

February 26, 1969

R. E. Keller - So. Second
W. R. Richard - GO
E. P. Wheeler - GO

TO

L. R. Stark
General Offices

An analytical procedure for extracting, concentrating, and measuring Aroclor at the sub ppm level in water has been developed and verified with Aroclor "spiked" tap water samples (Table I).

This procedure was employed to determine the tap water solubility of Aroclor 1242, 1248 and 1254 (Table II).

The Aroclor saturated tap water samples used in this study were prepared in the following manner: two 60-70 g. portions of each Aroclor fluid were placed in 32oz. narrow neck screw top glass bottles and 500 ml. of tap water (South Second Street) added to each. The bottles were then placed on a roller mill, rolled for 24 hours and allowed to stand undisturbed at room temperature (25°C) until analyzed. The period of time between preparation and analysis was approximately 4-5 months.

Inspection of EC/GC traces and the data in Table II indicates that the solubility of Aroclor is a function of both the amount of chlorination and the position. This anticipated behavior makes absolute quantification difficult since a standard with the same isomer distribution of the water solubilized material is impossible to prepare. Therefore, the "Aroclor found" was calculated in this manner: the original Aroclor in question was used as a standard and a calibration curve prepared by plotting the peak height of the major isomers versus μg Aroclor. The peak height response of the samples were then totaled, corrected for a tap water blank response and the amount of "Aroclor found" determined from the calibration curve. A rough idea of the error inherent in this procedure can be obtained by using 1242 as a standard for 1248, etc. A deviation on the order of $\pm 10\%$ was experienced.

The data in Table II also seems to indicate that a stable Aroclor-water emulsion is formed at approximately twice their solubility levels.

The Pydraul fluids being multi-component systems are a completely different story and as such will require much more effort. At this point, I think we should probably clarify what information is actually desired and if the need for this information can be justified in terms of the effort necessary to obtain it.

E. Scott Tucker
E. Scott Tucker

db

Attachments - 2

NEV 031195

780733

TABLE I
RECOVERY OF AROCLOR FROM SPIKED TAP WATER SAMPLES**
USING GC/GC

<u>Sample Number</u>	<u>ppb Aroclor Added</u>	<u>Sample Volume (ml)</u>	<u>ppb Aroclor Found</u>	<u>Per Cent Recovery</u>	<u>Comments</u>
OR 88932 #1	1980	250	1960	99.0	Aroclor 1242. Samples concentrated with vac. rot. evap. Results obtained 9-6-68.
OR 88932 #2	1980	250	-----*	----	
OR 88945 #1	270	225	266	98.5	Aroclor 1254. Samples concentrated on Kundera-Danish evaporative concentrators. Results obtained 12-13-
OR 88945 #2	270	225	266	98.5	
OR 88945 #3	540	225	577	107.0	
OR 88945 #4	540	225	577	107.0	

The sample preparation and work up outlined for water samples was employed. The results were quantified by preparing a calibration curve using a hexane solution of the Aroclor 1242 and 1254 used to spike the water samples. The major isomer peak area was used to construct the curve. The water samples were spiked by injecting μ l amounts of a concentrated acetone***-Aroclor solution.

* Sample contaminated - results discarded.

** Data used to confirm proposed water sample work up procedure and concentration techniques.

*** Spiked water samples contained 40-60 ppm Acetone.

NEV 031196

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TABLE II
SOLUBILITY OF AROCLOR IN TAP WATER

<u>Sample Ident.</u> <u>Number</u>	<u>Grams Aroclor</u> <u>Equilibrated</u>	<u>Sample</u> <u>Vol. (ml.)</u>	<u>ppb Aroclor</u> <u>Found</u>	<u>Average</u>
1242				
OR 80936-1+	67.5	225	193	203 $\pm$ 10
-2+	67.5	225	213	
-1*	55.1	250	372	375 $\pm$ 3
-2*	55.1	250	378	
1248				
OR 80936-1+	70.5	250	92	106 $\pm$ 14
-2+	70.5	250	120	
-1*	70.6	224	196	209 $\pm$ 13
-2*	70.6	225	222	
1254				
OR 80936-1+	73.2	250	51	50 $\pm$ 2
-2+	73.2	250	48	
-1*	69.7	224	134	139 $\pm$ 5
-2*	69.7	225	143	

+ Aqueous sample filtered through pre-wetted Whatman #2 filter paper.

* Aqueous sample carefully siphoned from bottle.

NEV 031197

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publications in hand (1,2) show that Risebrough has not made a positive structure identification to ^{prove} presence of chlorinated hydrocarbons (Biphenyls) let alone Aroclor products in material he has worked with. His approach is not an absolute identification procedure. It's based on similar retention times for 10 components eluted through a gas chromatography column. This measurement is not specific for chemical compounds in unknown mixtures. Furthermore, the electron capture detector used to monitor separated components is not specific for chlorine or even halogens. Work in our labs shows at least 13 components in Aroclor 1242, 17 in Aroclor 1254 and 14 in Aroclor 1260 with different retention times than those reported by Risebrough. More information is needed about un-reported experimental chromatographic conditions used by Risebrough to resolve differences between labs.

Risebrough has based his conclusions implicating chlorinated biphenyls on work by Holmes (3), Holden (3a) Widmark (4), and Jensen (5). Holmes and Holt obtained similar gas chromatography ~~A~~ containing 11, 13 and 7 peaks respectively for commercial polychlorobiphenyl resin. Holmes and Holden also did not make a positive structure identification.

Widmark and Jensen in Europe (Sweden) obtained a similar gas chromatography for eagle extracts. Chromatographic fractions from this work were identified structurally by Mass Spec as higher chlorinated biphenyls. Risebrough, in his reported work has apparently made no positive identification of this type. His implication of chlorinated biphenyls appears to be by reference back to above work through similar chromatograms. To the best of our knowledge, no one has identified components structurally in biological systems as chlorinated biphenyls in ^{U.S.A.} Work is underway in our labs on an unequivocal structure identification of unknown organic species in ~~natural~~ ^{natural} products using gas chromatography and mass spectroscopy techniques.

REFERENCES:

- (1) Risebrough, R. W., Chem. Fall Out, First Rochester Conference on Toxicity, in the Press (1966)
- (2) Risebrough, R. W. Nature, Draft of Paper in Press

ROUGH DRAFT

REFERENCES - Cont'd.

- (3) Holmes, D. C. & Simmons, J.H., Tatton, J., Nature 216, 227 (1967).
- (3a) Holden, A.V. and Marsden, K., Nature 216, 1274 (1967)
- (4) Widmark, G., J. Assoc. Off., Anal. Chem. 50, 1059 (1967)
- (5) Jensen, S., New Scientist, 32, 612 (1966)

from R. E. Keller per phone
to M. Stanley
2/28/69

NEV 031199

780737

DATE

March 4, 1969

cc R. E. Keller - Res. 1
E. P. Wheeler - GO

SUBJECT

AROCOR WILDLIFE:
INCINERATION OF NCR PAPER

REFERENCE

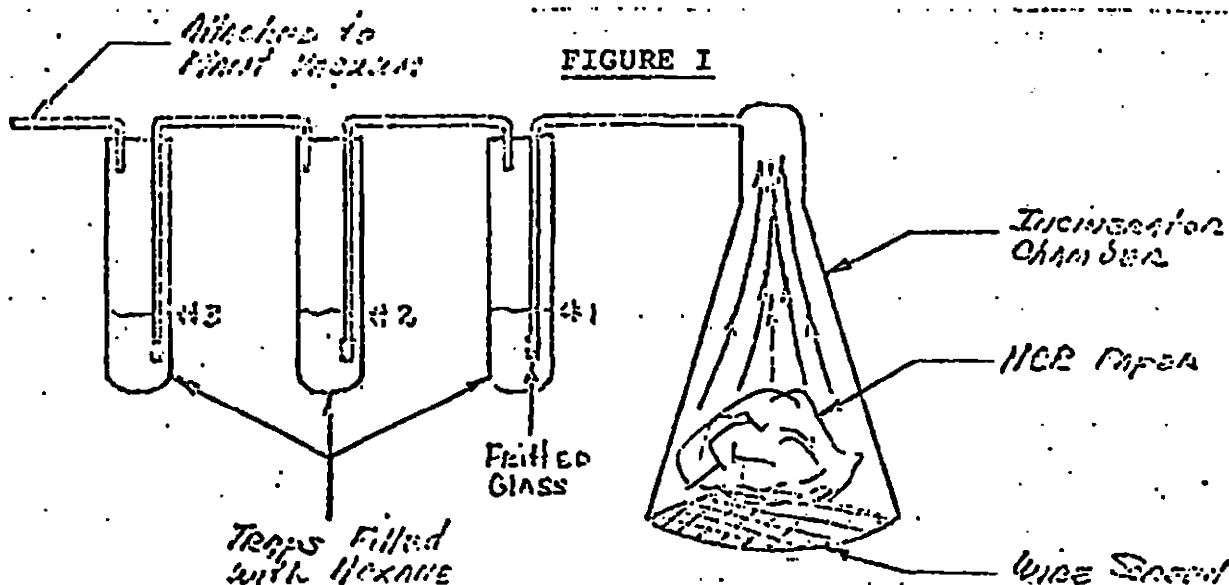
TO

W. R. Richard - GO

It has been proposed from the observed distribution of polychlorinated biphenyls in tissue samples taken from marine organisms that global eco-distribution of these materials occurs via aerial transport (wind currents, airborne particulate matter, etc.).

A qualitative experiment has been performed with the objective of determining if Aroclor in N.C.R. paper is destroyed or volatilized when the paper is disposed of by burning.

The experiment was carried out in the following manner. Approximately 3g. (1 sheet) of paper (CB 15 $\frac{1}{2}$ white, 8-1/2 X 11, long grain, F-3468-4-24-64, The N.C.R. Company) was placed in the incinerator chamber of the apparatus shown in Figure I.



At this point the vacuum was turned on and the paper ignited. After the paper had completely burned, the hexane in each trap, and hexane extracts of the ash and the walls of the incinerator chamber were analyzed for the presence of Aroclor by EC/GC. Hexane samples from trap #1 were also analyzed after extraction with base and acid to remove any oxidized materials.

NEV 031200

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W. R. Richard
March 4, 1969
Page 2

Conclusions:

Under the conditions of this experiment:

1. Aroclor is easily volatilized when N.C.R. paper is burned.
2. Aroclor undergoes little, if any, decomposition when burned.
3. Unfortunately, it appears that significant air pollution can occur via burning of N.C.R. paper or other Aroclor containing materials even under more strenuous conditions.

E. S. Tucker

db

NEV 031201

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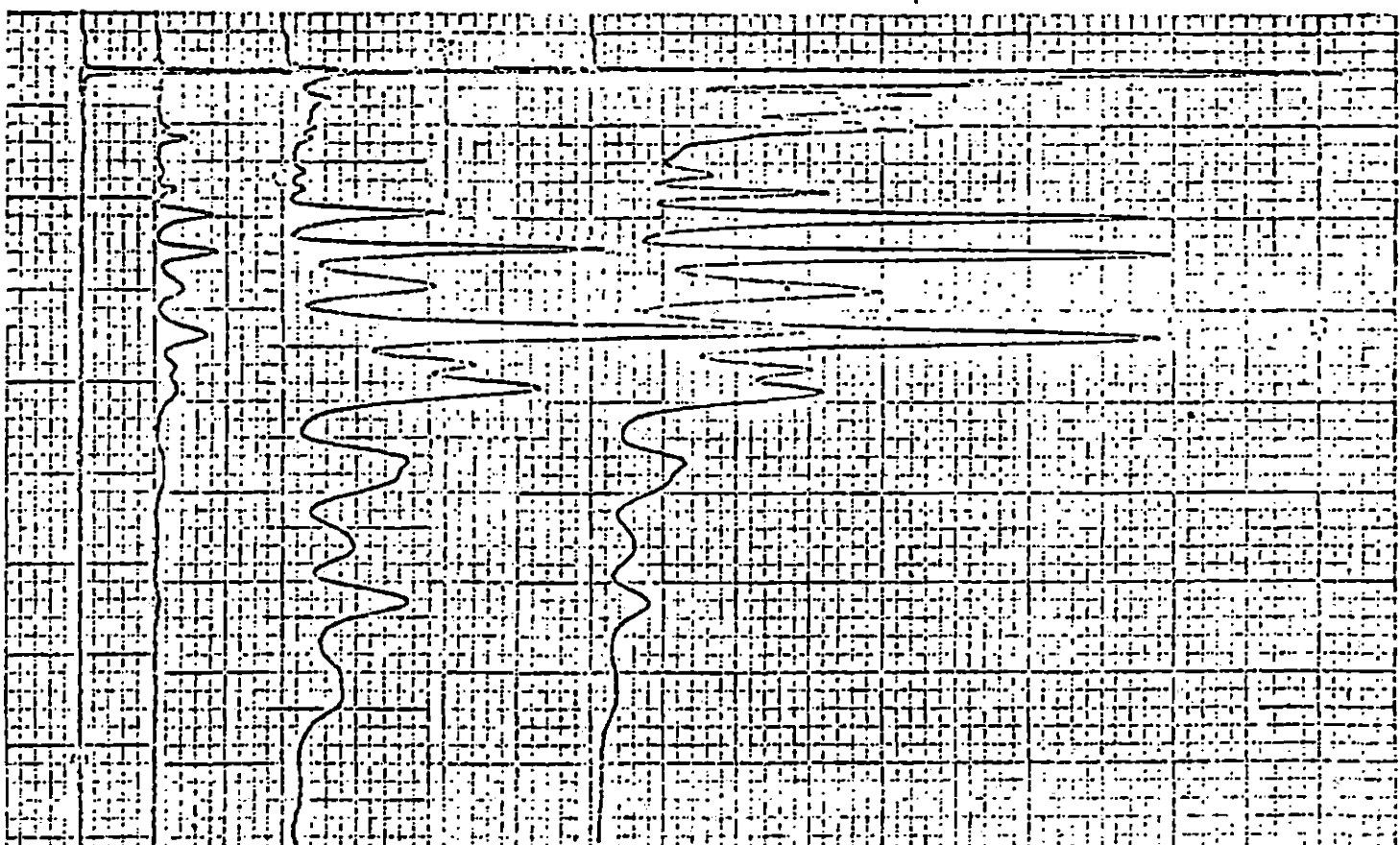


FIG. 2

Material
recovered
by NEXUS

Nucleon 1242
Standard

Material
extracted
from residue
Blank

NEV 031202

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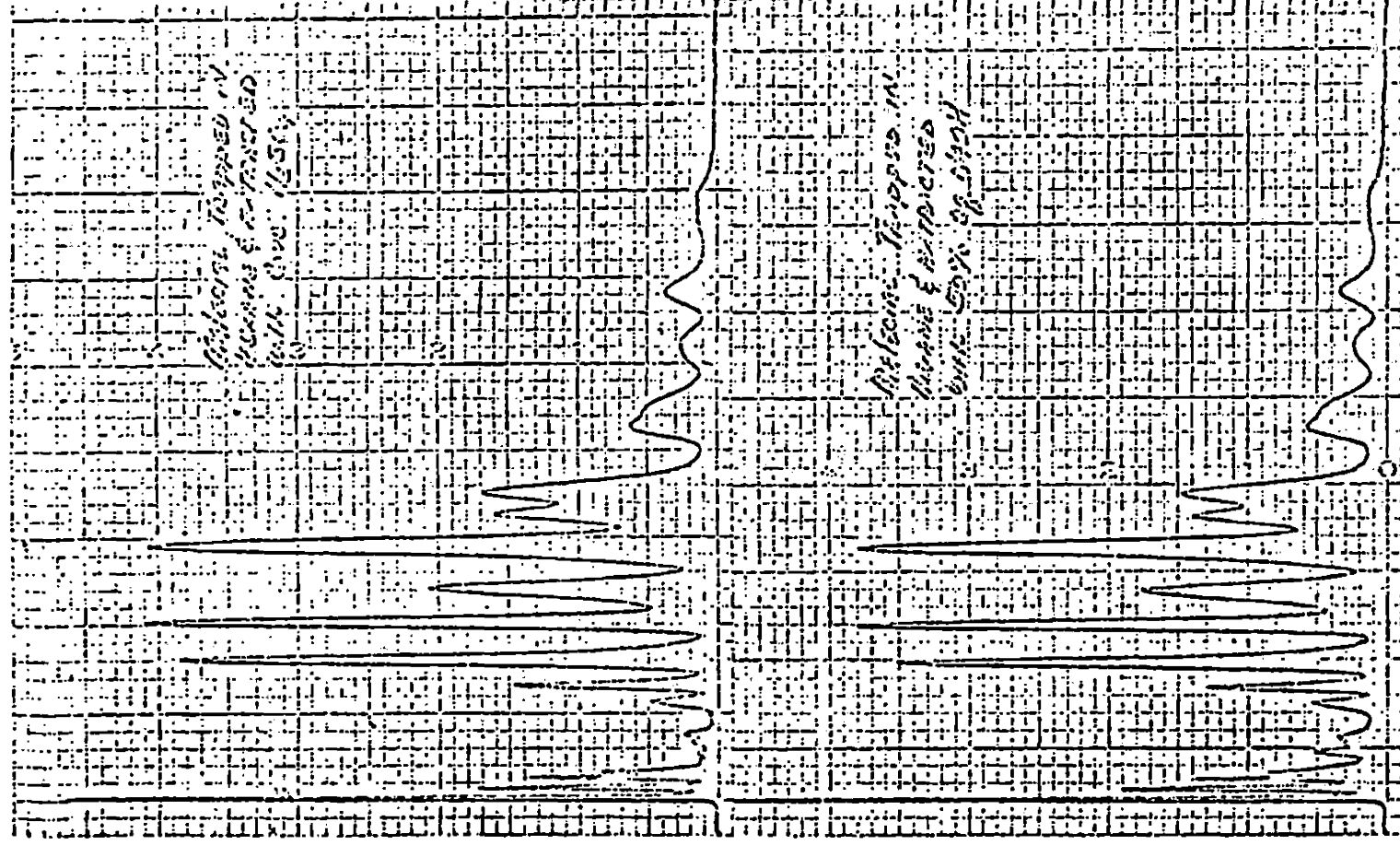


Fig 3

NEV 031203

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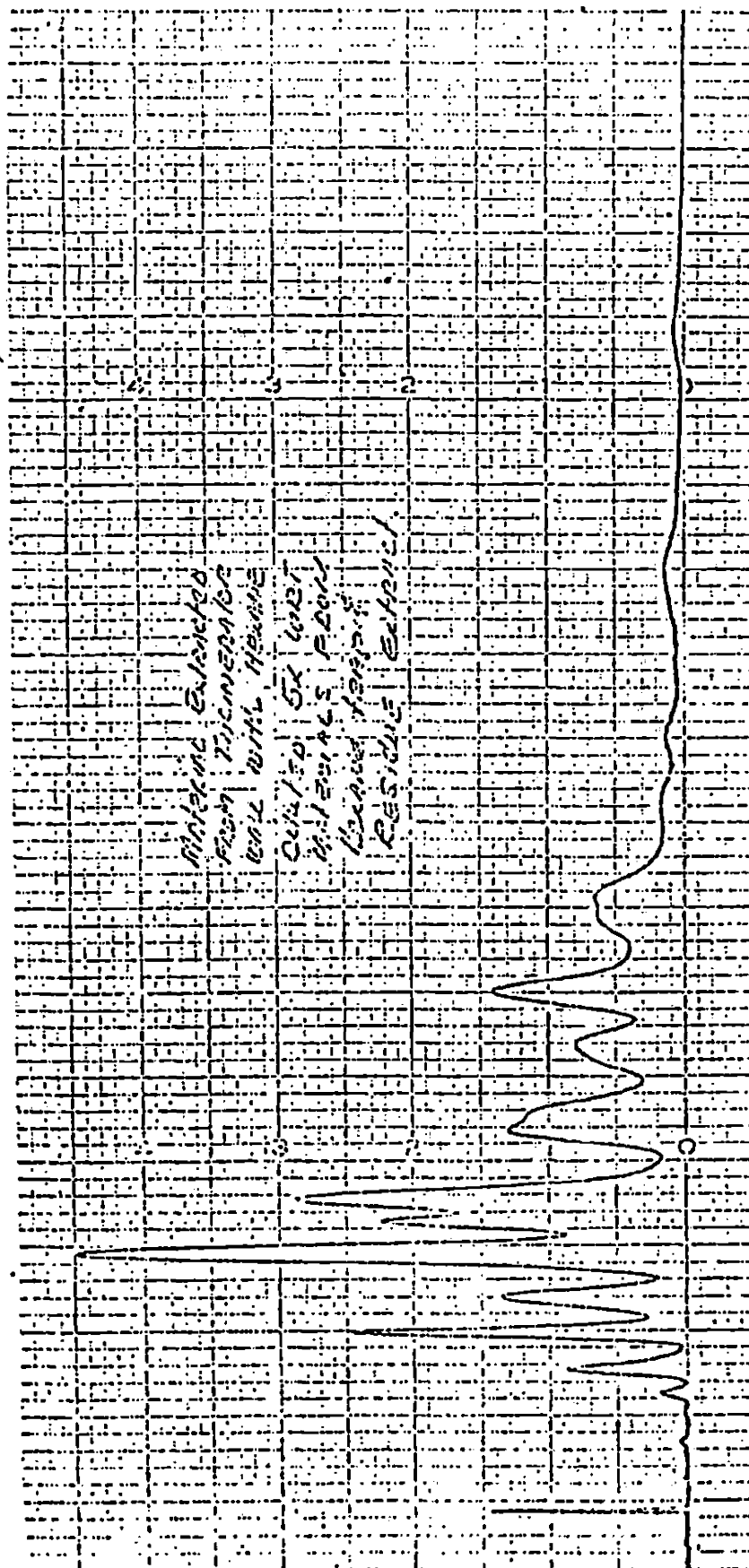


Fig. 7

NEV 031204

General Physical Properties of the Aroclor® Chlorinated Compounds

Aroclor.....	Aroclor 1221 Colorless mobile oil	Aroclor 1232 Practically colorless mobile oil	Aroclor 1242 Practically colorless mobile oil	Aroclor 1248 Colorless to light yellow- green, clear, mobile oil	Aroclor 1254 Light yellow viscous oil
Color.....	50 Max. (APHA)	50 Max. (APHA)	50 Max. (APHA)	50 Max. (APHA)	50 Max. (APHA)
Acidity — Maximum (mgm. KOH per Gm.)...	0.014	0.014	0.010	0.010	0.010
Average Coefficient of Expansion... cc/cc/°C	0.00071 (15°-40°C)	0.00073 (25°-100°C)	0.00068 (25°-65°C)	0.00070 (25°-65°C)	0.00066 (25°-65°C)
Typical Density Specific Gravity..... Pounds per gallon — 25°C(77°F).....	1.182-1.192 (25°/15.5°C) 9.85	1.270-1.280 (25°/15.5°C) 10.55	1.381-1.392 (25°/15.5°C) 11.50	1.405-1.415 (65°/15.5°C) 12.04	1.485-1.505 (65°/15.5°C) 12.82
Distillation Range — ASTM D-20 (Mod.) °C.....	275°-320°	290°-325°	325°-355°	340°-375°	365°-390°
Evaporation Loss — % — ASTM D-6 Mod. 163°C..... 5 hrs. 100°C..... 6 hrs.	— 1.0 to 1.5	— 1.0 to 1.5	3.0 to 3.6 0.0 to 0.4	3.0 to 4.0 0.0 to 0.3	1.1 to 1.3 0.0 to 0.2
Flash Point — Cleveland Open Cup..... °C °F	141°-150° 286°-302°	152°-154° 305°-310°	176°-180° 348°-356°	193°-196° 379°-384°	None
Fire Point — Cleveland Open Cup..... °C °F	176° 349°	238° 460°	None°	None	None
Pour Point — ASTM D-97..... °C °F	Crystals at 1°C Crystals at 34°F	-35.5° -32°	-19° 2°	-7° 19.4°	10° 50°
Softening Point — ASTM E-28..... °C °F	— —	— —	— —	— —	— NEV 031205
Refractive Index — D-line — 20°C.....	1.617-1.618	1.620-1.622	1.627-1.629	1.630-1.631	1.639-1.641
Viscosity — Saybolt Universal 210°F (93.9°C) Sec. (ASTM — D-88)	30-31	31-32	34-35	36-37	44-43
130°F (54.4°C)	35-37	39-41	49-55	73-80	260-340
100°F (37.8°C)	33-41	44-51	82-92	125-240	1800-2100

LD₅₀ - rats (approx.) 3980* 4470* 8650* 11,000* 11,000*
 LD₅₀ - rabbits - mg/kg >2000* >1260* >794* >794* >1260*
 administered as 50% soln. in corn oil # 33/35 in corn oil

Aroclor 1260 Light yellow soft sticky resin	Aroclor 1262 Light yellow sticky clear resin	Aroclor 1268 White to off-white powder	Aroclor 1265 Light yellow, clear, brittle resin	Aroclor 5412 Yellow trans- parent sticky resin	Aroclor 5450 Clear, yellow- to-amber, brittle resin	Aroclor 7555 Black, opaque, brittle resin
50 max. (APIII)	50 Max. (APIII)	1.5 Max. NPA (molten)	2 Max. NPA (molten)	2 Max. NPA (molten)	2 Max. NPA (molten)	—
0.014	0.014	0.05	0.05	0.05	0.05	1.4
0.00057 (20°-100°C)	0.00051 (25°-65°C)	0.00057 (20°-100°C)	0.00051 (25°-65°C)	0.00123 (25°-59°C)	0.00179 (25°-124°C)	0.00015 (25°-65°C)
1.550-1.505 (30°-15.5°C) 13.55	1.572-1.533 (30°-15.5°C) 13.72	1.804-1.811 (25°-25°C) 15.09	1.670 (25°-25°C) 13.51	1.470 (25°-25°C) 12.24	1.670 (25°-25°C) 13.91	1.734 (25°-25°C) 14.41
395°-420°	395°-425°	435°-450°	230°-320° at 4 mm. Hg.	215°-300° at 4 mm. Hg.	220°-335° at 5 mm. Hg.	—
0.5 to 0.5 0.0 to 0.1	0.5 to 0.6 0.0 to 0.1	0.1 to 0.2 0.0 to 0.05	0.2 to 0.3 0.0 to 0.02	0.2 0.01	0.03 1.5 to 1.7 (at 260°-5 hrs.)	0.2 to 0.3 —
None	None	None	None	247° 477°	None	None
None	None	None	None	> 350° > 652°	None	None
31°	35°-39°	—	—	46°	—	—
83°	99°	—	—	115°	—	—
—	—	150° to 170° (hold pt.) 302° to 338° (hold pt.)	60° to 60° 140° to 151°	45° to 52° 115° to 126°	98° to 105.5° 203° to 222°	66° to 72° 143° to 152°
1.647-1.643	1.6501-1.6517	—	1.634-1.657	—	1.660-1.655	—
72-73	65-100	—	90-150 (240° or 130°C)	390-490	—	—
3200-4500	650-850 (100° or 71°C)	—	—	—	—	—
—	—	—	—	—	—	—
0,000**	11,300**	10,900**	16,000**	10,600**	19,200**	6,317**
> 1000**	> 1000**	> 2000**	> 2000**	> 1000**	> 7940**	> 2000**
< 2100**	< 2100**	< 3100**	< 3100**	< 2000**	< 3100**	< 3100**

soln. in corn oil soln. in corn oil

NEV 031206

March 11, 1957

Dear Mr. [Name]
[Address]
[City, State, Zip]
[Country]

Dear Mr. [Name]:

I am writing to you today to inform you of the results of the [test/experiment] which was conducted on [date]. The results show that [description of results]. This is a significant finding and it is hoped that it will be of interest to you. I am enclosing a copy of the report for your information.

I believe that these results are very important and I am sure that you will find them of great interest.

I am sure that you will find these results of great interest and I am sure that you will find them of great interest.

I am sure that you will find these results of great interest and I am sure that you will find them of great interest.

NEV 031207

780745

March 1, 1962

1-12

March 1, 1962

All of the following are available and distributed separately.
1. A series of 100 slides, 8 x 10 inches.

All of the slides are photographically distributed in color. The
slides are 8 x 10 inches in size and are 1/2 inch thick. The
slides are of the same size and thickness as the slides of the
other series. The slides are of the same size and thickness as the
slides of the other series. The slides are of the same size and
thickness as the slides of the other series.

If I can be of any further assistance, please let me know.

Sincerely,

Walter R. Hargrove
Director, National Health

cc: Mr.

Mr. Hargrove

cc: Mr. H. Hargrove

Mr. H. Hargrove
Mr. H. Hargrove
Mr. H. Hargrove

NEV 031208

780746

Pesticide

Wisconsin Hearing on Bid to Ban DDT
Could Affect Future of All Such Products

By RICHARD D. JAMES

Staff Reporter of The Wall Street Journal

MADISON, Wis.—The agricultural chemical industry is under attack—again.

Ever since 1952 it has led a somewhat harassed existence. That was the year the late Rachel Carson's best seller, "Silent Spring," appeared, showing widespread, indiscriminate use of pesticides produced by the industry. Now, as before, the issue is pesticides, this time specifically 1,1,1-trichloro-2,2-bis (p-chlorophenyl) ethane—better known as DDT.

The battle is being waged on several fronts. Last summer, Illinois, Wisconsin, Michigan and Indiana signed an agreement calling for stricter controls on all pesticides. DDT included, that are polluting Lake Michigan. The Illinois legislature is considering a bill banning the use of DDT. In Pennsylvania, a state senate committee recommended a ban on its use in fields and forests. And Sen. Nelson (D., Wis.) says he plans again to seek legislation outlawing the insecticide nationally. "I think it's been clear for a long time to these scientists who are knowledgeable that DDT is having a devastating environmental effect," he

Fighting in Wisconsin

The sharpest fight of the campaign, however, is shaping up here, and its outcome could have an important bearing on the future of DDT and pesticides generally. Focal point of the confrontation is a hearing being conducted by the Wisconsin Department of Natural Resources on a petition to ban the use of the chemical in the state. The agency has jurisdiction over keeping the state's water resources free of pollution, and under state law it can, upon petition by interested parties, restrict or ban the use of any substance it finds to be fouling the water.

In November the department was petitioned by a group of Wisconsin conservationists called the Citizens Natural Resources Association. They were joined by the Wisconsin Division of the Frank Watson League. The two groups allege DDT is getting into the water from a variety of sources and is harming wildlife.

Hearings began in December and continued for 13 days, with about a dozen scientists appearing in support of a ban. Then the proceedings were recessed to allow the chemical companies time to prepare a defense. They are expected to begin presenting their case in a few weeks.

The case is of more than passing interest, since "Silent Spring" appeared, research has found up now evidence suggesting DDT may harm wildlife, and possibly humans too, in previously unsuspected ways. The hearings mark the first time many of the findings have been

presented in a public forum. Last pesticide makers, who claim the evidence is flimsy, are expected to carry their fight against the chemical to the state supreme court.

Moreover, if the campaign against DDT is successful, the industry expects attacks on other pesticides. "If DDT is banned, the door

is open to a steady battle against DDT and similar insecticides, chiefly in the courts, ever since it was formed in October 1957.

It has met only limited success in the courts, but its lawsuits against state and local agencies haven't been totally ineffectual. Among other things, the pressure the suits have generated is credited with prompting more than 30 cities in Michigan to stop using DDT against the Dutch elm disease.

The industry is fighting back through a DDT task force, organized several years ago under the aegis of the National Agricultural Chemicals Association to contain the brush fires ignited by DDT's opponents. Most of its members are the companies that make DDT: Diamond Shamrock Corp., Allied Chemical Corp., Olin Mathieson Chemical Corp., Lebanon Chemical Corp., a privately held company; and Montrose Chemical Corp. of California, the largest maker. Montrose is owned jointly by Chris-Craft Industries Inc. and Stauffer Chemical Co. A sixth member, Geigy Chemical Corp., Ardsley, N.Y., doesn't make DDT.

Caught Off Balance

Thus, the industry is well organized to defend itself, but the Wisconsin attack seemingly caught it off balance. The task force didn't retain an attorney to represent it at the hearings until less than a week before they opened, and it apparently had almost no idea of what it would face in Madison. "Frankly, nobody knew what kind of hearing this was," says Louis A. McLean, the attorney finally picked by the task force. "We thought it would be something like a legislative hearing, where people got up and made statements of position." Mr. McLean is a long-time industry spokesman, who until he retired in July 1957 was secretary and general counsel for Velsicol Chemical Co., pesticide maker and Northwest Industries Inc. subsidiary.

In the past, pesticide manufacturers sometimes have tried to dismiss their critics as food faddists and neurotics. For example, in 1957 Mr. McLean wrote: "... the antipesticide people in almost every instance hold numerous beliefs in nutritional quackery and medical quackery, and they oppose public health programs."

The characterization rankled many of the scientists involved here, leading some to suggest that the industry this time has underestimated its opposition. Indeed, the Environmental Defense Fund and its attorney, Victor J. Yannaccone Jr., have spearheaded the case against DDT with expert testimony from reputable scientists brought in from all over the country.

Included, for example, and wildlife biologists, botanists, an ornithologist, a pharmacologist and an entomologist. Through the scientists' testimony, evidence is being presented by Charles F. Warden, an ornithologist and professor at the State University of New York at Stony Brook, the DDT has been found in the eggs of a pool of

at a pond in the Dutch elm disease, and in the eggs of a pool of

harmful use. Besides, industry spokesmen say DDT is safe. It must be approved by the Federal Government, they assert, and the Governmental Agencies involved—the departments of Agriculture and Interior and the Food and Drug Administration—wouldn't approve any agent harmful to humans or wildlife.

The industry backs up its contentions of safety by citing a study of Montrose Chemical employees at a DDT plant. The study report the employees are exposed to much higher levels of DDT than is the general public, yet they don't show any signs of harmful effects.

Possible Effect on Humans

So far, the issue of DDT's effects on humans hasn't been raised directly in the hearings. It was touched on briefly, though, by witnesses. Richard Welsh, a pharmacologist with Burroughs Wellcome & Co., a drug manufacturer, said the sex hormones affected in rats by the DDT-activated enzymes are the same ones found in man. He also explained that the amount of DDT needed to produce effect "is within a range of DDT found in human fat. . . . thus, if one can extrapolate data from animals to man, then one would expect that the change in these enzymes probably occur in man."

And Robert Blackbrough, a biologist with the University of California's Marine Biological Laboratory, touched on the subject briefly in his testimony. "Our general point is that the Food and Drug Administration has taken any consideration of the enzyme-inducing capacity of these substances (DDT and similar pesticides). This is a decision which the FDA will have to make sometime in the future. Will it permit an increase in the activity of these enzymes in our liver? No responsible person could now get up here and say that this constant nibbling away at our steroid sex hormones is without any physiological effect. It would be irresponsible."

Finally, the industry can be expected to harden on DDT's public health uses and benefits. "Too many people forget we need DDT control of mosquitoes that carry encephalitis and the world needs it to control malaria," says Mr. McLean.

Add Samuel Rotroen, chairman of I

NEW 031209

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The Wisconsin Department of Natural Resources petitioned the U.S. Supreme Court to allow conservationists to sue the National Resources Association. The two groups are fighting the use of DDT in the water from a variety of sources and is harming wildlife.

The case began in December and continued in June, with about a dozen scientists appearing in support of a ban. Then the proceedings were recessed to allow the chemical companies time to prepare a defense. They are expected to begin presenting their case in a few days.

The case is of more than passing interest. Since "Silent Spring" appeared, research has turned up new evidence suggesting DDT may harm wildlife, and possibly humans too, in previously unsuspected ways. The hearings mark the first time many of the findings have been used as ammunition against pesticide makers. Wisconsin finds the evidence sufficiently persuasive to ban or severely limit the use of DDT, conservationists and other DDT opponents are expected to carry their fight against the industry into other states.

Moreover, if the campaign against DDT goes successful, the industry expects attacks on other similar insecticides. Finally, the lower courts are certain to appeal to the courts, raising the prospect of a precedent-setting decision.

Could Affect Larger Market

The industry attempts to play down its financial interest in the case. It says the DDT sold in Wisconsin in 1967 amounted to sales of \$17,000. Even nationally, DDT volume is small. In 1967, the largest year for which figures are available, sales totaled \$137 million. However, the larger market that the industry would be threatened if the DDT ban goes against it totals about \$200 million annually—more than 20% of manufacturers' total pesticide sales.

To bolster their attack, the Wisconsin conservationists enlisted the help of the Environmental Defense Fund, a small Long Island, N.Y.-based group comprised mainly of scien-

tists and Northwest Industries Inc. outside the state.

In the past, pesticide manufacturers sometimes have tried to disguise their motives as food, health and scientific. For example, in 1957 Mr. McLean wrote: "...the antiparasitic people in almost every instance hold numerous beliefs in nutritional quackery and medical quackery, and they oppose public health programs."

The characterization rankles many of the scientists involved here, leading some to suggest that the industry this time has underestimated its opposition. Indeed, the Environmental Defense Fund and its attorney, Victor J. Yannaccone Jr., have spearheaded the case against DDT with expert testimony from reputable scientists brought in from all over the country.

Included are fishery and wildlife biologists, ecologists, an organic chemist, a pharmacologist and an entomologist. Through its scientists advisory committee, headed by Charles F. Wurster Jr., a biology professor at the State University of New York at Stony Brook, the EDF has built up since its inception a pool of about 100 scientists to furnish opinions or testimony. Not all EDF witnesses are members.

The EDF contends a complete ban on DDT is needed because even small amounts of the pesticide applied in the most rigidly controlled manner will still pollute the water and atmosphere. Mr. Wurster testified DDT is easily picked up from the soil and carried throughout the world on wind-borne dust and water particles. Other witnesses testified DDT has been found in nearly every part of the world, including dust collected over the Indian and Atlantic oceans. It even has been detected in the penguins of Antarctica, they assert.

The widespread contamination is harming wildlife, not necessarily by killing it outright, but by producing subtle metabolic changes, unsuspected until recently, that are gradually eliminating various species, the scientists say. Kenneth March, a biologist for the U.S. Department of Interior's fish-pesticide laboratory at Columbia, Mo., reported his research shows that feeding low, sublethal doses of DDT to brook trout causes a higher mortality among their offspring and makes the trout more susceptible to environmental stresses.

The industry's position is that DDT is a safe and effective insecticide. It would be irresponsible to ban it.

Finally, the industry can be expected to lean hard on DDT's public health uses and uses for control of mosquitoes that carry encephalitis, and the world needs it to control malaria," says Mr. McLean.

Adm. Samuel Hooten, chairman of the

Dip in Bird Population

University of Wisconsin wildlife ecologist Hickey testified that since 1946 there has been a plunge in populations of birds of prey such as the eagle, osprey and peregrine falcon. At first, scientists didn't know why, he testified. Then in 1957 research showed the birds were laying thinner-shelled eggs that were breaking and falling to hatch. Because the change in eggshell thickness occurred after 1946, the start of widespread DDT use, the scientists theorized that DDT somehow was upsetting the birds' calcium metabolism, which is involved in eggshell formation.

Mesars, Hickey, Wurster and others believe the theory now is well documented. During the hearings they explained how researchers quite by accident found that DDT, even in small amounts, activates certain liver enzymes in rats, rabbits and some birds. Enzymes generally control the body's chemical functions; those involved in this instance affect estrogen, a female sex hormone that plays a role in calcium metabolism. In this subtle way, they argue, DDT exacts its toll.

Additional support came from Lucille Stichel at the Interior Department's Patuxent wildlife research center in Maryland. She told how she fed small amounts of DDT and DDE, a breakdown product of DDT, to mallard ducks. The results were thinner eggshells and increased breakage, she said.

Although the industry hasn't yet presented its side of the story, talks with Mr. McLean and others give some indication as to what times it will face. Mr. McLean questions the qualifications of those who conducted the research. For instance, he said Mr. Wurster is an organic chemist. "But he was talking about things entirely unrelated to the field of chemistry. If a man wants his opinions respected, he should be qualified in the specialty in which he's speaking, and a scientist who's speaking outside his area of expertise is really no better qualified to foist an opinion than any person on the street."

Mr. McLean indicates the industry will call toxicologists and medical experts in its defense. "I think it's particularly interesting that although the EPA is basically talking about matters of health, it didn't bring one medical witness to the stand. And frankly I didn't expect them to, because I don't know of any medical toxicologist who's informed about pesticides who shares their fears."

DDT took force and general manager of Monsanto Chemical. "I think I have seen the future in DDT." "I think I have seen the future in DDT." "I think I have seen the future in DDT."

There's no way, of course, to tell yet how the Wisconsin Natural Resources Board will rule. But it may have given some indication of its attitude on the DDT question last year in one of its technical bulletins. "The use of any persistent pesticide (which includes DDT) remains a calculated risk. Science has shown that DDT is a potent hydrophobic poison. It is highly persistent in the environment. It is highly toxic to many animals. Further, these residues may be harming a variety of animal life in many subtle ways, which will only become apparent through intensive research. To continue to use DDT . . . in the face of the present level of contamination would seem to be an invitation to disaster."

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March 5, 1960

DDT ON TRIAL

W. Richard
WRICH

H. S. Bergen - HBERG
M. W. Farrar - JFQ
Dr. R. E. Keller - RKELL
Scott Tucker - STUCK
W. F. Waychoff/W. E. Schalk/
J. E. Springa
E. Wheeler/Dr. R. E. Kelly.

I am sure the attached article in the Wall Street Journal of March 4 on the DDT "trial" in Wisconsin has not escaped your notice. It emphasizes several things.

1. Dr. Risebrough seems to figure prominently in the proceedings. It could bode ill for Aroclors if the quotation attributed to him is true. "No responsible person could now get up here and say that this constant nibbling away at our steroids is without any physiological effect. It would be irresponsible." Not only does he appear to be setting the stage that anyone disagreeing with him is irresponsible, he seems to be equating any effect with a bad effect. This attitude has unpleasant implications.
2. The fact that the DDT "task force" (Diamond/Allied/Olin/Lebanon/Montrose/Geigy)"did not retain an attorney to represent it at the hearings until less than a week before they opened, and apparently had almost no idea of what it would face" is a sobering thought. Have we taken steps to obtain the transcript of the proceedings as discussed at our meeting in January. Should we alert our legal people to the possibility of Aroclor "hearings" in the future so that we are fully prepared.
3. I note that several of the witnesses for the prosecution have also been asking for Aroclor samples. In the worst light, this could mean future trouble for us.

Cumming Paton

CP:dbw

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