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GENERAL  ELECTRIC

TECHNICAL INFORMATION SERIES

Title Page

AUTHOR A.L. Bridgman <i>A.L. Bridgman</i>	SUBJECT CLASSIFICATION 1 Pyranol 2 Bibliography	NO. 56TP423 DATE 3-27-56
TITLE The Physiological Hazards of Pyranol Components Bibliography and Review		
ABSTRACT A list of 43 published references on the physiological hazards of Pyranol components is presented. A brief review of the information gathered from these references is reported.		
G.E. CLASS III GOV. CLASS	REPRODUCIBLE COPY FILED TECHNICAL DOCUMENTS Pittsfield Data Bureau	NO. PAGES 6
CONCLUSION		

By cutting out this rectangle and folding on the center line, the above information can be fitted into a standard card file.

For list of contents-drawings, photos, etc. and for distribution see reverse side.



INFORMATION PREPARED FOR Engineering and Manufacturing Information

Compilation S. Sass, A. L. Bridgman

COUNTERSIGNED R. R. Ralston *RR Ralston* SECTION Analytical Chemistry Sub.

BUILDING and ROOM No. 8-1A LOCATION Pittsfield

737114

GENP 002366

INTRODUCTION

Some question has arisen on several occasions concerning the physiological hazards resulting from misuses of Pyranol. A search is now under way for information available on the toxicity of Pyranol components and decomposition products. This bibliography is presented as a survey of published literature on The Toxicity of Pyranol Components. A brief review of information gathered from these references is submitted.

REVIEW

The subject matter was of interest as far back as 1899 (20). Only one reference of the forty-three collected gives any information concerning the chlorinated benzenes (34); no authoritative sources are listed for this information. The remainder deal primarily with chlorinated naphthalenes - which are not a current component of Pyranols, secondarily with the chlorinated diphenyls.

Toxic quantities of the chlorinated aromatics can be ingested (1,6,29,41), although this is considered as a minor source of introduction. Inhalation (1,2,6,17,18,9,29,32,41) and absorption through the skin (2,17,18,29,32,41) are considered the major avenues of contamination.

Introduction of these materials into the system have been known to cause acute yellow atrophy of the liver (1,6,9,17,18,29,32,41). Exposure either to the fumes or to the bulk material has caused a characteristic dermatitis, frequently called chloracne (6,9,17,18,29,32). Fatal poisoning from exposure to chlorinated naphthalenes has been reported in seven cases (6,9,17), from exposure to chlorinated aromatics in several cases (17), and from exposure to chlorinated diphenyls (9,41). Frequent cases of dermatitic poisoning have been reported (17,37). One author claims that the chlorinated diphenyls are more toxic than the chlorinated naphthalenes (1).

Maximum allowable concentrations for exposure during an eight hour period are reported of 1 mgm per cubic meter for chlorinated diphenyls and chlorinated naphthalenes (2,9,34); of 0.5 mgm per cubic meter for chlorinated diphenyls (6,7,41,43); of 10 mgm per cubic meter for chlorinated diphenyl (7); and of 50-75 parts per million in air for chlorinated benzenes (34).

As a safety measure, it is recommended that these materials be transferred, handled and poured in the cold (17,18), and under conditions of adequate forced draft ventilation (43). One paper deals primarily with the design, construction and ventilation of wire impregnating tanks using chlorinated hydrocarbons (43).

Pre-employment and periodic physical examinations for all employees working with chlorinated aromatics is recommended (17,18,32), as is also direct medical supervision (9,28,32). Knowledge of and prevention of hazardous conditions is considered the responsibility of the foreman, under direct engineering control (17,18).

It appears to be generally agreed upon (3,7,17,18,32,35,41) that the following hygienic measures should be taken by personnel working with these materials: (a) regular daily change of work clothes; (b) shower and scrub down of exposed parts of body at the end of the working period; (c) use of a protective skin cream on all exposed body parts; and (d) regular periodic cleansing of the work area. A cleansing cream of equal parts of butyl stearate and sulfonated castor oil built up with a corn meal abrasive is recommended by one author (18).

Analysis of air samples by combustion over a platinum catalyst with determination of chlorine and chloride is described (9,29). Another method (29) suggests collection in amyl acetate, a lamp combustion and determination by argentometry or turbidimetry.

Of the forty-three references collected, only twenty-seven were abstracted; the other sixteen were not readily available to the William Stanley Library. Three textbooks (29,34,39) gave no source material for their information. Experimental work with rats and rabbits has been reported (1,6,33,40).

ACKNOWLEDGEMENTS

The author is indebted to Mr. S. Sass of the William Stanley Library for his aid in collecting the material. He is also indebted to Dr. F. G. McKerr for review of the paper.

10-31-55

Since the writing of this report, a new monograph by W. F. von Oettingen, U.S. Department of Health

"The Halogenated Hydrocarbons, Their Toxicity and Potential Dangers" Public Health Service Publication No. 414 (1955)

has been received by the William Stanley Library.

Chapter V, Halogenated Aromatic Hydrocarbons (pp 283-320) is of interest with respect to this paper, particularly the sections:
1-C: Polyhalogenated Benzene Derivatives (pp 297-299)
5-C: Polychlorinated Diphenyl Derivatives (pp 306-307)
6-B: Polyhalogenated Naphthalene Derivatives (pp 308-314)

A bibliography is given with each section.

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Monsanto

DICTATE IN SEQUENCE:

1. HEADING INFORMATION
2. NAMES OF ADDRESSEES
3. NAMES OF CARBONEES
4. IMMEDIATE ACTION NEEDED
REPORT ON CALL

REPORT CAPTIONS:

1. OBJECTIVE
2. PERSONS CONTACTED
3. RESULTS
4. ACTION REQUIRED

CUSTOMER NAME WESTINGHOUSE ELECTRIC		DATE OF CALL 4/29/70	
CITY AND STATE BLOOMINGTON, IND.		DATE RECEIVED	
CUSTOMER MAILING LIST CHANGES - SERVICE CENTER USE ONLY			
NAME AND TITLE		PUT ON	TAKE OFF
		MP	MAG.
		CATEGORY CODES	
REGION EASTERN		SERVICE CENTER CINCINNATI	
		SALESMAN R. GRAHAM	

TO P. G. BENIGNUS - ST. LOUIS CC D. A. Olson - St. Louis
W. B. Papageorge - St. Louis

PERSONNEL CONTACTED: Don McClain - Manager, Engineering
George Mercer - Capacitor Design Engineer
Ken Tyson - Buyer - Purchasing Dept.

Presented contract per Purchasing request for same.

Discussed rebate situation and obtained confirmation from P.G. Benignus re same and have since confirmed via telephone to Ken Tyson. In meantime, Ken learned of details from Kelly.

Purchasing currently considering purchase of milk truck for scrap material to be hauled to Findett. Recommended that they contact Farmers Co-op in Indiana area for surplus trucks. These units should cost approximately \$1.00/gal.

Kelly and Tyson unaware of April 21 meeting. Learned about it at the last minute. This type of situation should be avoided and it was my understanding at our January meeting that such customer presentations in St. Louis would be arranged through the field. Had we set this up, Purchasing would have seen that someone from Bloomington had attended this meeting.

In future, salesman will plan to arrange all such meetings at Westinghouse unless there has been a change in how we formerly agreed to do this.

DuPont now supplying polypropylene film to Westinghouse. Additionally using binding straps for power factor capacitors made of polypropylene tape.

Westinghouse states that General Electric uses .045 and .060 polypropylene film in their capacitor designs.

Don McClain states that he has one of the first Westinghouse A,oclor capacitors (1934) in his laboratory. He is agreeable to Monsanto reference in a Monsanto magazine article. This capacitor is a 2400 volt, 10 KVar unit taken from New York State Gas & Electric in Johnson City, N.Y.

PLAINTIFF'S
EXHIBIT

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PLAINTIFF'S
EXHIBIT

158

DICTATE:

1. HEADING INFORMATION
2. NAMES OF ADDRESSEES AND CARBONEES

ORT:

- IMMEDIATE ACTION REQUIRED
2. PERSONS CONTACTED
3. OBJECTIVE
4. RESULTS
5. FURTHER ACTION REQUIRED

CUSTOMER NAME WESTINGHOUSE ELECTRIC		DATE OF CALL 4/29/70	
CITY AND STATE BLOOMINGTON, IND.		CHANGE REQUIRED CALL UNITS	
CONTACT DATA AND MAILING LIST CHANGES - DISTRICT OFFICE USE ONLY			
NAME AND TITLE	PUT ON	TAKE OFF	MP MAG. CATEGORY CODES

- 2 -

TO

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Electrical industry growth now ~~started~~ doubling every 8 years according to McClain. He states that for every KVA generation, have to add 1/2 KVar capacitants.

Engineering would require following characteristics from any new impregnant to replace Aroclor:

1. High corona extension voltage almost equal to starting voltage.
2. High dielectric constant to shift stress to film and off of fluid (Aroclor higher DK than polypropylene film; Aroclor DK, 5.8 and polypropylene DK, 2.4).
3. Requires ~~Underwriter~~ Underwriter laboratory listing as being fire-resistant.

Westinghouse Engineering states that silicones offer some attractive advantages, such as wide temperature range, good corona characteristics, and doesn't attack polypropylene film or jack up the power factor; however, it does have a lower dielectric constant than Aroclor and the price is prohibitive.

Of interest is fact that Westinghouse polypropylene film designs use Aroclor as follows: 100 Kvar - 24 lbs. Aroclor; 150 Kvar - 36 lbs. Aroclor.

When asked about a ~~ht~~ higher dielectric constant impregnant, McClain responded that if a film could be developed with losses of 1/2 watt or lower and a dielectric constant of 3 to 4 instead of 2, then a fluid with a dielectric constant of 10 to 12 may be of interest (such a fluid would throw more stress on film). In addition to requirements mentioned above, one additionally must consider how such a fluid would respond over a wide temperature range.

Metallized film capacitors were discussed and Westinghouse Engineering feels that metallized film processes, as we know them today, are too expensive for manufacture of power factor capacitors.

DISTRICT OFFICE	SALESMAN	DATE REC'D. 1159	DATE TYPED
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DATE:

1. HEADING INFORMATION
2. NAMES OF ADDRESSEES AND CARBONEES

NOTE:

1. IMMEDIATE ACTION REQUIRED
2. PERSONS CONTACTED
3. OBJECTIVE
4. RESULTS
5. FURTHER ACTION REQUIRED

CUSTOMER NAME WESTINGHOUSE ELECTRIC BLOOMINGTON, IND.		DATE OF CALL 4/29/70	
CITY AND STATE		CHANGE REQUIRED CALL UNITS	
CONTACT DATA AND MAILING LIST CHANGES - DISTRICT OFFICE USE ONLY			
NAME AND TITLE	PUT ON	TARE OFF	MP MAG. CATEGORY CODES
- 3 -			

TO

CC

However, the losses of this type system are much less because removing paper and Aroclor (here is where losses occur). However, unless economics of the metallized film process change, it is out as far as Westinghouse is concerned. Metallized film currently priced at \$4.00-20.00/lb. and machines for capacitor manufacture are expensive. If metallized film is much over twice the cost of the Aroclor-film system and unless the metallized film has some super qualities, then economics dictate polypropylene film in power factor units.

Additionally, metallized film winding procedures are slow, low volume operations and it doesn't appear that significant tonnage can be developed which would lower cost or cause machine manufacturers to design more rapid handling and processing equipment. Presently, there is a large volume of scrap with metallized film.

Attn. P. G. Benignus: Westinghouse has raised the question as "What do we tell our customers?" re disposal of failed capacitors and Aroclor. We must come up with some key type of response for our customers. Have been asked this question at almost every account.

DISTRICT OFFICE	SALESMAN	DATE REC'D.	DATE TYPED
		1160	

EXHIBIT NO. **2655**

	GENERAL ELECTRIC	WESTINGHOUSE	MONSANTO
AUTHENTICATED:			
YES			
NO			
NO KNOWLEDGE			
NORMAL BUSINESS ACTIVITY:			
YES			
NO			
NO KNOWLEDGE			
NO SUSPICION OF AUTHENTICITY:			
YES			
NO			
STIPULATED OTHERWISE:			
YES			
NO			
NO KNOWLEDGE			

BCC: P. G. BENIGNUS
D. A. OLSON

August 14, 1970

Dr. Lyon Mandelcorn
Advisory Scientist
Research & Development Center
Westinghouse Electric Corporation
Pittsburgh, Pennsylvania 15235

Dear Dr. Mandelcorn:

Attached are copies of (1) activate sludge bio-degradation test method and (2) analytical procedures for the determination of polychlorinated biphenyls in water, sediment, biological specimens and gases.

I promised this information during our interesting meeting at your Research Center on July 23.

I hope the delay has not inconvenienced you and if I can be of further service, please let me know.

Sincerely,

W. B. Papageorge
Manager
Environmental Control

ms

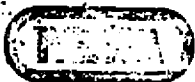
Attachments

cc: G. R. Graham
Monsanto Company



NEV 003891

703129



National Electrical Manufacturers Association
155 East 44th Street - New York, N.Y. 10017 - 212-682-1500

MINUTES:

**COMMITTEE ON USE AND DISPOSAL
OF ASKAREL; OF THE BOARD OF
DIRECTORS; OF THE POWER EQUIP-
MENT DIVISION**

PLACE OF MEETING:

O'HARE INN, CHICAGO, ILL.

DATE AND TIME:

**TUESDAY, FEBRUARY 23, 1971
10:30 A.M. - 3:45 P.M.**

MEMBERS PRESENT:

D. E. Allen
J. P. Kuzela
E. L. Raab
W. C. Reinhardt
J. C. Rissinger
H. R. Rowe

Allis-Chalmers Manufacturing Co.
Sangamo Electric Company
General Electric Company
Moloney Electric Company
Westinghouse Electric Corp.
McGraw Edison Power Systems Div.

MEMBERS ABSENT:

NONE

OTHERS PRESENT:

P. G. Benignus
A. O. Hauser
W. B. Papageorge
A. L. Rickley
A. M. Salazar

Monsanto Company
Electric Utilities Company
Monsanto Company
Doble Engineering Co.
NEMA Staff

PRESIDING OFFICER:

W. C. Reinhardt, Chairman

I. APPROVAL OF PREVIOUS MINUTES

The minutes of the August 20, 1970 meeting not being available, as yet, no previous minutes were submitted for approval.

II. PURPOSE OF THIS MEETING

The Committee noted that the purpose of this meeting is to review developments since the August 20, 1970 meeting and develop recommendations to ANSI on a suggested program of action, including priorities for various activities, list of organizations to be invited to participate, etc. The Secretary's letter of February 10, 1971 calling this meeting and outlining the agenda, also contained a chronological list of steps taken, so far, and a master list of organizations that might have interest in this problem. A copy of the letter is attached as EXHIBIT "A".

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Askarel - Div. 8

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February



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Messrs. P. G. Benignus and W. B. Papageorge of Monsanto and A. O. Hauser, whose company manufactures capacitors and A. L. Rickley, who is associated with a well known electrical insulation consulting firm, were invited to participate in the discussions.

III. REVIEW OF DEVELOPMENTS SINCE THE
AUGUST 20, 1970 MEETING

Members of the Committee presented reports on developments, as outlined in the Chairman's working agenda, as follows:

A. The PCB problem in brief, including the status of the Massachusetts House Bill No. 3635 - - - W. B. Papageorge

NOTE

A copy of the Bill is attached as EXHIBIT "B".

B. Report on developments within IEC, IEEE and ASTM, on the askarel problem - - - E. L. Raab

NOTES

Mr. Raab distributed copies of written reports, which are attached as follows:

1. Letter providing the Chairman of IEC WG/02 on askarels with information on US activity, (EXHIBIT "C").

2. Report on October, 1970 meetings of IEC No. 10 on Liquid and Gaseous Dielectrics and Subcommittee 10B on Insulating Liquids Other than Hydrocarbon Oils. Messrs. Raab and Benignus, who are the US Delegates, attended these meetings, (EXHIBIT "D").

3. Lecture given by Mr. P. Jay of the Prodelac Company, a foreign producer, at a university in Sweden, in 1970. This information was distributed at the October IEC meetings, by the Delegate from France, (EXHIBIT "E").

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Askarel - Div. 8

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4. Appropriate excerpt from minutes of the April 15, 1970 meeting of the Insulating Fluids Subcommittee of the IEEE Transformers Committee, (EXHIBIT "F").

5. Excerpt on further discussion from the minutes of the October 28, 1970 meeting of the parent IEEE Transformers Committee, (EXHIBIT "G").

6. Appropriate excerpt from the minutes of the September 11, 1970 meeting of Subcommittee B, of ASTM Committee D27 on Insulating Fluids, (EXHIBIT "H").

C. Which PCB's remain in use in the electrical industry? - - - - P. G. Benignus.

D. Status of disposal facilities - - - - W. B. Papageorge.

Mr. Papageorge commented on the above, as follows:

1. Monsanto facilities for bulk fluids.
2. Monsanto facilities for moderately sized solid materials.
3. Rollins-Purle, Inc. facilities for bulk fluids.
4. Kentrol Pollution Services, Inc. facilities for bulk fluids. (Still under investigation by Monsanto).
5. Landfills

The value of landfills depends on the type of soil conditions, distance from waters, etc. Preliminary investigations with Officials of some states indicate a negative reaction to state sanctions. States usually defer to local levels on these matters.

IV. FORMATION OF THE ANSI COMMITTEE

After some further discussion, the Committee approved the following:

- A. The holding of an ANSI conference, as soon after receiving ANSI formal approval as is possible.
- B. Mr. W. B. Papageorge should act as discussion leader for the Conference and should present the background leading to Monsanto's and NEMA's sponsorship of the formation of an ANSI Committee. As was the case at

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today's meeting, others involved in the discussion, so far, should be called upon to assist, as is considered to be appropriate.

The following objectives, developed at today's meeting, should also be proposed:

OBJECTIVES

In addition to developing procedures and guides for safe use, maintenance and disposal of askarel and askarel soaked materials used in electrical equipment, it shall be the objectives of the ANSI Committee to:

1. Serve as a source for technical information and advice for Federal, State and local authorities and for the information of all others concerned.
2. Encourage the development of suitable disposal facilities and maintain a list of their capabilities and locations, for the information of all concerned.
3. Serve as the advisory group for US participation in CEE, IEC, COPANT, SEGRA and other international organizations.

As appropriate during the presentation, or during the following discussion, Mr. Papageorge should propose that the following Subcommittees should be considered to develop specific proposals for Committee action:

1. Procedures and guides for disposal of askarel and askarel soaked materials.
2. Procedures and guides for safe use, care and maintenance of askarel.
3. National and international communications.

At an appropriate time during the meeting, the Secretary should recommend that a small Steering Committee, comprised of the Chairman of the Committee and the Chairmen of the EEI, IEEE, ASTM and NEMA Delegations. The purpose of the Steering Committee is to appoint the above Subcommittees and, in general, assist the Chairman in the performance of his other responsibilities as Chairman of the ANSI Committee.

C. The letters inviting interested organizations to participate should briefly comment on the need for the ANSI Committee and indicate that a Conference is being called by a certain date, to review the matter in more detail and formally establish the Committee and any needed Subcommittees. An attachment to the letter should cover the sponsors, the scope approved by ANSI and a list of Organizations being invited to participate.

D. In addition to any other Organizations represented on the ANSI Electrical and Electronics Technical Advisory Board (EETAB) that may express interest in this activity, the following Organizations should be invited to attend the Conference:

American Public Power Association
American Society for Testing and Materials
Association of American Railroads
Association of Edison Illuminating Companies
Automobile Manufacturers Association Inc.
Certified Ballast Manufacturers Association
Doble Engineering Co.
Edison Electric Institute

Government Groups

Atomic Energy Commission
Corps of Engineers
Department of Health, Education
and Welfare - Food and Drug Administration
Department of Interior
Environmental Protection Agency
General Services Administration
National Bureau of Standards
Rural Electrification Administration
Tennessee Valley Authority

International Association for Pollution Control
Institute of Electrical and Electronic Engineers
Kentrol Pollution Services
Manufacturing Chemists Association
Monsanto Company
National Electrical Manufacturers Association
National Fire Protection Association
Rollins-Purle Inc.
Underwriters' Laboratories Inc.
Water Pollution Control Federation

V. TIME AND PLACE OF THE NEXT MEETING

Left to the call of the Chair.

VI. ADJOURNMENT

There being no further business before the Committee, the meeting was adjourned at 3:45 P.M. Luncheon was served during the meeting and there was, therefore, no recess for that purpose.

AMS:dk
ATTS: EXHIBITS "A" - "H"

A. M. Salazar,
Executive Secretary
Power Equipment Division

APPROVED BY COUNSEL:

Comm. on Dis. of
Askarel - Div. 8

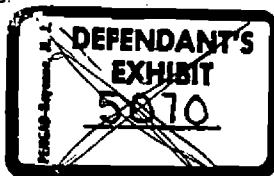
- 8 -

February 23, 1971

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EXHIBIT NO. **1651**

	GENERAL ELECTRIC	WESTINGHOUSE	MONSANTO
AUTHENTICATED:			
YES			
NO			
NO KNOWLEDGE			
NORMAL BUSINESS ACTIVITY:			
YES			
NO			
NO KNOWLEDGE			
NO SUSPICION OF AUTHENTICITY:			
YES			
NO			
STIPULATED OTHERWISE:			
YES			
NO			
NO KNOWLEDGE			



BLOOMINGTON WORKS

From : Materials Department
WIN
Date : November 4, 1970
Subject: Meeting with
Monsanto Chemical Co

TO: J. Brittain, Mgr. Engr.
R. Thompson, Manager Materials

→ CC: K. Tison, Buyer Purchasing
J. Howells, Cap. Engr.
Dr. T.W. Dakin, R & D Lab.

Messrs. Ken Tison, Jeff Howells, Keith Kelly, Don McClain, together with Dr. T.W. Dakin of R & D Labs attended a meeting with Monsanto Chemical Co., in St. Louis, October 30. Monsanto personnel included Messrs. Baber, Benignus, Bergen, Davis, Gossage, Graham, Munch, Papageorge, and Bryant.

1. Status of work on polychlorinated biphenyls (PCB's), including capacitor grade aroclor 1242, as potential environmental contaminants, was reviewed. Monsanto is now involved in at least 2 lawsuits. More than 125 different laboratories have joined in the investigation of the effects of P.C.B.'s on the environment. P.C.B.'s appear to have effects similar to DDT, but in reduced magnitude and rate.
2. Monsanto response to the situation has been
 - A. Controlled usage of aroclors
 - (1) Where loss to environment appears certain, sale has been stopped. (Usage as hydraulic fluid, plasticizers, etc. has been stopped).
 - (2) Where usage may be contained and controlled (as in capacitors and transformers), supply is continuing.
 - (3) Publicity and plant visitations have been used to alert customers and users to problems and to initiate strict control procedures in manufacture and application.

(continued)



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- (4) Participation in the ANSI Committee will aid in setting guidelines and publicizing use, application, and disposal of PCB's.

B. Provide for Disposal of Scrap Aroclors

- (1) Incinerator being installed at Sauget, Illinois for disposal of waste fluids. (Cost @ 3¢/lb. + freight).*
- (2) Other commercial disposal plants investigated:
Rollins - Purle Truck Co., is installing first of what may become 100 kiln-type disposal plants. One is installed outside Philadelphia, with others under way at Baton Rouge, Chicago and Cleveland.
- (3) Studied land-fill disposal. It is their opinion that restrictions will develop that will finally eliminate this means of disposal.
- (4) Studying other disposal methods for saturated solids combined with metals (containers, foil, wire, etc.)

* Note: It was estimated that cost for "small" incinerator of type developed by John Zink Inc., Tulsa, Okla., would cost approximately \$250,000.00, installed with gas scrubber, and having a 3,000,000 to 5,000,000 lb./yr. capability.

C. Provide suitable replacement fluid

Monsanto indicated, by their heavy commitment, a strong conviction that the problem can be met and askarel production continued on the basis of introduction of a new askarel, "MCS - 1016". Gas chromatograms were introduced comparing the initial and final composition of conventional aroclor 1242, treated for 72 hours with sewage sludge. Degradation of mono-, di-, and trichlorinated biphenyl was evident, but concentrations of higher molecular weight material remained relatively unchanged. The new MCS-1016 has all high molecular weight aroclors (above 1242) removed, and rapid biodegradability by sludge treatment is to be expected. It is hoped that use of such a non-persistent material would not be considered a serious threat to the environment.

Typical comparative analyses were offered:

(continued)

900542

700 0289

CONCENTRATION

	<u>Aroclor 1242</u>	<u>MCS-1016</u>
Aroclor 1254	8 %	< 0.15 %
Aroclor 1243	18 %	< 9.0 %
Aroclor 1242	(Balance)	(Balance)
Dichlorinated Biphenyl	19 %	(19 % +)
Mono-Chlorinated "	1 %	(1. % +)
Non-chlorinated "	< .05 %	0.

Flash point for the MCS-1016 compares with Aroclor 1242. ("Fire point" has not yet been defined.)

Monsanto has supplied 55 gallon drums for trial by all of their major customers, and expect to receive reports within 2 to 4 months. They anticipate favorable results on life tests, and data indicate dielectric properties comparable to Aroclor 1242.

Monsanto has ordered a distillation column suitable for mass production of MCS-1016 and expect to be able to make deliveries beginning in July 1971, from the Krummerick plant.

Cost of MCS-1016 will be about 2¢ to 3¢/lb. higher than for Aroclor 1242.

Availability of Aroclor 1232 will be continued.

3. In summary, Monsanto plans to do everything in their control to remain a supplier of askarel to the capacitor and transformer industry. Should events force total discontinuance of polychlorinated biphenyls or if competitors begin to offer more palatable materials, they will have no alternatives to offer.
- (a) Monsanto has agreed to redefine the 90 day clause in the present contract. Mr. Gossage will write a letter to K. Kelly redefining this clause and assuring supply of 1242 until an adequate substitute is developed.
- (b) Monsanto has also suggested a meeting between their top management and J. Sterling of Westinghouse. Their intention would be to further assure "W" of Monsanto's intent to remain in the business. The need for this meeting will be explored following satisfactory rewording of the contract.

(continued)

900543

700 0290

- (c) Monsanto stated that their costs have increased \$.03/#. They plan to announce a price increase effective January 1971 (effective July, 1971 to DAD due to contract). The amount of this price increase has not been determined but it is estimated at about \$.02/#.


Keith Kelly
Purchasing Manager


D. McClain
Manager Capacitor Engr.

KK:emc

900544

700 0291

EXHIBIT NO. **1452**

	GENERAL ELECTRIC	WESTINGHOUSE	MONSANTO
AUTHENTICATED:			
YES			
NO			
NO KNOWLEDGE			
NORMAL BUSINESS ACTIVITY:			
YES			
NO			
NO KNOWLEDGE			
NO SUSPICION OF AUTHENTICITY:			
YES			
NO			
STIPULATED OTHERWISE:			
YES			
NO			
NO KNOWLEDGE			

Monsanto

A. E. PELTOSALO

FEB 14 1972

MONSANTO INDUSTRIAL CHEMICALS CO.

800 N. Lindbergh Boulevard

St. Louis, Missouri 63186

Phone: (314) 684-1000

February 8, 1972

Mr. A. E. Peltosalo, Group V.P.
General Electric Company
570 Lexington Avenue
New York, New York 10022

Dear Sir:

We have recently been in communication with you concerning Monsanto's policy to restrict the sale and delivery of polychlorinated biphenyl (PCBs) products including those sold under tradenames such as Aroclor®, Inerteen®, Pyranol®, and under the generic term askarel.

As you are aware, effective January 15, 1972 Monsanto discontinued sales and delivery of these products to manufacturers of transformers and capacitors, except those who have entered into special agreements to indemnify Monsanto with respect to these products. You have entered into such an agreement.

In the past Monsanto supplied these PCB-containing askarel products to transformer repair shops, and to companies needing these products for top-up of existing transformers. These sales have now been discontinued. Future inquiries from these companies owning or desiring to repair a transformer of your manufacture will be referred to you as the source for additional askarel fluids.

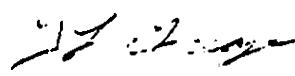
In the event you desire to supply top-up product to your customers or to repair shops, Monsanto intends to make these products available to your company or to your designee upon receipt of your order. In either case, the sales will be to you and we will invoice you. If you choose to ship directly from your own stocks to your customers, we will be happy to make available to you all information we have on proper packaging of these products. Please contact us concerning your instructions for referral of these customers to you. If you have any questions, or if you



wish to meet with representatives of Monsanto concerning the program Monsanto intends to follow, please telephone (314) 694-2513 or write directly to Mr. Paul Benignus, Monsanto Company, P. O. Box 14617, St. Louis, Missouri 63178.

We sincerely regret any inconvenience that this decision may cause you, but it is taken in an effort to continue to make available these products for these important applications within the framework of our overall sales policy.

Very truly yours,


T. L. Gossage
Marketing Director
Specialty Products Group

/b1

cc: Mr. Walter A. Schlotterbeck,
Corporate Counsel
570 Lexington Avenue
New York, New York 10022

Mr. Edw. L. Raab
Transformer Department
100 Woodlawn Avenue
Pittsfield, Massachusetts 01201

Mr. James P. Kinney
Redmond Circle
Rome, Georgia 30161

EXHIBIT NO. **1453**

	GENERAL ELECTRIC	WESTINGHOUSE	MONSANTO
AUTHENTICATED:			
YES			
NO			
NO KNOWLEDGE			
NORMAL BUSINESS ACTIVITY:			
YES			
NO			
NO KNOWLEDGE			
NO SUSPICION OF AUTHENTICITY:			
YES			
NO			
STIPULATED OTHERWISE:			
YES			
NO			
NO KNOWLEDGE			

Monsanto

FROM (NAME & LOCATION): Industrial Chemicals Co. - St. Louis

DATE December 17, 1971

cc

SUBJECT

REFERENCE

TO : Directors of Marketing
Field Sales Directors
Field Sales Managers
District Sales Directors

CONFIDENTIAL

At their Board meeting on December 9, 1971, Monsanto's Board of Directors approved corporate Monsanto decisions previously taken as follows:

1. Terminate all sales of PCB fluids for use in heat transfer applications by formal notice to all customers.
2. Immediately implement a plan to terminate all sales of polychlorinated terphenyls by March 31, 1972 for plasticizers.
3. Sales of PCB fluids for transformer or capacitor use will be dependent upon the receipt of agreements acceptable to Monsanto, holding Monsanto harmless from legal liability associated with the use of PCBs in transformers and capacitors from customers whose financial responsibility makes such agreements meaningful in Monsanto's opinion.

Since Monsanto Industrial Chemicals Company sells these products to many key corporate Monsanto customers, we want you to be aware of these decisions and their implementation so that customer visits don't lead to surprises.

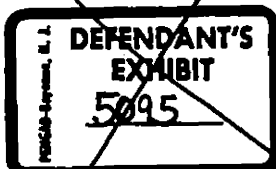
What MICC products are involved?

1. Specialty Products Business Group
Functional Products Group
MICC

Heat Transfer Fluids:

Therminol® FR-Lo Temp
Therminol® FR-0
Therminol® FR-1

900369



300 2655

Capacitor Dielectric Fluids:

Capacitor 21
Aroclor® 1016
Aroclor® 1242
Aroclor® 1248
Aroclor® 1254

Transformer Askarel Fluids:

Inerteen 100-42
Inerteen 70-30
Inerteen PPO
Pyranol A13B3B

2. Plasticizer Business Group
Rubber & Process Chemicals Division
MICC

Plasticizers

Aroclor® 1221B
Aroclor® 5432
Aroclor® 5442
Aroclor® 5460
Aroclor® 6000 Series

Montar 5
Santicizer 301
Santicizer 311
Santicizer 326
Santicizer 327
Santicizer 335
Santicizer 336
Santicizer 337
MXP 101

What effect will this have on our customers?

While everyone wishes these decisions did not have to be taken, and while they will cause some inconvenience to customers, the picture is not so gloomy as might be supposed.

1. These decisions should not come as a complete surprise to any customer. We have been alerting customers by letter periodically since February, 1970 of the problems associated with PCBs.
2. We phased out PCBs from certain applications (plasticizers, hydraulic fluids, and process fluids) from mid-1970 to early 1971.
3. We discontinued sales of PCBs to new heat transfer fluid systems several months ago.
4. Since August, 1971, many existing PCB heat transfer fluid users have effected conversions to non-PCB fluids. (To date over 150 of such systems have converted. We have retained 90% of these conversions for Monsanto with our non-PCB heat transfer fluids Therminol 55 and 66.)

300 2656

What help are we offering our customers?

1. Heat Transfer Fluids

As explained in our customer notification letter, we have assembled an experienced engineering team to give help to customers as they decide on conversions. We also offer the services of a high temperature incinerator to dispose of used PCB heat transfer fluids, and will accept return of originally packaged PCB fluids.

2. Dielectrics

The decision on dielectric fluids will probably not affect most of you since transformer and capacitor manufacturers are a reasonably small and separate group. We emphasize that we are not discontinuing dielectric PCBs since their usage is important to the national interest. Monsanto is conditioning such sales, however, on obtaining certain financial safeguards, while acting responsibly in the interest of the electrical industry, its consumers, and thus the country. We are also active in ANSI C107, a committee set up to develop guidelines and policies for handling PCB in the electrical industry.

3. Plasticizers

Monsanto is working to develop a list of suggested replacement products and suppliers to be used as a guide in replacing our Arcelor[®] products in existing formulations.

Questions from customers

Customers are going to ask questions about these decisions. We would suggest that your salesmen not try to answer these questions but to refer the customer to St. Louis:

Heat Transfer Fluids

Telephone:	(314) 694-2514
Mail:	Cumming Paton Monsanto Company P. O. Box 14617 St. Louis, Missouri 63178

Dielectrics

T. L. Gossage	(314) 694-2545
P. G. Benignus	(314) 694-2513
C. Paton	(314) 694-2520

Plasticizers

W. S. Clark

(314) 694-2518

Direct inquiries from customers to Monsanto district offices should be handled in the same way. If you wish to pass on questions or statements from customers, please feel free to do so through the same channels.

Key Monsanto customers

Attached you will find a list of key corporate Monsanto customers who will be given special notification of Monsanto's decisions. Separate lists are given for Heat Transfer Fluids and chlorinated terphenyl plasticizers. No list is given for dielectric customers since discontinuation of sales will not result unless our terms are rejected. Customers not included in these lists will receive the formal notification letters by mail (copies attached). Key customers will be notified as follows:

Heat Transfer

1. By mail: Formal letter plus cover letter indicating that conversions are already underway or (in the case of multi-plant locations) have actually taken place at some locations.
2. By phone: Formal letter will then be mailed.
3. By phone plus personal visit (letter hand-carried): In this category we may ask assistance from Regional Vice Presidents or Directors of Sales/Marketing to introduce us to the "right" people. The personnel primarily involved from Specialty Products Group in notifying key customers will be:

H. S. Bergen, Jr.	- Business Group Director
T. L. Gossage	- Director of Marketing
M. T. Johnson	- Field Sales Manager
C. Paton	- Product Manager

Plasticizers

1. By mail: Formal notification by letter addressed to the Office of the President to be mailed on 12/31/71.
2. By phone: By regional managers and salesmen during period from 12/20/71 to 12/31/71. This will cover all important accounts.

300 2658

3. Personal calls: By regional managers and salesmen from 12/20/71 to 12/31/71 with follow-up visits by St. Louis management personnel from 1/1/72 to 1/14/72 at key accounts as appropriate.

Customer Notification

U. S. Domestic Customers

Heat Transfer Fluids: December 15-20, 1971
Plasticizer Arcolor: December 20-31, 1971

Canada

Notification will follow the U. S. pattern as quickly thereafter as practical.

International

Action will be taken through World Area Marketing management in the first quarter of 1972.

It is very important that you do not make this subject a deliberate topic of conversation in your dealings with your customers. Please do not preempt the business groups involved in notifying customers. We have alerted you so that you are not caught unaware should delicate negotiations concerning your products be going on. We would ask in return that you treat this information in confidence so that we can implement these corporate decisions as effectively as possible for both Monsanto and our customers.

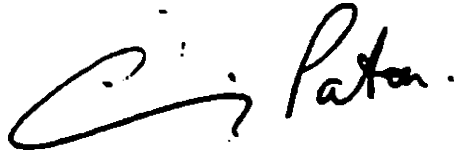
Competition

Be particularly careful in how you handle this information at the following accounts:

Dow
Dow Corning
All oil companies

Dow is Monsanto's major competitor in synthetic heat transfer fluid. They have never had fire-resistant fluids like Therminol FR fluid. However, they will be out to obtain refills of fluid with Dewtherm against our Therminol 66. If the customer operates at temperatures below 550°F. or so, he may elect to go to lower cost fluid such as Therminol 55. In these cases, our competition will be petroleum-based fractions from Humble, Mobil, Shell, etc.

Finally, may we ask that this memo be furnished only to those with a need to know.



C. Paton
Product Manager
Dielectric, Heat Transfer &
Process Fluids
Specialty Products Business Group



W. S. Clark
Product Supervisor
Plasticizer Business Group

Enc. (H. T. Fluid Letter)
(Plasticizer Aroclor Letter)
(Key H. T. Fluid Accounts)
(Key Plasticizer Aroclor Accounts)

300 2660

EXHIBIT NO.

1654

	GENERAL ELECTRIC	WESTINGHOUSE	MONSANTO
AUTHENTICATED:			
YES			
NO			
NO KNOWLEDGE			
NORMAL BUSINESS ACTIVITY:			
YES			
NO			
NO KNOWLEDGE			
NO SUSPICION OF AUTHENTICITY:			
YES			
NO			
STIPULATED OTHERWISE:			
YES			
NO			
NO KNOWLEDGE			

10

COMMENTS BY THE GENERAL ELECTRIC COMPANY ON
"PROPOSED TOXIC POLLUTANT EFFLUENT STANDARDS
FOR POLYCHLORINATED BIPIHENYLS"

(41 FR 30468, July 23, 1976)

INTRODUCTION

The General Electric Company is a major manufacturer of electrical capacitors and transformers whose dielectric fluids contain polychlorinated biphenyls (PCBs). Consequently, we have followed diligently the development of the regulatory structure for PCBs, and we submit the following comments regarding the proposed toxic pollutant effluent standards for PCBs published in the Federal Register on July 23, 1976 (41 FR 30468). We hope that our comments will assist the Environmental Protection Agency in promulgating effluent standards for polychlorinated biphenyls (PCBs) that are technically sound, clear and equitable in application, and in compliance with the terms of the Federal Water Pollution Control Act.

Although these comments are directed specifically to the proposed standards for PCBs, they are also relevant to two related issues: (1) the establishment of effluent limitations on PCBs for dischargers not covered by the proposed standards, and (2) the development of effluent limitations and guidelines for the 65 chemicals and chemical classes covered by the same consent agreement* that established a deadline for the proposal of these PCB effluent standards.

* Approved on June 9 by the U. S. District Court for the District of Columbia, NRDC v. Train, 8 ERC 2120.

776249



GENP 007846

a) Definition of PCBs [Sec. 129.4(f)] Does Not Differentiate
Among Isomers and Homologs

There is neither chemical nor biological justification for considering all PCB isomers and homologs to be equivalent in respect to the criteria for toxicity used by EPA in selecting pollutants for the list of toxic pollutants (38 FR 24342).

An interdisciplinary group of life scientists on the staff of GE's Corporate Research and Development Center recently conducted an exhaustive analysis of the available toxicological and environmental literature on PCBs. This analysis disclosed substantial evidence of large differences in toxicity, bioaccumulation, and environmental persistence among different commercial grades of PCBs and among different test species.

For example, large ranges of toxicity have been seen in animal studies that focussed on the nature of the effect produced by similar doses of different Aroclors, including studies conducted by the same group of workers in the same laboratory. Thus, the same group (Kimbrough, Burse et al) that reported that Aroclor 1254 or 1260 in rats could provoke a progression of hepatic changes, beginning with hypertrophy and pyperplasia, and going on to adenofibrosis, neoplastic nodules, and carcinomas (cited under "(4) Carcinogenesis" on p. 30472) also reported parallel studies indicating that none of these toxic manifestations occurred with Aroclor 1242 or 1016. Similarly, the initial liver response to Aroclors 1254 and 1260, i.e. marked induction of drug-metabolizing enzymes, was absent when Aroclor 1016 was used.

The extensive Japanese investigations of the Yusho poisoning episode, particularly the more recent findings summarized by Dr. Kuratsune at the

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GENP 007847

National Conference on PCBs in November 1975, have disclosed the origin of the huge ranges in toxicity exhibited by different grades and even different specimens of the same grade of PCB. The actual toxic agents in the PCBs have been identified as the polychlorodibenzofurans (PCDFs). Kuratsune showed that it was the PCDFs, not the PCBs, that were chronically accumulated in humans and that it was the levels of PCDF, not those of PCB, that correlated with toxic manifestations in man. It is remarkable that the very first clinical report on PCB poisoning in humans, that of Jones and Alden in 1936, clearly recognized that the toxic action had to come from an impurity; however, the impurity was not actually identified as PCDF until more than 35 years later. Clear-cut correlations of toxicity with PCDF level were reported for chickens by Vos et al in 1970-72.

We reviewed all relevant data in the scientific literature describing chronic PCB toxicity studies on mammals. We then constructed Table I, in which columns 3, 5, 6, and 7 present our best quantitative estimates or calculations, from these published data, of PCDF concentrations in the PCBs used, of "maximum no-effect" concentrations of PCB in food, of food intake rates, and of "maximum no-effect" dose rates. For comparison, we have included Kuratsune's data on humans. Among the animal studies, we note in particular that the lowest "maximum no-effect" concentrations and "maximum no-effect" dose rates were associated with the highest estimated PCDF concentrations ($>> 1$ ppm PCDF in PCB). Furthermore, the "no-effect" numbers for hepatic effects in rats are significantly higher for Aroclor 1016 (which was estimated to have no PCDF) than for the higher chlorinated Aroclors (which were estimated to have about 1 ppm PCDF in the PCB used.)

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GENP 007848

TABLE I. CALCULATION OF MAXIMUM NO-EFFECT DOSE RATE FOR PCB/PCDF COMPOSITIONS

(1) Test Subject	(2) PCB/PCDF Tested	(3) Ppm PCDF in PCB (Estimated)	(4) Major Toxic Effect	(5) Max. no- effect, ppm PCB in food	(6) Intake rate, kg. food/kg. body wt.-day	(7) Maximum No-effect dose rate, mg. PCB/kg. body wt.-day
Human	Kaneclor-400 (heat aged)	10,000 ^a	Dermal	(0.5g.) ^{c*}	(~1000 day) ^{k**}	~0.007
Monkey (adult)	Aroclor-1248 (shelf aged)	>>1 ⁿ	Dermal	<2.5 ^d	0.04	<0.1
Monkey (infant)	Aroclor-1248	~1 ^b	Dermal	>300. ^e	0.04	>12.
Mink	Aroclor-1254 (metabolized)	>>1 ^o	Hepatic	<0.6 ^f	0.05	<0.03
"	Aroclor-1254	~1 ^b	"	<5. ^g	"	<0.25
Dog	Aroclor-1260	~1 ^b	Hepatic	~10. ^h	0.03	~0.3
	Aroclor-1254	~1 ^b	"	<100.	"	<3.
	Aroclor-1242	~1 ^m	"	>100.	"	>3.
Rat	Aroclor-1260	~1 ^b	Hepatic	~10 ⁱ	0.05	~0.5
	Aroclor-1254	~1 ^b	"			
	Aroclor-1242	~1 ^m	"			
"	Aroclor-1016	0 ^b	"	~100 ^j	"	~5.

Sources

a. Kuratsune, 1976. b. Bowes et al., 1975. c. Kuratsune, 1972. d. Barsotti et al., 1975. e. Abrahamson and Allen, 1973. f. Platanow and Karstedt 1973. g. Ringer et al., 1972. h. Keplinger et al., 1971; Calandra, 1975; as interpreted by FDA, 1973. i. Keplinger et al., 1971; Calandra, 1975; Kimbrough et al., 1972; as interpreted by FDA 1973. j. Burse et al., 1974. k. Assumption of FDA, 1973. m. Ax and Hansen, 1975. n. Estimated from progressive increases in toxicity observed in going from early to late (Ref.d) tests. o. Estimated from use of liver, known to concentrate PCDF relative to PCB (Ref.a) as mink food.

* This figure is the maximum no-effect dose in grams of PCB.

** This is FDA's assumption of number of days over which dose is accumulated by humans.

Even more significant was the demonstration by the Japanese group that the particular PCDF's chronically and specifically accumulated by the human liver were the penta- and hexachlorinated homologs. Since the PCDF's were found to arise from the PCBs upon aging, particularly under conditions favoring thermal oxidation of the PCB's, it is evident that the source of the chronically toxic penta- and hexachloro PCDF's must be the corresponding penta- and hexachloro PCBs.

In this connection, it is significant that Aroclor 1016, which is essentially the only Aroclor used by the capacitor industry since 1971, was specifically designed to contain virtually none of these more environmentally persistent and potentially toxic penta- and hexachloro homologs. The widely-quoted Monsanto prospectus indicates a total content of these "higher homologs" as $< 1.1\%$; however, the product quality control limit was set at 0.4% ; and the actual material shipped to GE during the past two years has usually contained less than 0.1% . This contrasts with the 100-fold higher level of "higher homologs" found in Aroclor 1242 (typically, around 9%) or the 1000-fold higher level in 1254 or 1260 ($> 70\%$). Thus, there is a clear chemical basis for the strikingly lower toxicity levels actually observed in mammals whose diet contained Aroclor 1016.

Toxicity in fish probably results from a general anesthetic effect of the PCBs themselves rather than PCDF activity in most cases; even so, there are significant differences in chronic toxicity among the various product grades, which appear only partly relatable to differences in bioaccumulation. Reported values for bioaccumulation of Aroclor 1016 in various species and life stages of fish run from 2,500 to 55,000, and are usually 10-20,000. Bioaccumulation of Aroclor 1254 is typically 2-5

776253

GENP 007850

fold larger. In continuous flow chronic toxicity tests, reported LC 50 values for various species and life stages of fish cover the range 11-81 ppb for Aroclor 1016 (Hansen, Parrish and Forester, 1974) and about 1-5 ppb for Aroclor 1254 (Nebeker and Puglisi, 1974). There is one report of "significant mortality" in sheepshead minnow fry at 0.1 ppb of Aroclor 1254; the same authors also reported, however, that 100-fold higher levels were required to produce a comparable effect with Aroclor 1016. (Nebeker and Defoe, 1974).

In summary, all available evidence indicates that Aroclor 1016 is 10- to 100-fold less hazardous than the higher PCBs to fish; 100- to 1000-fold less hazardous upon direct exposure to animals, and probably 500- to 5000-fold less hazardous if exposed via the fish bioaccumulation - fish consumption route. Inasmuch as there is no analytical problem in distinguishing among the different degrees of chlorination present in a given PCB sample, it is scientifically justified and practically feasible to establish separate ambient water criteria for PCBs with degrees of chlorination ≤ 4 Cl/biphenyl (which represent 65% of current U.S. production) and for PCBs with degrees of chlorination ≥ 5 Cl/biphenyl (which are the homologs most persistent in the environment and potentially the most toxic).

We believe that separate criteria for the higher and lower PCBs would be in the public interest for three reasons.

o The development of Aroclor 1016 by Monsanto, and its subsequent use by capacitor manufacturers beginning in 1971, represented a major and technically successful effort by industry to reduce to a negligible level the most environmentally persistent components of the dielectric fluid used in capacitors. Failure of the proposed rules to give any

recognition to the differences between the toxicity and persistence of different commercial grades of PCBs would certainly discourage other manufacturers from attempting to remove objectionable impurities from other products in the future.

- o A regulation that attempts to discourage the use of one substance on the basis of a gross exaggeration of its toxicity increases the likelihood that it will be replaced by a substitute that may in fact be environmentally less desirable than the original substance.

- o Although the proposed effluent standards apply only to manufacturers of PCBs, capacitors, and transformers, the ambient water criterion could be used as a basis for regulating other dischargers, such as paper mills, whose effluents contain Aroclor 1242 because they recycle paper containing that material. A water quality criterion that recognized the more benign nature of Aroclor 1242 compared to higher chlorinated PCBs, which were not used in paper products, would protect aquatic life and still enable the public to enjoy the environmental benefits of recycled paper.

b) Derivation of Proposed Ambient Water Criterion

The criteria that are most defensible, and that best serve the public interest, are those that follow in the most logical and straightforward manner from the demonstrated scientific facts of the situation. The establishment of such criteria requires (1) a thorough, critical evaluation of the available toxicological data, in order to separate the solid, self-consistent facts from the anomalies, extrapolations, and inferences, and (2) a clear statement of the safety factors used in proceeding from any "maximum no-effect dose" thereby established to the proposed criterion. If such safety factors have been generated ad hoc, then the rationale behind them should be indicated.

The preamble to the proposed standards contains a series of categorical statements relating to the reported toxicity, carcinogenesis, and human health effects of PCBs, and to the persistence, mobility, degradability, bioaccumulation and biomagnification of PCBs. These statements summarize the highlights of "the extensive data base set forth in the criteria document" (which is referred to in Appendix A), and lead EPA to the conclusion that "a criterion level of 0.001 $\mu\text{g/l}$ would appear to avoid adverse effects to most aquatic organisms..."

However, the only direct connection made by the Agency between the biological data and the proposed criterion is its statement that "This level is based primarily on the bioaccumulation properties of PCBs." But, in fact, the Agency does not develop any such quantitative derivation of the criterion from bioaccumulation data. Instead, it says: "Based upon a bioaccumulation factor of 274,000* a concentration of 0.001 $\mu\text{g/l}$ would result in bioaccumulation to 0.274 ppm in flesh, which is below the dietary levels which have been shown injurious to aquatic birds and mammals who may feed upon them." (underlining added). The Agency goes on to say: "In addition, however, there is evidence that in some waters some fish bioaccumulate at rates roughly ten times this, and in waters where the chronic level generally exceeds 0.001 $\mu\text{g/l}$, such as Lake Michigan, there is evidence of sublethal toxic effects on fish." None of the foregoing provides any rational basis for choosing 0.001 $\mu\text{g/l}$ as the ambient water criterion.

* The upper end of the range the Agency says is found "after prolonged exposure in the laboratory."

Even after proposing this ambient water criterion, the Agency proceeds to raise doubts about its adequacy in its statement that "the Agency recognizes the possibility that such water quality level may not provide absolute safety for all organisms in all waters," and "there probably is no numerical concentration level above zero which one can at this time say with great confidence provides an 'ample margin of safety' for all organisms under all circumstances." Furthermore, the Agency goes on to say that "even if every point source discharge were prohibited, PCB concentrations in the water would remain for a long time not only above zero, but in some water bodies, above .001 $\mu\text{g/l}$. Moreover, since the capability does not exist presently to measure PCB concentrations below 0.001 $\mu\text{g/l}$ with any reasonable degree of reliability, no useful purpose would be served in establishing a criterion number below this."

In essence, the Agency appears to have adopted the position that no level of PCBs in the ambient waters provides an "ample margin of safety," and is setting an actual numerical value at what it believes is the lowest level of analytical detectability. (On this point the Agency appears to be inconsistent, because the analytical method specified for PCBs in Section 129.105 states that "the limit of detection is approximately 1 $\mu\text{g/l}$ for each Aroclor mixture.")

There is no doubt that some PCB/PCDF systems are toxic, that they do bioaccumulate, and that safety factors are required whenever one is attempting to regulate exposure to a toxic agent that is difficult to detect (e.g. PCDF) via the level of a more readily detectable congener or precursor (e.g. PCB). However, regulation should be derived from sound data. Weight

must be given in the regulatory process to the established, self-consistent portions of the data base rather than to values reported by individual observers.

2) Technological Basis for Proposed Effluent Standard.

a) Control Technology Required

We can understand the pragmatic approach of the Administrator in interpreting the language of Section 307(a) to authorize consideration of control technology in setting toxic pollutant effluent standards. However, because Section 307(a) contains no explicit language on control technology, the Administrator should look for guidance in this area to those sections of the Act that do require specific levels of control.

For existing plants, such guidance is provided by Sections 301 and 304, which call for effluent limitations that shall require the application of BPCTA (1977) or BATEA (1983). The present proposal, as it applies to existing plants, is neither BPCTA or BATEA. Instead, it more closely resembles Section 306, which applies to national standards of performance for new sources. Section 306 requires "a standard ... which reflects the greatest degree of effluent reduction ... achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including where practicable, a standard permitting no discharge of pollutants." Note the striking parallelism between the language of Section 306(a) and the current proposal that "the Administrator is requiring that discharges be prohibited where possible and that other discharge comply with the very best results which available technology can achieve," including specific process changes and operating methods, such as replacing steam jets with mechanical pumps and replacing detergent washing with solvent vapor degreasing (underlining added).

We understand the intent of the law to set more stringent effluent limitations for new plants than for existing plants and to require existing plants to meet more stringent limitations by 1983 (BATEA) than by 1977 (BPCTCA). We also understand that under Section 304 the Administrator is directed to consider process changes in his assessment of BAT, which would be applicable to existing plants. But the timetables set forth in the Act certainly do not authorize the requirement that these proposed rules would impose, namely that existing plants must institute process changes within only one year of promulgation.

In light of the foregoing, the Administrator should amend the proposed standards to make the items listed in the column "type of technology applied" (p. 30475) that relate to process changes* applicable only to new sources. Existing sources should be subject only to requirements involving treatment technologies (e.g. carbon adsorption), not process changes.

* E.g. "Replace steam jets with mechanical pumps" and "Replace (detergent washing water) with solvent vapor degreasing."

b) Analytical Method Acceptable (Section 129.105)

We have reviewed the method specified in 40 CFR Part 136 for PCBs (NPDES, Appendix A, FR 38, No. 75, Pt. 11) and have compared the procedure and the claims made for it with our own experience in analyzing industrial effluents for PCBs.

We have two comments concerning the use of the EPA method to establish compliance with an effluent standard.

1) The published method fails to specify the details of the procedure to be used in obtaining effluent samples for analysis. In our experience, the scatter among the results of single analyses on successive samples of a given waste stream is far wider than the scatter among successive analyses on aliquot portions of a single sample. Standardization of sampling procedures is essential if results obtained on samples taken at different times are to be meaningfully compared either to each other or to a prescribed effluent standard.

2) Our experience and that of other laboratories offers qualified support to the EPA claim that "the limit of detection is approximately 1 $\mu\text{g/l}$ (1 ppb) for each Aroclor mixture." When blanks are very low, and no interferences are present, and the calibrating standard is qualitatively the same as the sample, this limit is reasonable. The results of a recent ASTM round robin test indicate that the 95% confidence limits at the 1 ppb level ranged from $\pm 25\%$ to $\pm 75\%$ of the reported value for a single analysis. In this test the samples used were pure Aroclors in distilled water and one sample of river water. In the real-world sequence of industrial sampling, sample preparation, sampling handling, and analysis, the reliable limit of

detection may range from 1 to 10 ppb, and the 95% confidence limit for a single determination at the 1 ppb level may be $\pm 100\%$.

We believe it is essential that EPA prepare a revised version of its proposed analytical method that will include the following items:

- 1) A description of acceptable sampling procedures.
- 2) A description of acceptable methods for removing or correcting for interferences likely to be present in industrial waste water streams. (The present version refers primarily to pesticide-type interferences, which are unlikely to be present in industrial samples).
- 3) A well-documented statistical analyses of the method as applied to industrial waste samples so that decisions on compliance with the effluent standards as promulgated will be based on a realistic understanding of the confidence limits associated with results reported by dischargers.

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