1.9
	B	16492	86	83.8	1.0
18-24 cm	A	6825	35	83.8	0.4
	B	9257	48	83.4	0.6
24-30+cm	A	4685	24	97.6	0.2
	B	5914	31	105.6	0.3

TABLE 13 Distribution of Radioactivity in Loam Columns after Leaching of Previously-aged Lindane

Soil Layer	Column	Total Dpm in Soil Layer	Lindane Equivalent, ng	Weight of Air-dried Soil, g	ng Lindane Equivalent per g of Soil
0-6 cm	A	36186949	187655	76.8	2443
	B	37994153	197027	79.1	2491
6-12 cm	A	2965769	15380	76.4	201
	B	2711866	14063	74.9	188
12-18 cm	A	16960	88	77.8	1.1
	B	12995	67	72.6	0.9
18-24 cm	A	11916	62	75.9	0.8
	B	10977	57	75.7	0.8
24-30+cm	A	6186	32	103.1	0.3
	B	15236	79	90.2	0.9

EXPOSURE ASSESSMENT BRANCH
PESTICIDE ENVIRONMENTAL FATE ONE-LINER

Lindane

File No: 009001 CAS No:
Type Pesticide: Insecticide/Acaricide
Chemical Name: Hexachlorocyclohexane

Empirical Form:

Uses: Terrestrial food, terrestrial nonfood, greenhouse food, greenhouse nonfood, forestry, domestic outdoor and domestic indoor, commercial outdoor, wood, and wooden structure treatment uses. It is used mainly for seed treatment, livestock treatment, and hardwood lumber treatment.

Form. Type:

Mole Wt.	Sol. @20C (ppm)	Vap. Pres. (torr)	Log Kow	Henry
00	0.00		0.00	

Hydrolysis (161-1)
pH 5:
pH 7:
pH 9:

Photolysis (161-2, -3, -4)
Air:
Soil:
Water:

Mobility Studies (163-1)
Soil Partition (Kd) Rf Factors
** 1 Clay Loam (16.5)
** 2 Loam (14.4)
** 3 Loamy Sand (25.4)
** 4 Sand (3.2)
** 5 No lindane in leachate for aged loamy sand, clay loam, loam, and sand columns
** 6 No lindane in leachate of unaged soil columns of clay loam, loam, loamy sand and sand

Soil Metabolism Studies - Terrestrial
Aerobic (162-1) Anaerobic (162-2)

1
2
3
4
5
6
7

Soil Metabolism Studies - Aquatic

Aerobic (162-4)	Anaerobic (162-3)
1	
2	
3	
4	

Field Dissipation Studies

Terrestrial (164-1)	Aquatic (164-2)
1	
2	
3	
4	
5	
6	

** EPA Acceptable Study
# Supplement (Scientifically Sound) Information

Field Dissipation Studies

Forest (164-3)	Other (164-5)
1	
2	

Ground Water Findings
1
2
3

Rotational Crop Restrictions (165-1, -2)
1
2

Fish Accumulation Studies (165-4)
* * 1 780x(fillet) 1400x(whole fish), 2500x(viscera) with 96, 85 and 95% depuration in 14 days
2

Degradation Products
1
2
3
4
5

Notes

Key Reviews:

EAB #70464 (3/9/88)-Fish Bioaccumulation
EAB #70468 ( )-Leaching (Aged and Unaged)

References

Writer P. Ott