POLYCHLORINATED BIPHENYLS (PCB)

HEARINGS

BEFORE THE

SUBCOMMITTEE ON FISHERIES AND WILDLIFE CONSERVATION AND THE ENVIRONMENT

OF THE

COMMITTEE ON MERCHANT MARINE AND FISHERIES HOUSE OF REPRESENTATIVES

NINETY-FOURTH CONGRESS

SECOND SESSION

ON

OVERSIGHT TO EXAMINE THE IMPACT OF POLYCHLORINATED BIPHENYLS AND SIMILAR TOXIC SUBSTANCES ON FISHERIES AND WILDLIFE RESOURCES

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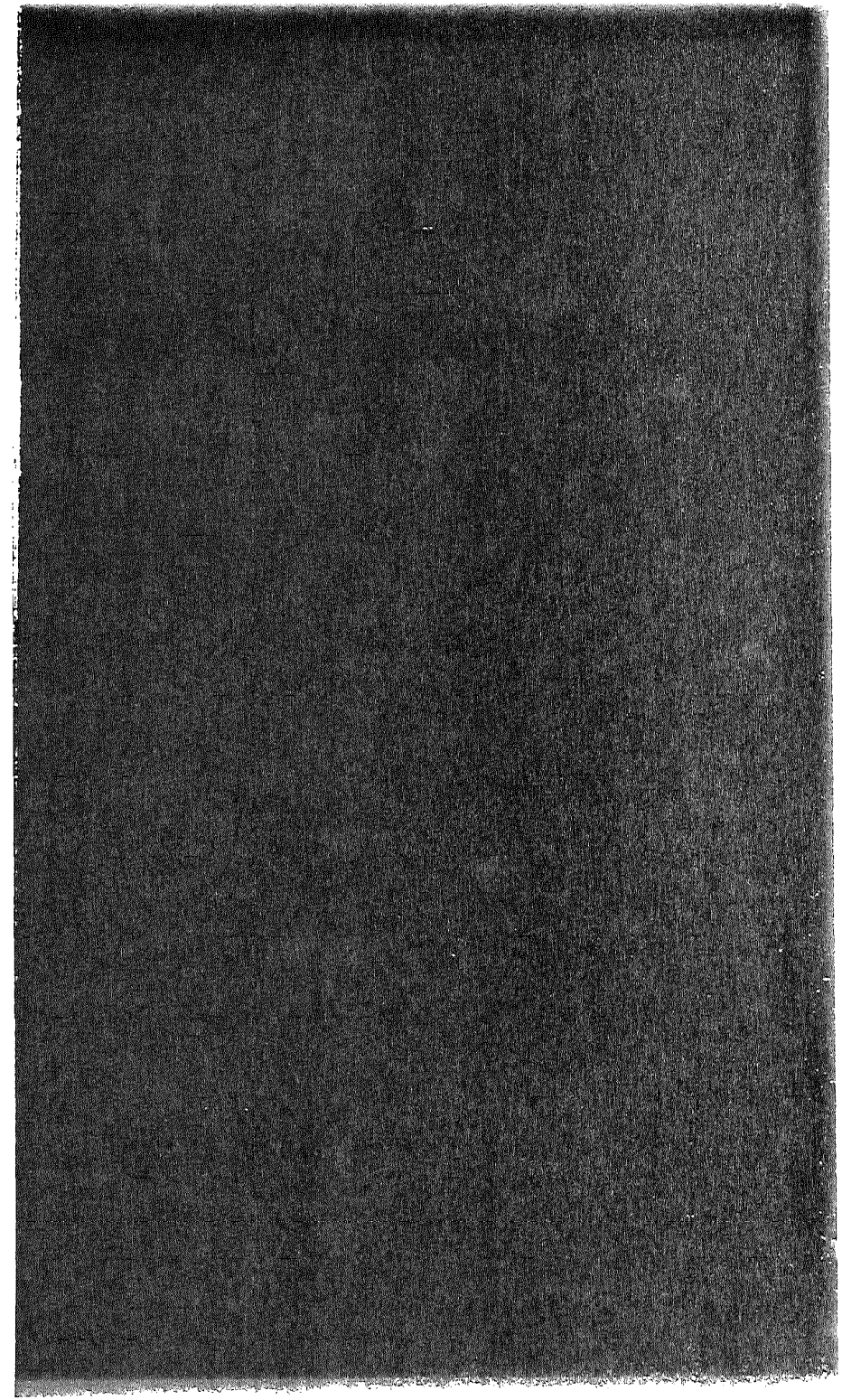

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Perhaps you might want to comment on the present adequacy of the toxic bills.

Mr. TRAIN. I believe you are correct.

I think you would want to be careful before you require a proof of safety prior to the introduction of any chemical into commercial use.

Proving a negative is exceedingly difficult, for one thing. It can be exceedingly long and I would think that putting the burden on the introducer to establish reasonable safety—and I think there has always been that kind of qualification—that it should only be with respect to classes of chemicals that had been determined to be inherently questionable.

Now, we have that authority under the pesticide legislation, the Federal Insecticide, Rodenticide Act.

We are in the process of reregistering all pesticides, 38,000 or 40,000 of them.

Mr. SPENSLEY. That is for pesticides.

That would not apply, however, to many of the chemicals that you have been referring to today.

Mr. TRAIN. No, it does not involve what we have been talking about today.

I am saying this is not an unusual thing that you are talking about. In our reregistration process, we are adopting a rebuttable presumption that for certain classes of pesticides the risk outweigh the benefits.

It is going to be incumbent upon the registrant, the manufacturer, to produce reasonable evidence that the benefits outweigh the risks in those cases, so the burden is placed upon the manufacturer in those cases.

This is not an unheard of procedure and it does exist at the present time.

I would not think you would want to expand that generally.

It could be a very inhibiting requirement in terms of innovation in industry.

Mr. SPENSLEY. So you are saying, in short, you would not support such a concept generally although you would support it in the pesticides area.

Mr. TRAIN. No.

You must have misunderstood me.

I would not support a requirement that all chemicals must be proved safe or relatively safe by the introducer prior to their being permitted to enter into the environment.

I do not think I want to have some unknown chemical coming into commercial use without some knowledge of its effects. I do not think it is practical for us to try to handle all chemicals but where we can determine that a new chemical falls into a high risk category because of its molecular structure or past experience with similar chemicals, something of that sort, I do not think that premarket testing would be an unreasonable requirement.

Mr. LEGGETT. Thank you very much, Mr. Spensley.

Mr. de la Garza, do you have questions of this witness?

Mr. DE LA GARZA. Thank you very much, Mr. Chairman.

I apologize, Mr. Train, for my absence but I had another very important matter and therefore, not having gone through your statement in detail, I would forego any question.

Mr. LEGGETT. I appreciate that and I thank you very much, Mr. Train.

We will be in further touch with you.

Mr. TRAIN. At the risk of being repetitive, let me make one more comment following up counsel's question.

I think that a very important element in the toxic substances legislation is notification of the commercial introduction of a chemcal so that even though we may not be requiring proof of no risk in advance of marketing, we at least know that something is going into the market; we know its general chemical characteristics.

We will know what testing has been done with respect to it, and are on notice and have an opportunity to blow a whistle if it is indicated before it gets into widespread use in the economy.

To illustrate the importance of such notice, PCB's are built so deeply into the economy now that no matter what you do it is a very wrenching process.

Mr. SPENSLEY. At least it is one small step for some men.

Mr. LEGGETT. Very good.

Thank you very much, Mr. Train.

Mr. Oberstar?

Mr. OBERSTAR. No questions.

Mr. LEGGETT. Mr. de la Garza.

Mr. DE LA GARZA. May I come back just for a question?

Mr. Train, when Secretary Reed testified he was asked about a plan and he alluded to the fact that he would leave that to your agency.

Could you go over that in your testimony?

Mr. LEGGETT. I think we have pretty thoroughly covered that.

Mr. DE LA GARZA. Then I would appreciate it, and I would redirect it.

Mr. TRAIN. If you have any further questions about it, do not hesitate to contact me.

Mr. LEGGETT. We will undoubtedly have you back here again.

Thank you again, Mr. Train.

Now, we have two industry members.

One is Mr. William B. Papageorge, Monsanto Industrial Chemicals and Mr. Clifford H. Tuttle, Jr., of Aerovox Industries.

Mr. Papageorge, how long would your testimony take?

STATEMENT OF WILLIAM B. PAPAGEORGE, MONSANTO INDUSTRIAL CHEMICALS CO., ST. LOUIS, MO.

Mr. PAPAGEORGE. I would say about 13 minutes, Mr. Chairman.

Mr. LEGGETT. How about you, Mr. Tuttle?

Mr. TUTTLE. I would say about the same or perhaps a little less, Mr. Chairman.

Mr. LEGGETT. Which of you has to leave the earliest?

Mr. PAPAGEORGE. I can stay overnight if it will help the committee any.

Mr. LEGGETT. Well, I would like to finish with both of you today. Do you have to go back tonight, Mr. Tuttle?

Mr. TUTTLE. I can stay or I can go at the pleasure of the committee.

Mr. LEGGETT. If you are both in the same situation, Mr. Papageorge, you are on first.

Mr. PAPAGEORGE. Thank you very much, Mr. Chairman.

My name is William Papageorge, and I am manager of product acceptability for the Montanto Industrial Chemicals Co., which is an operating unit of Monsanto Co.

Mr. LEGGETT. Very good.

And you are the very distinguished organization that has a cartel on the manufacture of PCB's.

Well, you do not have to answer that.

Mr. PAPAGEORGE. I like the distinguished part but I do not know about the cartel, Mr. Chairman.

Mr. LEGGETT. Your statement will be included in our record as though you read every bit of it.

Now you can highlight it or argue with the committee or suggest solutions or you can read it.

My staff has read the order of your analysis and you can do whatever you like at this point.

Mr. PAPAGEORGE. Well, that puts the burden on me, does it not?

Mr. LEGGETT. Yes; it does.

Mr. PAPAGEORGE. Then I would like to read it, sir, at your pleasure.

Mr. Chairman, the chemical structure of polychlorinated biphenyls—PCB's—has been known for nearly 100 years. Commercial production of the material was initiated in 1929 in response to the electrical industry's need for an improved dielectric insulating fluid which would also provide increased fire-resistant benefits when used in transformers and capacitors.

Mineral oil, the only known alternate material for these applications, had stability and flammability problems that made it potentially hazardous. Power surges in electrical equipment can cause arcs. A sustained, high-energy arc can vaporize mineral oil to the point where the material will ignite. The unique properties of PCB's—inertness, fire resistance, and their ability as dielectric insulators to act as nonconductors of direct electric current—made them ideally suited for those applications where high-voltage arcing could occur, and result in fires and/or explosions, damage to equipment and create hazards to people.

As the unique properties of this material became more fully understood, many additional uses were found. Their fire resistant nature made them an excellent choice for use in hydraulic and heat-transfer fluids. Their inertness imparted long-lasting qualities to lubricants. They also improved the waterproofing characteristics of surface coatings and offered similar and other benefits to the manufacturers of carbonless copy paper, printing inks, plasticizers and special adhesives.

PCB's, therefore, evolved as a truly unique class of chemicals which met important needs for both industry and society. It was within this framework that Monsanto and other producers developed a growing, worldwide business for these versatile products.

First signs of environmental concern:

In the late 1960's, some 40 years after PCB's were introduced, the first signs of potential environmental problems turned up in two separate events—one in Japan, the other in Sweden.

In 1968, about 1,000 people in Japan became ill from eating rice oil heavily contaminated with Japanese-produced PCB's as a result of an unfortunate industrial accident which has come to be known as the "Yoshu Incident." PCB's were being used as a heat-transfer fluid in equipment used to heat the rice oil. A leak developed in the equipment and went undetected, allowing the PCB to spill into the oil. Some news accounts hsave erroneously linked this incident with deaths, stillbirths, and miscarriages. While, in fact, no such cases were actually attributed to the incident, those exposed to PCB-contaminated rice oil did experience dizzyness, nausea, loss of appetite, weakness, and dermatological side effects. Infants, born to mothers who had been exposed during pregnancy, exhibited darkened skin at birth; however, in every case, this condition cleared within 3 months.

It should be pointed out that the levels of PCB contamination in the "Yoshu Incident" were in the 2-to-3 parts-per-thousand range—extremely high concentrations—while the levels being reported in fish and wildlife today are in the low parts-per-million and billion.

Mr. LEGGETT. That comes out to 2 or 3 parts per million?

Mr. PAPAGEORGE. Yes, sir.

It is also important to note that a similar industrial accident today, at least in the United States, is virtually impossible since PCB's are not used in heat-transfer applications.

The Japanese ban:

Primarily as a result of Yoshu, the Japanese Government announced, in 1971, a total ban on all PCB usage to become fully implemented by September of 1973. Monsanto and the U.S. electrical industry are often asked how Japan has been able to get along without PCB's in its electrical applications.

It should be pointed out that the major uses for PCB's in Japan were in "open applications," particularly for carbonless paper. The Japanese power distribution industry, less advanced than the United States technically, had never actually gotten around to taking advantage of fire resistant transformers to the extent they have been used in this country. Most of their transformers were either using mineral oil or were dry-type units. The Japanese capacitor industry on the other hand was only in the beginning stage of converting its equipment to the more reliable PCB dielectrics when the ban was announced.

Reliability standards for capacitors in the United States are much more stringent than they are in Japan or anywhere else in the world. So, the Japanese ban really did not materially impact that country's electrical power distribution industry.

THE SWEDISH FINDINGS

The other early sign of trouble was reported by a Swedish biologist, who, while using a new and totally unique technique, for the first time, identified PCB's in the bodies of fish. Montanto and others began immediately to study the Swedish work. But before these findings could be confirmed or duplicated in the United States, analytical methods had to be refined in order to separate PCB's from the other chlorinated hydrocarbons—like DDT—that were known to be present in the environment. Techniques also had to be developed to enable researchers to identify the chemicals in a very small parts-per-billion range.

MONSANTO'S RESTRICTED SALES PROGRAM

When these scientific investigations first confirmed the presence of PCB's in the environment in the United States in 1970, and long before information regarding the potential impact of this contamination was determined, Monsanto voluntarily began its program of terminating sales of PCB's to open applications—those which could likely result in losses to the environment.

Major applications affected by the company's unilateral withdrawal were in carbonless paper, fire resistant hydraulic fluids, heat transfer fluids and plasticizers. These restrictions resulted in a reduction in uses of PCB's, in applications where their loss to the environment was less controllable, of some 45 million pounds per year—cutting production in half.

At the same time, Monsanto made the conscious decision to continue supplying PCB's only to the electrical power distribution industry where they were marketed as dielectric fluids in closed or sealed systems such as transformers and capacitors.

In making this decision, Monsanto felt, (1) that entry of PCB's to the environment would be effectively limited and controllable as a result of this restricted sales program—which became fully implemented by late 1972, (2) that a more biodegradable, lower chlorinated homolog had been developed for use by the capacitor industry, and (3) that withdrawal from electrical applications would have brought to a halt production of equipment, essential to the safe and efficient distribution and use of electrical energy—there being no known, satisfactory replacement for PCB dielectrics available.

MONSANTO'S MANUFACTURING FACILITY

In the manufacturing area we took a number of significant steps to prevent loss of PCB's to the environment. Control, unique in the industrial chemicals industry, has been achieved. Measurable losses from the Sauget Village treatment plant to the environment are approximately 1 to 2 pounds per day, which equates to approximately 1 to 2 parts per trillion PCB's in the Mississippi River at average flow rates. [Two parts per trillion is the equivalent of two pennies out of $10 billion]. While there presently are no formal PCB discharge limits, proposals under consideration call for ambient water concentrations at levels not to exceed one part per trillion.

In our manufacturing area we have acted to prevent loss of PCB's in the environment by literally making the department a "concrete bathtub." Drainage is collected in an isolated PCB sewer system with setting basins to insure PCB containment in case of accidental spill or equipment failure with the capability of monitoring the effluent from the department.

Storage tanks are blanketed with nitrogen to eliminate tanks "breathing," and mist eliminators have been installed in vapor lines to eliminate the possibility of PCB's leaving the manufacturing area. The key to our continued success in controlling PCB's is in our maintaining a high housekeeping level.

A Monsanto chemical waste treatment facility, to be completed in late 1976, will be a further step in reducing PCB effluents.

STEPS TAKEN IN LABELING AND TRANSPORT PRACTICES

Monsanto ships PCB fluids in both bulk carriers and in drums. Bulk shipments are made in a Monsanto-owned fleet of tank cars which is used exclusively for that service, or in customer-owned tank trucks.

Drum shipments are made in special reinforced drums which we believe to be the best available.

A multilinqual warning label is affixed to each package giving a brief description of the nature of the material and appropriate actions to be taken in the event of a spill or leak. We also supply a label to be used on return shipments for incineration, which gives similar information.

THE MONSANTO INCINERATION SERVICE

An incinerator was built at our Sauget, Ill., plant for the specific purpose of destroying waste PCB-containing liquids, both from our own operations and from our customers.

Firebox temperatures above 2,000 degrees Fahrenheit are maintained to completely destroy the PCB compounds, and combustion products are removed in scrubbers. Routine sampling of both the stack and the scrubber effluent has confirmed the effectiveness of the system.

A fee for handling is charged for the information service, which does not fully cover the costs we have incurred to date in developing and operating the incineration system.

INDUSTRY GUIDELINES

In addition, representatives of the transformer and capacitor industries, utilities, and governmental agencies formed the American National Standards Institute Committee C-107 and promulgated guidelines for handling and disposing of dielectric fluids. The actions of this committee reflect the industry's understanding of the need for proper control.

FEDERAL TASK FORCE

In 1972, Monsanto's voluntary program was reviewed by a Federal interdepartmental task force—consisting of representatives

from the Office of Science and Technology, Council on Environmental Quality, Department of Agriculture, Department of Commerce, the EPA, HEW, and the Department of the Interior. The Federal Task Force Report, which is a matter of public record, supported and endorsed Monsanto's program.

CURRENT SITUATION—MONSANTO'S POSITION

Thus, the situation today is quite different from conditions which existed only a few years ago. Prior to 1971, Monsanto sold some 85 million pounds of PCB's per year to literally thousands of customers worldwide. At the present time, PCB's produced for U.S. consumption—about 27 million pounds per year—are used by fewer than 40 domestic customers and only in the manufacture of sealed electrical equipment.

All this notwithstanding, Monsanto is obviously aware of the mounting reports carried in the news media that would seem to suggest that the entry of PCB's into the environment has not been effectively curbed.

Monsanto simply cannot accept this hypothesis, given the following basic facts: (1) Production—reduced by over 50 percent; (2) open-system applications—totally eliminated; (3) manufacturing controls, unique in the industry—implemented; and (4) stringent electrical industry guidelines, for handling and disposal—established.

On the contrary, Monsanto sincerely believes that its current program, together with an increased level of awareness and concern on the part of the electrical industry, has had to have drastically reduced the amount of PCB's entering the environment. It is now known that certain of the PCB insomers will persist in the environment for a considerable period of time.

Monsanto is convinced, therefore, that the mounting reports of widespread contamination are not evidence that the restrictions are not working but, rather, substantiation of our theory that old PCB's have remained in the environment and are now being increasingly identified by a growing number of researchers, equipped with improved, highly sophisticated analytical tools and armed with advance knowledge of what to look for.

And, indeed, the findings of a task force involving agencies from Minnesota, Wisconsin, and the Federal Government, organized in the spring of 1975, tend to support this theory. Their report, issued in November 1975, said that industrial plants and sewage treatment facilities are not major sources of PCB contamination in the Mississippi River and its tributaries. Rather, the report suggested that the present source is quantities of PCB's that had been dumped into the river in past years.

The report explained that these PCB's settled to the bottom and became lodged in the sediment—only to be periodically stirred up by dredging operations.

PROGRESS ON ALTERNATE PRODUCTS

Monsanto has invested millions of dollars to implement and maintain its restrictive measures and controls and, despite the company's strong belief that they are effective, it has invested additional millions in major ongoing research programs to develop acceptable replacement dielectric fluids that would be, in themselves, more environmentally compatible. Significant progress is being made.

It is important to discriminate between fluids designed for transformer cooling and those designed for capacitor impregnation. Because each application has requirements not shared by the other, Monsanto knows of no candidate replacement products which would be applicable to both.

For capacitors, we have studied several alternative technical approaches and have settled on a product, code named MCS 1238, which duplicates the electrical behavior of PCB's, yet contains no chlorine. The environmental and toxicological test data we have developed thus far encourages us to believe that MCS 1238 is better than PCB's—more biodegradable, not subject to biomagnification and relatively non-toxic. Additional studies currently underway include acute toxicity to wildlife, mutagenicity and teratogenicity—which are scheduled to be completed in early 1976, and 2-year animal feeding tests for carcinogenicity—which will be available by mid 1978.

We are confident, based on the results of all testing done to date and the chemistry involved, that no major problems will surface with those ongoing studies.

Our performance testing program has included accelerated life tests on capacitors impregnated with this material. While our own results are favorable, the ultimate acceptance must come from our customers. Sample quantities of this replacement candidate are currently being evaluated by customers.

Should we receive an early favorable verdict from enough of the industry to support an investment, we could get into interim production, at a volume sufficient to supply the industry, in a relatively short period of time.

Initially, the replacement product would be more expensive since the electrical industry would have to be supplied from an interim production facility. A fully dedicated plant could be constructed within 2 to 3 years.

In transformer fluids, we are not as far along. The same basic problems face anyone attempting to develop a replacement dielectric for transformers as for capacitors, but fire resistance is even more essential in many transformer applications for two fundamental reasons:

One: Transformers contain about 2,000 pounds of dielectric fluid compared to from 2 to 4 ounces in the typical ballast-type capacitor, and

Two: Many of these 2,000-pound units are installed in high-rise buildings, hospitals, schools and urban commuter trains, where a fire could well be catastrophic.

It is because of this that, despite the normal commercial incentives to replace them, PCB's have endured as the standard dielectric fluid for over 45 years, consistently performing their designed functions better and safer than any other product as yet conceived.

It is axiomatic that the chemistry which imparts high fire resistance tends also to produce stable molecules—those that tend to persist in the environment.

Our research efforts here are focused on developing replacement fluids that will provide performance reliability, acceptable fire resistance and environmental compatibility, as well.

Unfortunately, there is no accepted, quantitative definition of the degree of fire resistance needed in a fire resistant transformer fluid.

Another major objective of this program centers around the need to develop replacement fluids that will not only work in newly designed transformers but also in the thousands of existing "Askarel" type transformers—which, by definition, contain fire resistant dielectric fluids—currently required in high density population applications. Electrical, zoning and building codes, and indeed insurance rates have been traditionally predicated on the use of these Askarel units which, without exception, get their fire resistance ratings from the use of PCB fluids.

We feel we have a responsibility and a commitment, to the extent it is technically possible, to develop a fluid that can be used, interchangeably, in these Askarel transformers—thus avoiding the obvious economic burdens and serious power disruptions that would otherwise result from having to replace or retrofit them.

We have one promising candidate which is currently being readied for testing by transformer manufacturers. Preliminary environmental and toxicological screening has been completed on this new candidate fluid, and the test protocol for a comprehensive biological evaluation program, similar to the one used for our capacitor fluid, is currently being developed.

Monsanto's future plans/intentions:

While Monsanto made the conscious decision back in 1970 to begin restricting sales to closed-system dielectric uses, the main reason we elected to continue supplying the electric industry was that they had no viable alternates to turn to.

EPA also recognizes this, even today. At his December 1975 press conference, EPA Administrator Russell Train said he would not ask Monsanto to stop production because that would shut down the electrical power industry and the railroads in short order. He said we must find a way to proceed without shutting down the country.

This is precisely the position to which Monsanto has been committed since 1970.

While the PCB issue is a difficult one to handle, the difficulty does not now, nor will it in the future, stem from any lack of effort or cooperation on the part of Monsanto.

The problems that we face, collectively, are rooted in the unique fire resistant and dielectric characteristics of PCB's and the irreplaceable role they have played in electrical and industrial applications for the past 45 years.

The challenge is to replace them in an orderly manner without creating another hazard of equal or potentially greater consequences while, at the same time, avoiding serious power and transportation disruptions.

Monsanto has no desire to remain in the PCB manufacturing business any longer than is necessary. By this we mean as soon as we are able satisfied that the electrical power supply industry's needs for usable, acceptable alternate dielectric fluids have been met by whomever, Monsanto will voluntarily shut down its PCB manufacturing unit.

In the interim, we will continue to work with industry and Government to insure that the restrictive measures and controls we implemented in the early 1970's remain in force and are diligently pursued.

Thank you, Mr. Chairman.

Mr. LEGGETT. Thank you very much, Mr. Papageorge.

Now, you are currently selling it to 40 companies, half of which you were manufacturing in 1971, is that right?

Mr. PAPAGEORGE. That is correct, approximately correct.

Mr. LEGGETT. How much are you exporting?

Mr. PAPAGEORGE. The latest figure I saw, sir, about 17 million——

Mr. LEGGETT. To how many companies?

Mr. PAPAGEORGE. Export, I do not know that number.

Mr. LEGGETT. Would that not be important, too?

Mr. PAPAGEORGE. I do not know. I do not know who could use that information. They go to Southeast Asia, South America, Africa, Mexico, Canada.

Mr. LEGGETT. The way we get the evidence is that we are all in one ecosystem.

Mr. PAPAGEORGE. That is right.

Our policy that we follow in the United States we follow throughout the world, which is slightly different than our competitors throughout the world.

Mr. LEGGETT. How many people do you employ to manufacture this?

Mr. PAPAGEORGE. The individuals directly involved for a full working day, number at best about 20—a couple dozen people.

There are others who are involved sporadically such as the maintenance men who do repairs and then leave the operation.

Mr. LEGGETT. Now, the Japanese apparently went out of this business 3 years ago. They apparently do not have a transformer standard requirement like we do, but the question is, so what?

Mr. PAPAGEORGE. I can only speak of my personal experience, sir.

Mr. LEGGETT. Are you particularly knowledgeable as to what deficiencies they really suffer in their system because they failed to meet our high standards which we meet through the utilization of PCB's?

Mr. PAPAGEORGE. No, I am not. I suspect someone in the electrical equipment industry would be better qualified.

Mr. LEGGETT. But if your company does have informaion like that, it would be helpful.

Now, we have evidence—I guess it is an application before the Environmental Protection Agency and/or others, I think by General Electric, who discharged directly something like 10,000 to 14,000 pounds of PCB's per year.

Are you aware of that?

Mr. PAPAGEORGE. Yes, sir.

Mr. LEGGETT. So that despite the fact we do have this closed system, it does open up in certain spots?

Mr. PAPAGEORGE. I do not know that anyone has ever tried to misinform anyone that this was totally a closed system to the point where not a molecule would ever escape.

Mr. LEGGETT. Let me ask you this then.

Do you have any estimate of the amount of PCB's that you sell is it on the order of 40 million to 45 million pounds per year?

Mr. PAPAGEORGE. Right.

Mr. LEGGETT. How much of that do you estimate escaped into the environment?

Mr. PAPAGEORGE. It is more in the order of 10,000 pounds per year, although I can understand from Mr. Train's testimony that we may have some differences of definition.

By escape, we are talking about the situation in which PCB's are made available to living creatures as distinguished from material buried in landfill.

Mr. LEGGETT. I understand. I would not counterattack that. If it is buried in a landfill and the landfill is a contained system, I would not count it as an escape.

Mr. PAPAGEORGE. That is the way we defined it; yes, sir.

Mr. LEGGETT. I think Mr. Train was talking about escapes from the landfill.

Mr. PAPAGEORGE. I have no measure of what is escaping from landfills. I am not aware of any programs that have monitored landfills.

So it has to be an estimate.

Mr. LEGGETT. OK.

You say 10,000 pounds out of the 45 million, that would be 1/45 hundredth, I guess, as escaping of what you are producing. OK.

Let me see. I have got to go.

Mr. de la Garza, can you Chair the committee for the balance of the questioning of this witness?

Would you like to proceed and answer questions tonight, or would you like to come back tomorrow?

Mr. PAPAGEORGE. It is up to the committee, sir.

I am available any time.

Mr. LEGGETT. Mr. Ruppe, do you have any preference?

Mr. RUPPE. I have to leave before noon tomorrow, so the chances with the witness' time would be appreciated.

Mr. LEGGETT. All right.

Because we are not coming back until 2 o'clock tomorrow, why do you not Chair the balance of the meeting, Mr. de la Garza, and—our last witness will be here tomorrow inasmuch he indicated it made no difference whether he stayed or went home. And we chose to have him testify tomorrow.

All right. The Chair would ask Mr. Tuttle if you would like to reconsider that. We frequently reconsider things, Mr. Tuttle.

Do you have any strong preference one way or the other?

Mr. TUTTLE. Well, I certainly would rather go back tonight, but. on the other hand. if it has to be postponed until tomorrow, I will make myself available.

Mr. LEGGETT. All right.

He has indicated he does not want to reconsider and you have got to make a stronger plea than that. Very good.

Proceed, Mr. de la Garza.

Mr. DE LA GARZA [presiding]. The question is you said your statement was 10 minutes or so, and if there is no great interest in questions afterwards and you would like to continue and make this statement, I think probably we can accommodate you here until about 6 o'clock or thereabouts.

Mr. TUTTLE. I would appreciate that.

Mr. DE LA GARZA. I do not think the chairman would have any preference unless you gentlemen are interested.

Mr. RUPPE. Can we have a few moments after the gentleman has testified to ask a few questions of both of them?

Mr. DE LA GARZA. We all have the time element problem, but I know being away from home and so on, if we can accommodate them, and all of you are agreeable, fine.

Mr. STUDDS. Fine.

Mr. DE LA GARZA. Any further questions of Mr. Papegeorge?

Mr. RUPPE. I have three questions.

Do you make any sales for use in open systems today?

You have indicated in your testimony you cut back the sales and have a program for elimination.

Has that program been completed and have you stopped all sales for open system use today?

Mr. PAPAGEORGE. The open system sales were terminated in early 1971.

Mr. RUPPE. You mentioned some possibility of PCB's being released in some type of breathing process.

Is that possible to take place in either—during the shipment or during storage by your customers, or even when the material is actually in the transformer itself?

Is there any chance for a release later on?

Mr. PAPAGEORGE. I cannot speak——

Mr. RUPPE. In the breathing process or any other process?

Mr. PAPAGEORGE. I cannot speak for the application in the electrical equipment. I would suggest that hopefully you can speak with someone who knows how a transformer functions while in service.

In the transporting, there is, of course, no breathing that occurs in the steel drums and in the tank car or bulk movements. The material is shipped at low temperatures so there are no high vapor losses and, in many instances, the use of inert gas like nitrogen is used. This is what we use.

Mr. RUPPE. You are satisfied that it gets from your plant to the customer's doorstep without the release of PCB's?

Mr. PAPAGEORGE. Yes; I am.

Mr. RUPPE. On page 9, you refer to the fact that—following up on your statement, you do not sell for open systems.

Is it not true that there is a certain amount of PCB reprocessing that does go into open-system utilization?

Mr. PAPAGEORGE. I have heard rumors to that effect, but this is not something we recommend or get involved in.

Mr. RUPPE. Do you know for a fact that perhaps it does get reprocessed for use in open systems?

Mr. PAPAGEORGE. I have been told by some people in EPA that they have some information in this area, but I have not been told the details.

Mr. RUPPE. Last question.

Do you know if PCB's are imported, and again, if they are imported, are those uses of imported PCB's most likely to be in open systems since it appears that Monsanto has a pretty good lock on the electrical utilities industry?

Mr. PAPAGEORGE. Again, I have to mention that my information came from EPA representatives who, in turn, got this from the Customs people, and the uses appear to be open type uses, those uses which we abandoned.

Mr. RUPPE. You mentioned that, on page 3, that the Japanese Yoshu incident was erroneously linked to deaths and stillbirths, miscarriages, and the like. And I understood there is an EPA study that indicates there were links to that effect.

I am not sure if you have been so advised.

Mr. PAPAGEORGE. I can only speak again from my personal observation. I have talked to Professor Kuratsame when he was here, and I believe we understood each other, and at no time did he say these were attributed to the exposure.

I have also spoken with representatives of the Food and Drug Administration who also have that impression, and we have in our medical department in Monsanto a letter from a professor who categorically says that the deaths were not attributed to the exposure.

Mr. RUPPE. Thank you very much.

Thank you, Mr. Chairman.

Mr. DE LA GARZA. Mr. Studds?

Mr. STUDDS. I will be extremely brief in recognition of the rule that thou shall not delay thy constituent.

Mr. Papageorge, I did not catch—I am not sure of your position with the company.

Mr. PAPAGEORGE. My position is that of manager, product acceptability.

Mr. STUDDS. Product acceptability.

I just really have one question. In today's Boston Globe, which is northeast of St. Louis, there is the following statement:

> Monsanto Co. has announced it intends to phase out the production of PCB's. In making the announcement in St. Louis the company spokesman said the phase out would take place in a planned and orderly manner.

Now, is that simply a rephrasing of your last paragraph, or is that an announcement of a new policy?

Mr. PAPAGEORGE. No; the intent was to rephrase. I hope it was done properly.

Mr. STUDDS. So that is not saying anything more or less than what you have said?

Mr. PAPAGEORGE. You are right.

Mr. STUDDS. Thank you.

Thank you, Mr. Chairman.

Mr. DE LA GARZA. Mr. Papergeorge, could you tell me, in a layman's term—are you a chemical engineer, a petroleum engineer, but can you tell us in a layman's term—can you explain to me in layman's term what is PCB?

Mr. PAPAGEORGE. I can try, sir. I have tried some time, and I think I have succeeded, and sometimes I do not do so well.

Mr. STUDDS. He really wants to know whether it comes from oil or gas.

Mr. PAPAGEORGE. He should.

We start with a high-purity benzene, and benzene is described by the chemists on paper with a diagram which represents a hexagon.

If you can visualize two hexagons, point to point, we have what we call the biphenyl group. Each of the points of the hexagons represents the position of a carbon atom.

To each carbon there is a hydrogen atom associated, so that give us—if I have my numbers correct, 12 carbon atoms, and 10 hydrogen, making the biphenyl group.

The biphenyl is then exposed to chlorine gas in its molten form. The chlorine displaces the hydrogen. The amount of exposure determines how many chlorine atoms affix themselves to the biphenyl group.

So we can have from 1 to 10 chlorines attaching themselves randomly on this double ring.

This is why this is called a commercial mixture, and it is a mixture of about 50 to 70—maybe 80 of these random mixtures of from 1 to possibly 10 chlorines.

The longer the chlorine is exposed to the biphenyl, the more chlorine attaches itself. Therefore, you will have PCB mixtures with chlorine content of 21 percent up to 68 percent. This is an indication of the amount of chlorine present.

There are, as was previously mentioned, 209 different chemical involved. So when we speak of PCB's, I think we should be very careful that we all understand what we are talking about. I find not only for PCB's, but for the precedent that it establishes, that we have got to be very careful that we do not attribute any characteristic to the whole family of 209, because it may not be factual.

Mr. DE LA GARZA. Where does the original benzene come from?

Mr. PAPAGEORGE. Benzene comes from petroleum sources.

Mr. RUPPE. Is that identified to one State, or just——

Mr. PAPAGEORGE. Well, yes. It does come out of Texas. Does that help any?

Mr. DE LA GARZA. I thought we ought to have that for the record, the process, and using the terms. it is a catalytic effect rather than a cracking or extracting effect. You take the benezene and then——

Mr. PAPAGEORGE. The benezine is cracked.

Mr. DE LA GARZA. You crack the benzene from the crude, and then in the process of making other matters from crude, but you add the chlorine.

Mr. PAPAGEORGE. Right. It is a chemical addition, right.

Mr. DE LA GARZA. Thank you very much, sir.

Are there any other further questions?

Counsel?

We appreciate very much your contribution, and without any further questions, you are dismissed.

Now, our next witness is Mr. Clifford H. Tuttle, Jr., Aerovox Industries.

Before you start, I might tell Mr. Papageorge, if you are looking for sites or sources for your product, we welcome you in South Texas.

You already are near Corpus Christi, but we wish you would come further south.

Mr. PAPAGEORGE. All right, sir. I will carry the message back.

Mr. DE LA GARZA. The same way with Aerovox.

Mr. STUDDS. A bad precedent has already been established.

Mr. DE LA GARZA. We will be happy to hear from you at this time, Mr. Tuttle.

STATEMENT OF CLIFFORD H. TUTTLE, JR., AEROVOX INDUSTRIES, NEW BEDFORD, MASS.

Mr. TUTTLE. Mr. Chairman and gentlemen, my name is Clifford Tuttle; I am not going to read this. Instead, I will highlight it and cover a few of the points on which I think there may be some confusion from previous testimony.

Firstly, you are just beginning to appreciate the magnitude of the problem.

Mr. Studds read a press clipping about the drinking water in five cities. I venture to say it is in every city water in the United States of America.

In New Bedford we reported the PCB content of incoming water to EPA. We also reported to the EPA that Boston was considerably worse than New Bedford. For New Bedford, it is not difficult to identify the source, because if you go back 10 years, we were paid for our scrap PCB's by the city, which used them to oil the roads.

Obviously, this was before the time we knew we were dealing with this ecological problem. What the source would be for Boston City, I cannot say, but PCB's are there.

Today there are three uses of PCB's. We have talked about them in general, and I am sure you gentlemen do not have to be told how to distinguish between them.

My company, Aerovox, manufactures what is known as small capacitors. A small capacitor is the type you have in fluorescent lighting, in street lighting, in television sets, microwave ovens, air conditioners, and virtually every AC motor in any plant, elevator, and so on.

It is used for one reason. It reduces the amount of energy required, and today the demand for this application is now up, because I am sure you are aware of the President's mandate on energy consumption decrease to appliance manufacturers of refrieragtors, freezers, washing machines, and driers; none of these are now power factor corrected directly.

If appliances do not have this type of capacitor, by adding it will cut the amount of energy used. This is going to mean more capacitors, not less needed.

So to some extent we are fighting ourselves—not that I am arguing—but we are trying to cut our energy consumption, which is a function of this capacitor, and yet it only operates well with a PCB in it.

The small capacitor constitutes about half of Monsanto's sales or 20 million pounds.

A second use is the large capacitor. This is the type that is used in very large buildings, on the side of the building, or inside it. It is also used by utilities. This constitutes about another 7 million pounds.

The chairman left, bnt he cited an article in Electric World, relative to McGraw saying it has a non PCB fluid for capacitors. That article specifically states the fluid is for large capacitors. It is not for small capacitors.

The manufacturer of that fluid is Dow Chemical, and the first time material was put in the hands of small capacitor manufacturers was in December. We have had it on order since last spring. We are just starting to test it. Whether it will be a good alternative fluid to PCB in small capacitors I do not think that anyone can state yet. Obviously I have to agree with Mr. Train—without the PCB capacitor—you would virtually stop the construction industry, and we would also probably double the amount of energy used. We could go back to incandescent lights. Incandescent lights are exactly one-quarter as efficient as fluorescent.

In the past we have used PCB's for four reasons. The first one was flammability, and I think that has been well documented. There is no fluid that we are going to get that is as good as PCB in flammability, because it will not burn as used in our application. We are going to have to make a compromise there.

Another factor was reliability. When we used mineral oil—that was before my time—users had to change fixtures every 2 or 3 years, which is as often as you change a bulb in a fluorescent. Obviously, we hope whatever we use instead of PCB will not require the changing of the fixture every 2 or 3 years, because it will be prohibitive in terms of today's service costs.

And the last—the cost is very attractive in a PCB unit, compared to anything else.

In my statement I cite very strongly the fact that we should talk about PCB's by their specific formulation rather than the generic term PCB.

I have been told that I took a remark by Dr. Risebrough out of context. I am very anxious to see the record of the Chicago Conference, because I am sure I quoted him correctly.

The fact is that there are only three fluids really in demand that Monsanto makes now. One is Aroclor 1016. This is used in capacitors and is exceptionally biodegradable.

We have talked about the number of chlorine atoms in a molecule. Pentas and above—molecules with five and six chlorine atoms in it—have a half life of maybe 50 years. Aroclor has only 0.1 percent of the pentas.

There is another formulation called 1242; this has 7 percent of the pentas and above.

Now, beyond this I am not going to get into an argument; EPA has not agreed on what is biodegradable, and how quickly even Monsanto cannot tell this specifically.

Everyone agrees the one chlorine degrades quickly and two or three pretty well, but we are a little hung up on the four.

I am going to touch briefly on some of the things that have been done by industry. In some cases this must be limited to our company. Still I know that everyone in the capacitor industry switched voluntarily 5 years ago when 1,016 became available, even though the cost went up about 40 percent. We were aware enough of the ecological problem to say, "Let us spend more money to get material that is more biodegradable."

There has been a lot done in the area of discharge. Everyone today in the industry is paying a cost of about 10 cents a pound for hundreds of thousands of pounds a year to be incinerated at a high temperature. This is the only way we can totally breakdown a PCB.

Because of this and other practices, I would take very strong issue with Mr. Train's statement that 10,000 pounds are going to the environment via direct discharge. I am part of an industry committee that has determined that right now we are discharging 7 pounds a day as an industry. That is the total direct discharge, and that includes both municipal and navigable water. My company has gone from 5 to 10 pounds in 1970, to about a half a pound to 2 ounces a day right now. On the fifth of January this year our discharge was six-tenths of an ounce.

Other companies have made similar efforts, and we are working very closely, subject to the antitrust restrictions, to share our knowledge of how we can help the environment.

Although Bill Papageorge covered the Yoshu incident very well, I would like to add some comments. The fact is this is the only documented evidence we have of the effect on man of PCB's. There are some studies being done now. NIOSH has contacted four or five plants. They are going to spend considerable time at one of these plants, because each represents the only known populations that has been working with PCB for a long time; they will try to study the resulting effects. It looks like Aerovox is going to be one of the winners, if you can call it a winner, and GE may also have the lucky task of having all these people running around through our records and talking to our employees.

Two things that have not been pointed out to date, although you will get on them tomorrow.

First: In Chicago at least two panels reported on studies of the food chain that indicated that in the last 3 years the food chain has significantly improved with the exception of certain species of fish, which you are concerned with. They cited stripers, obviously, and a couple of species in the Great Lakes area.

Second: Other papers cited the fact that every body of water has improved, with one exception, and that was Lake Michigan. All other bodies of water have shown a drop in PCB, as we expected they would.

An alternative fluid is the solution to the problem. The lack of one presently is the reason that Mr. Train said he would not want to put a time schedule on a PCB phaseout. By now, he appreciates the need to have a viable alternative to which to go.

There are two potential fluids. We expect that the fluid that the McGraw-Hill article covered will probably raise the price of our product 100 percent, which would have a major economic impact on the Nation. We have a little more hope for the fluid that Monsanto is coming along with. Unfortunately, both were only available to us late in the fourth quarter. Tests are underway at our plant on these, and I am sure they have started at every other plant that could use them.

Whatever happens, we are going to definitely have to have some modification in our personnel safety requirements. Our industry is hoping to get Mr. Train or others in the Government to help us on this. UL is our specifier—they write the Bible—and right now they have not recognized the problem. Still we have told them there is no choice—changes in the requirements for flammability must be made.

We would estimate that testing these alternative fluids, if successful, could give us enough data under our belts by late in the spring of next year to say let us go. At present, I don't know if the successful candidate will be Monsanto or Dow Chemical or someone else. After the approval, it will probably take another year to gear up to produce 20 million pounds needed annually by our industry.

The switch from PCB probably cannot be made without a large gamble in product reliability, before July 1978, but I do think that this is a reasonable date to try to hit.

I would like to emphasize one section in my statement. I point out that our discharges go into Buzzards Bay, a body of water that I fish in, as do a lot of others. The tests we have had conducted by outside laboratories indicate that that body of water now meets the proposed water criteria which has been established by EPA for all waters; this is one part per trillion. Many testing labs say that they cannot measure and even EPA has admitted it has trouble measuring one part per trillion. Still that is the requirement.

I further point out that this is being achieved despite the fact that Aerovox and others in the area were not particularly mindful of the environment in the past—we did not know that what we were doing was wrong. Still the fact is we did not try to minimize our discharge into the environment. We used scrap material to oil the roads, and keep the dust down. Our practices were not good, and we used a much less biodegradable material at that time.

And last, one of the things that has not been previously mentioned is that one of the best uses of PCB was for bottom paint on boats. Practically every vessel in New Bedford, which has many boats, was painted with PCB up through 1971—a high chlorine content PCB, 10 to 15 percent and therefore nonbiodegradable. If you scrape those hulls you will find the PCB is still there, but Buzzards Bay has been cleared up.

I am sure there are other ways in which PCB have gotten into my local environment. As a matter of fact, EPA pointed out that

a recent bridge across the New Bedford Harbor, carrying I-95 across, was done with a lot of landfill and that PCB was found in the earth.

You are groping with a very big task. There is no doubt that we have got to stop using PCB as quickly as possible. I hope, and suspect that we can do that in the timespan I just suggested but that is still 2 years plus. The bigger problem is what we do to rectify the harm done to the environment over the past 45 years; I do not have that answer, and I have spent virtually half of my time over the last 6 months dealing with the PCB problem.

Thank you.

Mr. DE LA GARZA. Thank you very much.

Mr. Studds?

Mr. STUDDS. Thank you, Mr. Chairman.

Mr. Tuttle, I appreciate your patience with our time schedule, and hope you make the airplane.

Do not pay any attention to Mr. de la Garza when he is talking about luring you to Texas.

You said that at one point, I think, with reference to EPA, that they refused to talk with you. You said they hold the Bible, and would not talk with you, or something like that.

Did I misunderstand you?

Mr. TUTTLE. I do not know. No, I did not mean to say that, at all. EPA has been very cooperative, very cooperative.

Mr. STUDDS. Then I beg your pardon.

Mr. TUTTLE. That was Underwriters Laboratory.

Mr. STUDDS. There has been, in your experience, no instance of lack of cooperation from Federal agencies?

Mr. TUTTLE. Absolutely none. None, no.

Mr. STUDDS. Did I understand you correctly to say that you are most optimistic in your estimate of July 1978 in terms of complete cessation of use of PCB, and a transfer to some other——

Mr. TUTTLE. That would assume that one of these two, or some small modification, or something that pops up very quickly with a fluid that was acceptable.

Mr. STUDDS. I gather from listening to you that your own company, and the industry in general, is doing every thing they can to further this research to accelerate that process?

Mr. TUTTLE. They are. About a dozen of us have attorneys now determining whether we can do this on a developmental joint effort.

Mr. STUDDS. Are you aware of any way in which you think the Government might, or ought to be of assistance in this problem that it has not been so far, or you do not care to see the Government involved?

Mr. TUTTLE. Let me say I would not want the Government mandating the industry on what fluid to use, unless it wants to pick up the responsibility for the product.

I would say that there are two things; and perhaps NBS, or some other group, could assist in making a legal vehicle to assist in the evaluation of alternative materials, rather than having 15 companies going in 15 directions. That is the American way, but it does not bring the product necessarily to the market first. The Japanese

are working through MITI via such means, and getting things done quickly.

The other thing—and I should have mentioned it earlier. We made a very passionate plea when we met with Mr. Train 2 weeks ago that perhaps some legislation could be passed giving some kind of assistance on fire insurance, this would be helpful.

There is going to be a big problem with the insurance underwriters, and in the end I am afraid of a lot of instances will come to pass in which a person will say, "let us try a lawsuit." All of us in the industry are going to be faced with product liability insurance bills that are going to be very, very substantial—very substantial.

I do not profess to really know how this could be worked out. Mr. Train was not too optimistic, either.

Mr. STUDDS. Thank you, sir.

Thank you for your time, and thank you, Mr. Chairman, for being accommodating.

Mr. DE LA GARZA. Thank you, Mr. Studds.

Let the record show that I am a friend of the New Bedford fleet. I just do not want to afford them any real protection that would injure the Texas fleet.

Mr. Ruppe?

Mr. RUPPE. Thank you very much. It may wipe out the Massachusetts fleet.

Thank you for a very, very interesting, very informative statement.

You mention the work your company has done, and the work that Monsanto has done to eliminate the sale of open system use of PCB.

Do you, in your own company, and from your own knowledge, and experience, know whether there is a great deal of import of this product, or reprocessing of the product for open systems use in the United States?

Mr. TUTTLE. I cannot imagine anybody in business being foolhardy enough to play with the liability we have.

Monsanto required 4 years ago that each of us, in order to be a customer, personally indemnify the Board of Directors of Monsanto.

Mr. RUPPE. How about the guy who reprocesses the waste?

Mr. TUTTLE. I pay a huge $10 million insurance policy on each director, and to sell a little scrap oil for a few dollars would not be too intelligent.

Mr. RUPPE. You have no knowledge of import through open system, or recycling or reprocessing?

Mr. TUTTLE. We process all fluid that comes into our plant from Monsanto. It is not clean enough to use; we filter it ourselves. We do our own filtering, but——

Mr. RUPPE. But yours is an open system use, the end product?

Mr. TUTTLE. The end product is closed, yes. The only place that I can think of it would not be in small capacitors, which you must remember are non-repairable items.

There are repair stations for your larger transformers and your capacitors.

Yes, these repair stations are generally a part of one of the big three or four who make that end product: Westinghouse, General Electric, McGraw, and so on. To the best of my knowledge, they are operating under the same care and practice that is dictated by management of the other plants.

They take a transformer in, and perhaps drain fluids; if it is deemed broken down, they barrel it and ship it back to the home plant which has an incineration process. The repair station then refills the transformer with new fluid.

I think generally all of the normal safeguards are being practiced there. Admittedly I have heard the rumor about recycling, and black market, and so on, but I just do not know that it exists. I really do not. I have no way of believing it. other than via imports, and it is very possible that the amount of imports may be unstated.

We have identified one user of imports of the type that are under investigation, also a constituent.

Mr. STUDDS. I hope that that is not the distinction that it sounds like.

Mr. TUTTLE. It is.

This is not a good use, but I have to say that it happens to turn out a beautiful gear, very inexpensively. Unfortunately, it requires that PCB wax being burned off and this gets into the environment. I am sure there are people who are still trying to buy PCB for hydraulic equipment and other things, because it is better.

I know of one guy who had a whole bunch of booster pumps. Without PCB as a cooling fluid, he had to wipe out about $200,000 worth of pumps. He queried me on the sale of PCB, I said, "no", although I could have made a buck on it. It just was not worth it.

Believe me, I really do not know of any black market selling, and I would be surprised if there is any, unless there is something insignificant which has not been identified, and that is very possible.

Mr. RUPPE. A number of people on this committee and in Congress have introduced a variety of toxic substance control pieces of legislation.

Do you think there is any merit to any type of pretesting, or preanalysis of the effects of such products in this area, and I must confess I do not know anything about it, to be more specific, but would there be any value in this kind of pretesting, which I think EPA referred to even earlier, as one of the things that would be within their realm of authority should the Toxic Substance Control Act pass in any form?

Mr. TUTTLE. I must say, that had you asked me this 2 years ago, I would have said a Toxic Substance Control Act was not necessary. But now I think it is a good idea, even though it is going to further control business.

I will be honest; at least two of the fluids that we are looking to as alternatives may not be ecologically and environmentally any better than PCB. I mean that. My people tell me they are not sure that alternatives will buy a thing, except a more costly product that is less reliable; the environment may be no better off than it is with 1016.

We might as well face up to potential problems before we bring out a new product—such as the cure all for the PCB that we are now using.

It is not impossible that via such legislation, and we do hear such arguments, that 1016 could be judged a PCB formula which should be continued for a long time. In this example, unfortunately, because Monsanto has gotten so much negative publicity, that even at triple the price, they would not continue PCB production.

I think that what Mr. Train suggested was a responsible way of eliminating the possibility of introducing harmful chemicals. He did not necessarily advocate pretesting except on certain formulations of chemicals—certain combinations of chemicals, that past experience indicated posed problems. I know that environment studies are going on right now by Dow Chemical on their fluids, and Monsanto on their fluids, and Dow Corning on their fluids, because they are coming into an area—replacing PCB—in which we, their customers, are saying there is no point in jumping from one fire and ending up in another fire the next day. EPA will be right down our necks all over again on a different chemical if it is hazardous.

So I think really toxic substances legislation, although it may not be this committee's responsibility, is in order for consideration. I must state though that I have not read the proposed bill.

Mr. RUPPE. Are you suggesting pretesting or, I think perhaps you said more identifying the chemical composition, or chemical pieces of the product?

Mr. TUTTLE. I am suggesting that some pretesting is necessary on certain more potentially harmful chemicals. I am suggesting—well, I am suggesting what Mr. Train recommended—that the legislation call for prenotification of any new chemical on those that were improvements of prior materials or new applications of chemicals used without harm in the past, nothing further need be done. But on those of known risk, pretesting I think would be in order—and obviously pretesting is being done right now.

Mr. RUPPE. Thank you, Mr. Chairman.

Mr. DE LA GARZA. Thank you very much.

Counsel?

Mr. MANNINA. Mr. Tuttle, you seem to indicate Aroclor 1016 should be continued in use, and that the environmental impact may not be as severe as other PCB's. You indicate that Dr. Risebrough at the University of California stresses in his study that he has yet to find that particular component of PCB in environmental or animal life.

I would hope you and Dr. Risebrough could get together.

I took the liberty of talking with him yesterday, and it was his feeling that your statement did not reflect his position accurately, that 1016 had been found in the environment and in animal life.

He further contended that 1016 is toxic. Given your statement, could you explain the difference between 1016 and 1242, if 1016 has 41 percent chlorine and Aroclor.

Why is 1016 a better compound than 1242?

Mr. TUTTLE. I am not a chemist or a toxicologist. It is not so much the amount of chlorine, but how many chlorine atoms are in the benzine molecule. Therefore, how much will biodegrade instantaneously.

Those with two atoms will go very quickly. Three quite quickly. The biodegradability of molecules with four atoms, as I said, is up in the air. So it is really what is inside the structure, not the percent of chlorine by weight.

Now, 1242 has got 7 percent of its molecules that contain 5, 6 or 7 chlorine atoms and do not degrade. 1016 has got 0.5 percent. That is the difference really; it has less of the 5, 6 and 7 atom molecules, and 1016 has got more one's and two's.

Mr. MANNINA. Thank you.

Mr. TUTTLE. That is the difference. I do think when the Chicago record is published, and I wish it were out now, that that quote will be correct.

Mr. MANNINA. Perhaps you can get together and verify, amongst yourselves.

Mr. TUTTLE. One individual from EPA did indicate my quote was correct, but let's drop the subject.

Mr. DE LA GARZA. Thank you very much.

We appreciate your contribution. I am sure there will be more questions, and with that, the committee will stand in recess until 2 p.m. tomorrow.

[Whereupon, at 6:16 p.m., the subcommittee recessed, to reconvene at 2 p.m., Thursday, January 29, 1976.]

POLYCHLORINATED BIPHENYLS (PCB)

THURSDAY, JANUARY 29, 1976

HOUSE OF REPRESENTATIVES,
COMMITTEE ON MERCHANT MARINE AND FISHERIES,
SUBCOMMITTEE ON FISHERIES AND WILDLIFE
CONSERVATION AND THE ENVIRONMENT,
Washington, D.C.

The subcommittee met at 2:50 p.m., pursuant to recess, in room 1334, Longworth House Office Building, Hon. Robert L. Leggett, chairman of the subcommittee, presiding.

Mr. LEGGETT. The meeting of the Subcommittee on Fisheries and Wildlife Conservation and the Environment will please come to order.

This is the time regularly scheduled for the second day of hearings on the oversight problem with respect to polychlorinated biphenyls, also known as PCB's, being introduced into the environment in spite of the fact that we have taken certain voluntary precautions.

In testimony that we have received yesterday, the committee was apprised of the overall national problem, particularly as respects fire in the high concentration of PCB's found in the fish environment in the Great Lakes area, such parts of the Atlantic Coast, to a lesser degree in other parts of the country, including the Yukon.

Today, we have a total of six witnesses, and counsel has suggested that we have all six witnesses testify as a panel, and the members be allowed to perhaps question them, not necessarily in rotation, but as the demand may require.

Today we have Mr. Tom Carver, National Marine Fisheries Service, U.S. Department of Commerce; Mr. Karim Ahmed, Natural Resources Defense Council; Mr. Lee Weddig, executive director, National Fisheries Institute; Dr. Del Wayne Nimmo, Environmental Reserch Lab, Environmental Protection Agency; Mr. Bob Pond, Stripers Unlimited; and Prof. Donald Parejko, Department of Biology, Northern Michigan University.

Very good, gentlemen.

Mr. Carver, your job with the National Marine Fisheries Service is what?

Section A: Reprint of article from January 1, 1976 issue of Electrical World.

Section B: Text of bulletin now being prepared for publication.

Section C: Technical paper prepared jointly by McGraw-Edison Company and Dow Chemical Company.

Section C

Reprinted from January 1, 1976 issue of Electrical World.

Substitute found for PCBs in capacitors

Polychlorinated biphenyls (PCBs) have been much in the news of late. Though widely used in electrical apparatus because of their nonflammability and low dielectric loss, PCBs have been under severe attack by environmentalists because of their extreme persistence and toxicity when they enter the food chain. As a partial answer to this problem, McGraw-Edison Co's Power Systems Div and Dow Chemical Co have announced jointly that an environmentally and electrically acceptable substitute for PCB in high-voltage power capacitors has been developed, and that McGraw-Edison will begin using it in commercial quantities by mid-1976. The new fluid—designated Dow XFS-4169L—has an alkylated chlorodiphenyl oxide (DPO) base, and will add less than $20 to the cost of a 200-kvar capacitor.

Herbert M. Appleton, president of McGraw-Edison's Electrical Systems & Service Group, says that, after examining results of tests performed at Dow's laboratories as well as evaluating experiences with its own equipment in hundreds of test samples over a three-year period, McGraw-Edison determined that the new fluid offers the same electrical performance as PCBs, or perhaps even better.

About 25% of all PCBs manufactured today are used in high-voltage power capacitors, so acceptance of the new fluid for this application alone would result in a significant cutback of PCB production and a corresponding reduction in hazard to the environment.

The three years of electrical testing by McGraw-Edison involved hundreds of samples and more than 18-million kvar-hr of service for full-sized units, as well as extensive testing of miniature units. The capacitors impregnated with the DPO-based dielectric demonstrated superior corona behavior and greater reliability than similar PCB-impregnated units. The units were subjected to accelerated life tests, with voltage stress and temperature ranges greatly in excess of those experienced under normal operating conditions.

Corona tests showed discharge inception voltage over the normal operating range to be 20-25% higher than for capacitors impregnated with PCB, and discharge extinction voltages were equivalent to those of PCB systems.

Dielectric loss as a function of temperature and stress also is equivalent in the two systems. The losses are as low as they are in PCB systems, from room temperature to about 90C.

The new dielectric fluid introduced by McGraw-Edison and Dow is technically a flammable liquid, using a standard flammability test. However, a comparison of flash and fire points shows that the new fluid has substantial advantages over mineral oil (see table).

Unlike distribution transformers in which the flash and fire points are often approached, capacitors are hermetically sealed, and the dielectric fluid normally attains maximum temperatures that are well below both the flash and fire points. Therefore, substantial energy is required from an arc to produce a fire.

Flammability of insulants

	Flash deg. C	Fire deg. C
Mineral oil	154	167
PCB	166	316
XFS-4169L	174	199

The National Electrical Code allows installation of electrical devices in or on buildings without a vault if they contain less than 3 gal of a flammable liquid. The commonest-sized power capacitor—a 200-kvar unit—contains less than 3 gal of fluid—and is usually installed out-of-doors. Therefore, the flammability classification does not pose a serious drawback to use of the fluid in capacitors.

As a flammable liquid, the DPO-based dielectric offers at least one major advantage over the PCB it replaces. PCBs require incineration at temperatures in excess of 2,000F and under highly controlled conditions for environmentally acceptable disposal (EW, Sept 15, 1970, p 76). The new insulating fluid requires no special incineration, and no toxic residue is expelled or deposited in the stack.

The problem of disposal of PCB was called to the world's attention in 1966 when its residues were detected during studies of the retention of DDT in animal tissues. Pressure against use of PCBs built up so rapidly that, in 1971, Monsanto Industrial Chemicals Co, principal producer of the chemical in the US, announced that it would, thereafter, restrict sales to use in so-called "closed-cycle" systems, such as capacitors and transformers.

The US Food & Drug Administration allows up to 5 ppm of PCBs in fish, but the US Fish & Wildlife Service considers anything over 0.5 ppm in a fish egg as unacceptable. Despite current tight control of PCBs in aquatic life, readings of these values have been found in fish in extensive sections of waterways throughout the country.

The low toxicity of DPO has been demonstrated in a test on fathead minnows. Comparatively, the DPO-based fluid proved to be 20 times less toxic to fish after 96 hr than were PCBs. A concentration of only 0.7 mg/liter of a capacitor-grade PCB was lethal to 50% of the minnows, compared to 15.4 mg/liter of the DPO-based fluid. Further tests in the same series indicated an even greater difference in toxicity for longer exposures.

In tests for toxicity to mammals, the highest practical dosage of the DPO-based fluid did not kill rats. During a 90-day dietary feeding study, no significant differences resulted in control rats and rats fed up to 15 mg/kg/day. In a 110-lb person, this dose would be equivalent to 750 mg/day or 1,500 ppm if consumed in a daily portion of meat or fish.

Relative biodegradability of chemicals in the DPO-based fluid and in capacitor-grade PCB also shows a marked difference, according to the developers of the new fluid. Generally, DPO-based fluid chemicals biodegrade significantly faster than the chemicals in capacitor-grade PCB, at a rate comparable to many nonpersistent industrial chemicals.

Chlorodiphenyl oxide, the most-water-soluble component in the new dielectric fluid, biodegrades fast enough to be classified as "biotreatable" in wastewater-treatment plants, although the developers caution against using this kind of disposal as a recommended practice. Disposal of the DPO-based fluid should be performed as with any other low-hazard chemical.

The new fluid is intended for use in capacitors, and is not directly applicable to transformers. Dow, however, has a polydimethyl siloxane liquid under test for this purpose. The Japanese National Railway System has used it for almost five years and ongoing field evaluation is under way in France, Scandinavia, and Great Britain.

Dow has assured the electrical industry that it will have the manufacturing capability to produce XFS-4169L at a 1-million-lb/yr rate during the first quarter of 1976. Should the fluid prove acceptable to the industry, Dow is willing to make a commitment to produce it in multimillion-lb/yr quantities by the end of 1976. ■

in others that are leeching into the environment, and it should be just capped with blacktop.

This should be an engineering process to find out how you stop a dump from leeching this out. There should be no more dumps or landfills near the water.

If I knew that PCB's were in my television set, I certainly would not take my television set to the local dump.

We have to know where it is. If it is in the fluorescent light, I have to know it is there, so I will not take that to the local dump.

It is criminal on the part of government and the industry in not telling us where it is.

I know electricians who to this day, do not know they should not take that transformer fluid and bring it to a farmer for him to spray on his crop. He still thinks it is a great thing for controlling bugs.

This was used, according to what I hear, as an original sort of pesticide, and was sprayed on apple orchards, and things like that.

This is just what I hear from electricians.

Mr. OBERSTAR. That is astonishing. I never heard that before.

Mr. POND. I heard this last night.

Mr. OBERSTAR. What we need is a massive program of public education to inform people of things like fluorescent ballast which are dangerous to the environment.

Mr. POND. They do not know. The average electrician has not the slightest idea, and even the people handling the material do not think it is dangerous. It has never been reported as being harmful.

I called GE's environmental scientist. He said that that stuff never hurt anybody. They got a few sores. He was angry about me calling 4 or 5 years ago when I first found these things in the eggs.

For the first time, recently, this electrician I know had to put in an installation where he actually sealed the transformer in a room, in a vault, and had to put a tank under it to catch the material. He said he never did this before. He had seen transformers where kids had opened the valves, and all the fluid went into the ground.

There are a lot of spills. If you talk to the electrical industry, the man that works in the industry, he will tell you some horrible stories.

Mr. OBERSTAR. Counsel has some questions.

Mr. SPENSLEY. Mr. Pond, I have one question I want to ask you.

Has any Federal agency helped you with any research money in your efforts?

Mr. POND. We have not found any agency offering any money at all.

Bruce Rogers collected a lot of data. He went to his EPA coordinator and said he really thought this should be looked into. He has been on this thing 4 years, and never had any money.

EPA scientists agreed this should be done, but from the highest level of Government they said no, we are not going to touch it.

I believe it is not just being open and aboveboard about the problem. You have to face it, and we have to do something about it.

We do need money, not ourselves, but the universities, at least, directly for this problem.

Mr. SPENSLEY. I also wanted to ask Mr. Carver and Dr. Nimmo whether you are satisfied that your agencies are coordinating your

research efforts in this area, and whether you are obtaining the type of information that is helpful in the projects you are working on.

Is there interagency agreement for coordinated research efforts, or exchange of information?

Mr. CARVER. There is a coordinating mechanism for all Federal pesticide research, and most PCB work comes under this.

Mr. SPENSLEY. What is the mechanism?

Mr. CARVER. The mechanism is the Federal Working Group on Pest Management. It consists of five or six panels, one of which is a research panel. I think about 20 different agencies are represented on this.

Mr. SPENSLEY. Are you satisfied that they are doing an adequate job?

Mr. CARVER. I think they are doing a splendid job.

Mr. SPENSLEY. Dr. Nimmo?

Mr. NIMMO. I agree. I am not familiar with what exactly Mr. Carver is talking about, but in terms of the information and the work of the programs, certainly this information is shared between the agenceis.

Mr. SPENSLEY. Well, EPA does participate in this panel that Mr. Carver is referring to?

Mr. CARVER. Yes.

Mr. SPENSLEY. One last question, to whoever wants to respond to it. Evidently one of the principal objections to substituting the PCB's in the industry is the question of flammability. Perhaps Dr. Ahmed or somebody else may have considered this question. Has there been a consideration of this question in evaluating substitutes?

Dr. AHMED. Well, there is an underwriters code with respect to transformers on flammability. There is no corresponding code for capacitors.

My understanding is even in capacitators there may be certain occasions where you might have problems of flammability.

Mr. SPENSLEY. I guess the question I am asking is, has someone examined these substitutes and verified the industry's claims that flammability is, in fact, a significant problem?

Dr. AHMED. With the substitutes you said, like mineral oil, and some of the other possibilities?

Mr. SPENSLEY. Yes.

Dr. AHMED. The only agency that has been looking at this thing seriously is the National Bureau of Standards. They are apparently expected to report their findings on this question soon.

A professor at Purdue University, in the engineering department, chaired this particular study group. If you would care to inquire of them, I think that they would have the best available information on this study.

Mr. OBERSTAR. Well, the National Water Quality Laboratory at DuLuth has developed some information that indicated substitutes are being developed by industry. Dow Chemical is manufacturing a fire-retardant fluid suitable for use in capacitators called butyldiphenol oxide, and Dow Corning is manufacturing material for use in transformers called a silicone oil.

Are you familiar, either of you, with either of these two materials, Dr. Nimmo, or Dr. Ahmed?

Mr. NIMMO. No; Dr. Gil Veith at the laboratory has told us on several occasions about these. As far as I know, the information is not generally known, any information concerning these, in terms of the physical chemical properties, and certainly no research that I know of in the agencies is going on as far as that is concerned.

Dr. AHMED. I have talked to both Dow Chemical and Dow Corning about these products. My impression is that the Dow Chemical product has undergone, at least within the industry, a certain amount of testing. They believe that they have the right kind of fluid in terms of physical properties. They still are concerned about the potential environmental impact.

The information I have gotten from them directly, which is not published in the literature, is that they seem to be considerably less toxic, both chronically and acutely.

The biphenyloxide material is a compound with the oxygen atom in between the two benzene rings. They apparently appear to be more biodegradable, and so on. This is the information I have.

They have apparently given this information directly to the EPA. But we have not been able to get exactly the technical information from the companies in writing. All I can tell you is that I talked with the technical staff, and they assure us that they are on the threshold of coming out with a very good substitute.

I think GE has used phthalate esters in countries where PCB's have been banned. They, in fact, have a promotional brochure on this particular material. It does have a bit of a flammability problem compared to the PCB. It is certainly not nonflammable.

Mr. OBERSTAR. Did you say that GE is doing this in other countries, using esters?

Mr. NIMMO. Yes; they are selling this product in other countries.

Mr. OBERSTAR. But they are not doing it in this country?

Mr. NIMMO. As far as I know, they are not. This matter was brought up at the hearings in Albany.

Mr. OBERSTAR. It is a little matter of patents they have, and the $6 million royalties they realize a year from the patents they have on systems of impregnating capacitators with PCB's.

Dr. AHMED. Well, this particular compound is called econol, and that is all we know.

Mr. OBERSTAR. Is it possible to develop a scientific protocol for testing of the butyldiphenyl oxide or the oil over a sufficient period of time so we could have some scientific evidence on whether that would be environmentally acceptable?

Dr. AHMED. Yes; I think it can be done. From my conversation with the technical staff at Dow Chemical, I was impressed with what they told me. They are studying the material on several species of animals at low levels.

In this kind of study, as it turned out to be true, it can be done by industry on other substances, like common toxic substances, and I think we will go a long way in preventing the kinds of problems we have been discussing today.

Mr. OBERSTAR. Mr. Tuttle, in his testimony yesterday, indicated that the best we could do in switching over from Aroclor or other PCB's would be July 1, 1978, quoting him, "Assuming the new fluids prove to be satisfactory."

That indicates that we would have to do a good deal of testing, both as to the environmental effects, biological effects, and the technological efficiency of new materials in the work that they are expected to do in the capacitors and transformers.

Is that a reasonable time frame?

Is that something that is achievable?

Dr. AHMED. Personally, I think it is. It is achievable.

But the other problems without the PCB already present in the environment, the bottom sediments and landfills and all, are still some issues that we still have to deal with.

There is no mechanism under the Federal Government to undertake that testing. This will have to be done by private industry and there is no means within the Federal regulatory framework to approve or disapprove the entry of a new chemical compound into industrial use and its introduction ultimately into the environment.

Dr. AHMED. You are right. There is nothing in the statutes.

Mr. WEDDIG. There is nothing in the statutes now, but it is one reason why we would like to see the Toxic Substances Control Act passed, because that would provide the mechanism.

Second, there is nothing to prevent, in terms of statutory authority, issuing very stringent effluent standards so that current manufacturing practices which are involved with Aroclor would cut off entirely further leakage through their plant outfalls.

Finally, there is nothing that would prevent this Congress or someone setting up a disposal system that would try to prevent further dissipation of the used material. Why not?

We are talking about recovering tin cans or aluminum cans from soda pop and beer, so why can we not set up a system to recover used capacitators. We used to pay bounties on wools and other creditors, so why can we not pay bounty on transactors?

Mr. OBERSTAR. You mean we should take each product that is sold, just like we do cigarette packages, and say, "Warning: the Environmental Protection Agency has determined that disposal of this material may be hazardous to health and other things in the environment"?

That is about the only way that you are going to be able to do it.

Mr. WEDDIG. I think if there is a system that is involved where you will get 50 cents back every time you bring one of these in, it would encourage a little bit of action in that way from junk dealers and from other people who can handle it.

They are bringing back newspapers at a far less cost than that.

Mr. OBERSTAR. Counsel has a question.

Mr. MANNINA. In 1971, the Government research with respect to PCB's was so diffused that an Interagency Task Force was created.

In response to Mr. Spensley's questions, you indicated this problem was largely solved because of the pesticide monitoring program.

What about things that are not pesticides, such as PCB's?

Are those covered under this monitoring program you have discussed?

Mr. CARVER. I think it was largely due to the efforts of pesticide researchers that the PCB problem was uncovered, and it is through their subsequent efforts that these problems have been identified.

Mr. MANNINA. All right.

NPDES Permit (No. NY 000 7048), issued to the General Electric Company for its facilities at Hudson Falls and Fort Edward, New York.

We request that notice of any final decision by the Administrator with respect to the proposed modification, as well as notice of any public hearing or request for an adjudicatory hearing, be given to NRDC, *et al.* by serving a copy thereof upon the undersigned.

Yours sincerely,

SARAH CHASIS,
Staff Attorney,
Natural Resources Defense Council.

Enclosure.

COMMENTS OF THE NATURAL RESOURCES DEFENSE COUNCIL, THE HUDSON RIVER FISHERMEN'S ASSOCIATION, THE HUDSON RIVER SLOOP RESTORATION, AND THE FEDERATED CONSERVATIONISTS OF WESTCHESTER COUNTY ON EPA'S PROPOSED MODIFICATION OF NPDES PERMIT NO. NY 000 7048, ISSUED TO THE GENERAL ELECTRIC COMPANY FOR ITS FACILITIES AT HUDSON FALLS AND FORT EDWARD, N.Y.

(By Sarah Chasis, Esq. and A. Karim Ahmed, Ph.D., Natural Resources Defense Council, Inc. January 26, 1976)

These comments are submitted on behalf of the Natural Resources Defense Council, the Hudson River Fishermen's Association, the Hudson River Sloop Restoration and the Federated Conservationists of Westchester County. The Natural Resources Defense Council (NRDC) is a national environmental organization with a membership of over 18,000. NRDC's purposes include protection of America's endangered resources and protection and improvement of the quality of the human environment. The Hudson River Fishermen's Association (HRFA) is a conservation organization with a membership of approximately 750. Its purposes include encouragement of the rational use of the aquatic resources of the Hudson River and its tributaries and abatement of pollution in the Hudson River. The Hudson River Sloop Restoration (HRSR), with a membership of approximately 4,000, many of whom reside in the Hudson Valley, is dedicated to maintaining the ecology and condition of the Hudson River. The Federated Conservationists of Westchester County (FCWC) is a coalition of 75 environmental groups in Westchester County, dedicated to providing support for solution of regional problems in conservation. Over the years, each of these organizations has devoted substantial resources to improvement and protection of the resource-rich Hudson River estuary.

Most recently, these groups, represented by NRDC attorneys, have intervened as full parties in the New York State enforcement proceeding against General Electric relating to its discharges of PCBs into the Hudson River at Hudson Falls and Fort Edward. Because of this involvement, these groups are particularly knowledgeable concerning the issues related to GE's continuing discharges of PCBs. These groups are also especially affected by EPA's action on PCBs because of the stake they and their members have in protection and enhancement of the resources of the Hudson River.

THE PROPOSED MODIFICATION OF GE'S NPDES PERMIT

In August 1975, NRDC and HRFA wrote to EPA Administrator Train demanding that he exercise his emergency powers under Section 504 of the FWPCA. The request was based on evidence that GE's discharges of PCBs into the Hudson River presented an "imminent and substantial endangerment" to the health of human consumers of Hudson River fish and the welfare of commercial fishermen who make their living selling fish from the Hudson River. We asked, *inter alia*, that GE's discharges be radically curbed by September, 1976 and that there be an immediate moratorium on all dredging activities in the Hudson River which might have the effect of disturbing PCB contaminated sediments. However, EPA has in the past and continues to refuse to exercise its 504 powers.

The evidence adduced during the course of hearings before the New York State Department of Environmental Conservation concerning GE's alleged violations of state law supports an exercise by EPA of its emergency powers. Fish in the Upper Hudson River below GE's plants at Hudson Falls and Fort Edward contain PCB concentrations in the range of 20–300 ppm Aroclor 1016/1242, with one fish sample containing 658 ppm. Fish throughout the Lower Hudson

contain levels of PCBs well above the 5 ppm temporary tolerance level set by FDA. Furthermore, it is clear that it is GE's past and ongoing discharges of PCBs in the Upper Hudson River which have resulted in these high levels of contamination.

These levels of PCB contamination constitute an imminent threat to the survival of fish species in the Hudson River and to the extensive commercial and sport fisheries dependent thereon. Most importantly, the concentrations of PCBs in the edible portion of fish in the Hudson River present a serious health hazard to the human consumers of such fish.

The fact that GE has curbed its discharges during 1975 does not alleviate the need for emergency action. GE's present discharges from its two plants range from .7 to 13.9 lbs/day, with an average daily discharge for October and November, 1975 of at least 3.2 lbs/day. These discharges result in concentrations in receiving waters far in excess of the 1 ppt standard recommended by EPA's National Water Quality Lab at Duluth, Minnesota. The present discharge also results in concentrations in fish greater than .1 ppm, the standard recommended for fish by the Great Lakes Water Quality Board of the International Joint Commission.

Moreover, just as GE's past discharges have contributed to present levels of contamination in Hudson River biota and sediments, so too will GE's present discharges. The persistent nature of PCBs, combined with the manner in which they bioaccumulate from water and sediments and biomagnify up the food chain, necessarily means that daily discharges over time will contribute to the buildup of PCB concentrations in sediments and biota at levels toxic to fish and humans. Moreover, GE's present discharges exist against a background of already high levels of PCB contamination, resulting from 20–25 years of PCB discharges by GE. Thus, further contribution to already dangerous levels of PCBs threaten injury to the Hudson River fishery and human consumers thereof.

In view of such evidence, combined with the evidence of the toxicity of Aroclor 1016/1242 to both fish and humans, we deplore EPA's failure to exercise its emergency powers. The present route EPA has chosen to follow, namely modification of the existing NPDES permit, is unsatisfactory for three major reasons. The foremost reason is that the proposed effluent limitations on present and future discharges of PCBs may not become effective if GE challenges the proposed modifications, until after an adjudicatory hearing. 40 C.F.R. Section 125.35(d)(2). If a request for an adjudicatory hearing is made and granted, it would mean that the discharge limitation of 30 lbs/day contained in GE's existing NPDES permit would be the only federal limitation in effect. Second, the proposed modifications of the present limitations on GE's discharge, even if they were to go into effect immediately, are too high. Third, EPA has failed to address the problem of limiting GE's discharges of PCBs into the Hudson Falls sewage treatment plant.

Rather than sanctioning GE's present discharge level by setting limits of 1.5 lbs/day PCBs for the two plants during dry weather and 5.8 lbs/day PCBs for the two plants during wet weather, EPA should establish an abatement schedule which requires GE to attain a maximum daily discharge of "none" [1] at all discharge points at the Fort Edward and Hudson Falls plants, as soon as such a level can be technologically achieved. Technological achievability should be defined not only on the basis of available treatment technology, but also with reference to the existence and commercial availability of substitutes for PCBs.

GE itself has said on record in the DEC proceeding that it has the technological capability for attaining a maximum daily discharge of 100g PCBs by the end of 1976. At the very least, EPA's proposed effluent limitations should take account of this admitted capability by requiring such a discharge level, if not a more stringent one, for December, 1976.

In addition to EPA's failure to exercise its 504 emergency powers or to propose sufficiently stringent effluent limitations, EPA has failed to address a very real problem connected with GE's discharges into the Hudson River, namely GE's indirect discharges of PCBs into the Hudson River via the Hudson Falls sewage treatment plant. It appears that the discharge of PCBs from the treatment plant (measured at .37 to 7.13 lbs/day) is in fact an indirect discharge

[1] For enforcement purposes, a violation of the "none" limitation should be defined as occurring at the point where the level of PCB concentration in the effluent can be detected by the most sensitive analytic technique available.

into the Hudson River from GE's Hudson Falls plant. Pursuant to its authority under Section 307(b) of the FWPCA, EPA should immediately establish pretreatment standards applicable to the GE discharge into the Hudson Falls sewage treatment plant and, pursuant to Section 402(a)(1), impose an appropriate condition in the NPDES permit. If this is not done several pounds per day of PCBs will continue to be discharged into the *Hudson River* by GE without control or limitation.

In addition to these major criticisms of the proposed permit modifications, we have certain other comments. We agree on the proposed designation of "none" as the maximum daily discharge for DSN 001, 003 and inclusion of DSN 003B, 005A and 006, also with a proposed maximum daily limitation of "none". However, we recommend that effluent limitations for discharges 003A, 005 and 007 also be included, with a maximum daily limitation of "none".

We agree that effluent limitations should be met as gross discharge values. This is particularly appropriate for the Hudson Falls plant where the main discharge pipe (002) is located near the intake and the other discharge pipes, i.e., 001 and 007, as well as the Hudson Falls sewage treatment plant are located upstream of the intake. Cross-contamination of the intake waters with discharge waters is likely, making use of net figures unreliable.

We recommend that Paragraph 12 of the permit be modified so as to require *weekly* rather than bimonthly monitoring of the effluent from the two plants.

Just as Paragraph 10(c)(2) correctly incorporates the terms of the State's 401 certification limiting the discharge of toxic wastes, so should Paragraph 9 in order to accurately reflect the conditions placed by New York State on GE's present discharges.

Finally, we have serious questions concerning the adequacy of the limitations placed on GE's discharges of oil and grease into the Hudson River. For DSN 002, the present limitation is 100 kg/day of oil and grease (220 lbs/day), with a 1000-fold reduction required by July 1, 1977. What is the reason for permitting such a substantial discharge. If 189g/day can be attained by July 1, 1977, why not require such a reduction now? Has any determination been made of the receiving water concentrations resulting from a 220 lb/day discharge at low, average and high flows and of whether proposed receiving water standards for oil and grease would be violated by such a discharge? The present limitations on discharges of oil and grease from both DSN 002 and 004 are particularly troubling because of the solubility of PCBs in the oil and grease component of the effluent.

CONCLUSION

Immediate and stringent controls are needed for the discharge of PCBs from GE's facilities and premises at Hudson Falls and Fort Edward, New York. The imminent threat to human health and to a vital fishery require no less. NRDC, *et al.*, view EPA's proposed permit modifications as a step in the right direction, but as inadequate to the task at hand. We urge the exercise of emergency powers under Section 504 of the FWPCA and the establishment of a maximum daily discharge level of "none" for all GE's discharges as soon as is technologically achievable. In addition, we call on EPA to undertake those other actions, such as the imposition of a moratorium on dredging in the Hudson River, which are necessary to control the substantial threats to health and welfare posed by the present situation.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT: DECISION OF THE COUNCIL ON PROTECTION OF THE ENVIRONMENT BY CONTROL OF POLYCHLORINATED BIPHENYLS

(Adopted by the Council at its 315th Meeting on 13th February, 1973)

The Council, having regard to Articles 5(a), 5(b) and 12(c) of the Convention on the Organisation for Economic Co-operation and Development of 14th December, 1960;

Having regard to the Recommendation of the Council of 26th May, 1972, on Guiding Principles concerning International Economic Aspects of Environmental Policies [C(72)128];

Having regard to the Note by the Secretary-General of 7th February, 1973, concerning Proposals for Concerted Action with respect to Polychlorinated Biphenyls [C(73)1(2nd Revision)];

Considering that the use of Polychlorinated Biphenyls (PCBs) should be controlled by international action in order to minimise their escape into the environment pending the realisation of the ultimate objective of eliminating entirely their escape into the environment;

On the proposal of the Environment Committee;

I. DECIDES

1. Member countries shall ensure that in their respective territories, Polychlorinated Biphenyls (PCBs) shall not be used for industrial or commercial purposes, except in the following categories of use: *Dielectric fluids* for transformers or large power factor correction capacitors; *Heat transfer fluids* (other than in installations for processing of foods, drugs, feeds and veterinary products); *Hydraulic fluids* in mining equipment; and as regards the foregoing categories, PCBs may be used only in those applications in which the requirements for non-inflammability outweigh the need for environmental protection and in which Member countries are satisfied that sufficient controls are exercised in order to minimize risk to the environment.

2. In pursuance of paragraph I.1 above, Member countries shall: (a) control the manufacture, import and export of bulk PCBs; (b) institute adequate arrangements for the recovery, regeneration, adequate incineration or other safe disposal of surplus and waste materials; (c) institute a special, uniform labelling system for both bulk PCBs and PCB-containing manufactured products; and (d) establish safety specifications for containers and transport.

II. RECOMMENDS

Member countries in implementing the Decisions set forth in Section I above:

1. Control and manufacture, import and export of PCB-containing products.

2. Work towards the elimination of the use of PCBs in small capacitors.

3. Give priority attention to the elimination of the following applications of PCBs: (a) heat transfer fluids in the food, pharmaceuticals, feed and vetinary industries; (b) plasticizers for paints, inks, copying paper, adhesives, sealants; (c) hydraulic liquids (other than in mining) and lubricating oils; (d) vacuum pump fluids and cutting oils; and (e) pesticides.

4. Request firms to use, as PCB replacements, materials which are less hazardous to human health and the environment than the range of PCBs now in use.

III. DECIDES

At the beginning of 1974, 1975 and 1976 within the frame-work of the Environment Committee, Member countries shall exchange information on the main statistical data concerning PCBs, notably on: (1) amounts of PCBs, including: amounts manufactured by PCB type, amounts imported by PCB type and by country, amounts exported by PCB type and by country, amounts incinerated by PCB type, amounts consumed by PCB type and by use;

(2) PCB replacements supplied by manufacturers, including the following points: identification, total amounts for each chemical type and for each use, known toxicity and environmental hazard of each chemical type; and (3) disposal of surplus PCBs by incineration (including evaluation of incinerator efficiency) or by other efficient means.

IV. NOTES

"Technical Note on Polychlorinated Biphenyls" contained in the Appendix to this Decision.

V. INVITES

Member countries to report to the Organisation at the beginning of 1974, 1975 and 1976 on measures taken in application of this Decision.

VI. INSTRUCTS

Environment Committee to follow the implementation of this Decision, to report at regular intervals to the Council on the information exchanges provided for in Section III of this Decision and to make such proposals to further improve and strengthen the control of production and use of PCBs as may

seem appropriate in the light of experience gained and the continued work of the Organisation in this field.

Appendix—Technical Note on Polychlorinated Biphenyls

INTRODUCTION

1. Polychlorinated biphenyls (PCBs) are a group of stable substances comprising theoretically more than 200 individual compounds, many of which are widely used particularly because of their dielectric properties and non-flammability. At present they are obtained through chlorination of diphenyl, resulting in mixtures that are characterised by their average content of chlorine. Due to the persistence and toxicity of some of these compounds,[1] effects have been observed in the environment and accidents reported over the last few years, which have given rise to serious concern in Member countries. In view of this concern the Sector Group on Unintended Occurrence of Chemicals in the Environment has investigated, on a priority basis, the need for, and feasibilty of, concerted action to control the use and emissions of PCBs. The results of this inquiry, which have been presented in document NR/ENV/72.49, lead to the following conclusions:

(a) Because of unacceptable levels of PCBs found in the environment and because of a number of incidents involving human health, some countries have taken, or are considering taking action to control the use of PCBs;

(b) There are (1972) only six companies in O.E.C.D. Member countries that manufacture PCBs: five of them have already taken steps to reduce production to the supply for a few approved uses;

(c) PCBs can be replaced except for some users where their dielectric properties and non-flammability are essential;

(d) The technology for destruction of PCBs exists;

(e) Because of the many applications of PCBs in the wide range of consumer products moving in international trade, the situation will almost certainly become complicated unless international agreement is reached on allowable uses; and

(f) A rough estimate[2] indicates that consumption of PCBs in O.E.C.D. countries is matched by production. Considering in addition that import of chemicals from non-O.E.C.D. to O.E.C.D. countries is still restricted to basic chemicals, import of bulk PCBs is unlikely. It is, therefore, reasonable to suggest that the major part of the problem of unintended occurrence of PCBs can be solved through concerted action between O.E.C.D. Member countries.

USES OF PCBS

2. The applications of PCBs fall mainly into two categories: uses in closed systems and dissipative uses.

CLOSED SYSTEMS

3. The use of PCBs in closed systems can be defined as applications from which the PCBs are recoverable. PCBs in transformers, capacitors, heat transfer systems, hydraulic equipment, and vacuum pumps are in principle recoverable, since during use, the PCBs are not generally dispersed into the environment.

4. It is, however, important to distinguish between closed system uses that are controllable in practice and those where control cannot be guaranteed either: because frequent replacement of relatively small quantities will lead to disposal rather than recovery, or because a large number of small units widely dispersed will make collection extremely difficult, or because accidental leakage will cause imminent danger to human health.

5. A truly controllable use may therefore be defined as an application where: the PCBs are contained in a sealed circuit in large, long-life units; the quantities involved are such that there is an incentive for regeneration.

6. Following what has been said above, the only truly controllable uses of PCBs are in dielectrics for *transformers* and for *large capacitors* for power factor correction. Preventing escape of PCBs from these applications is mainly a problem of engineering design and of collection and destruction of used liquids, or, in the case of capacitors, of removal and destruction of PCB-impregnated material. These uses also being essential for safety reasons, it would be unreasonable to suggest that they be discontinued at the present time.

7. In all other closed systems, recovery of PCBs, although theoretically possible, would not be practical. Such applications should, therefore, be discontinued, unless safety requirements prevent the use of substitute products:

(i) *Heat transfer systems.*—There may be some installations where the risk of explosion or fire must be avoided at all cost, and the danger of some escape of PCBs therefore is of less importance. Because of the risk of leakage, which can never be totally guarded against, the use of PCBs as heat transfer media in the food, drugs and feed industries should, however, be prohibited.

(ii) *Hydraulic equipment, vacuum pumps.*—Although the quantities involved in the individual case are relatively small, they will, unless recovered, add significantly to the environmental burden of PCBs. Theoretically, used fluids could be recovered, but in view of the difficulty of establishing a system to collect small quantities from many users, these applications should be discontinued. Furthermore, PCBs are generally not essential in hydraulic and pumping fluids, with the possible exception of hydraulic equipment in underground mining.

(iii) *Small capacitors.*—These are typical examples of an application of PCBs in sealed units that are almost completely non-recoverable. Considering, for example, the many domestic electrical appliances in which capacitors are used, the cost of recovery would probably be prohibitive. A warning label showing that the equipment must not be disposed of as ordinary waste has been suggested; it is however, not likely to be sufficient, unless manufacturers and retailers would accept return of appliances that are out of use. The problem of recovery remains unresolved at the present time, but it has to be noted that Japan has stopped the use of PCBs in the manufacture of small capacitors.

DISSIPATIVE USES

8. The dissipative uses are those where recovery of used PCBs is not possible, since they are not contained in closed systems but in direct contact with the environment:

(i) *Lubricating and cutting oils.*—The conditions under which these oils are used are such that there is continuous emission of small quantities into the environment. These applications, not being essential, should be discontinued;

(ii) *Pesticide use.*—This use has fortunately been abandoned in most countries already; if not, it should be banned with immediate effect. Since all O.E.C.D. countries require registration of pesticides, such a measure can easily be taken under existing legislation;

(iii) *Plasticizers.*—The most important category, by volume of dissipative use is in the field of plasticizers. They are or have been used in most countries in a wide variety of consumer products including paints, inks, copying paper, adhesives, sealants, plastic products, etc., many of which are traded internationally. The major applications seem to be in the printing and paint industries.

9. *The printing industry:* Because of the risk of contamination of paper, which after recycling may be used in food packaging, the use of PCBs in the printing industry should be banned. In view of the fact that printing inks can be produced without PCBs and that in any case the amount used probably represents a total value of only about $30.000 in O.E.C.D. countries, such a measure should not cause serious economic damage. Assuming that copying paper is usually provided by the copying machine manufacturers (relatively few and big companies), any economic effects should be small.

10. *The paint industry* poses a somewhat different problem. Over the last decade, production has increased by 3.5 per cent—5 per cent annually and the trend is rising in the O.E.C.D. area.

The over 2,000 million dollar West European paint industry alone accounts for some 40 per cent of the world output. Production is assured by a few large and a great many small companies (United Kingdom=480, Italy and France=350 etc.). This picture suggests that an overall ban on PCBs in paints could have some economic consequences.

It appears, however, that where used (e.g. in stoving applications) PCBs constitute something like 5–10 per cent of the paint. Few details are available in

[1] As of the time of the preparation of this Note, limited research studies with certain selected PCB-compounds seem to indicate that some of these compounds could eventually safely be used for certain applications.

[2] Production in 1971 amounted to about 48.400 metric tons and consumption in the 13 countries that provided numerical information to about 35,300 tons.

respect of the amounts used in paints, but taking one example (France) where 250 tons were used (1971) in a paint industry that produced something like 700,000 tons of paint, presumably only 2500–5000 tons would contain PCBs. Considering in addition that small paint manufacturers are generally highly specialised, and that the manufacturing process would not have to undergo a major change to replace the use of PCBs, a ban on PCBs should not cause any serious disturbance. The use of PCBs in paints has, in fact, been discontinued in some countries already. Figures for production (8,654,200 tons in 1969) and consumption (8,517,500 tons) in O.E.C.D. countires again suggest that import of paints from non-O.E.C.D. producers may be of minor significance.

11. In practice, none of the products where PCBs have been used as plasticizers can be recovered. Unless the use is totally eliminated, there will be continuous emissions into the environment due to evaporation, insufficient incinceration, etc. Judging by the action already taken in several countries, substitutes can readily be found for the whole category of plasticizer use of PCBs, which should, therefore, be banned.

12. It follows from what has been said above that for adequate protection of health and environment, but also to avoid undue competition in international trade, agreement is necessary on allowed uses of PCBs. In order to ensure that home production is not substituted by import, control action by governments, through licencing or other means, is essential. Measures are further necessary to ensure collection of used material, safety in transport of raw PCBs, and assessment of substitute materials:

(a) A uniform labelling system, internationally recognisable, should be developed for use on containers of raw PCBs as well as on any equipment or product containing PCBs.

(b) Suppliers (i.e. manufacturers and importers) should further provide containers for the transport of PCB-containing liquids: such containers must meet the appropriate specifications that have been laid down to ensure safety in transport of dangerous chemicals.

(c) Development of substitutes that are less hazardous than persistent PCBs[a] should be encouraged, but in view of the fact that no system for pre-market control of new chemicals has been introduced, testing for environmental effects is so far entirely the responsibility of the manufacturers. Information on replacement products should, therefore, be collected and reviewed.

Mr. LEGGETT. Are they manufacturing these PCB's in the OECD countries?

Mr. SPETH. I do not know.

Mr. LEGGETT. Monsanto indicated that they exported considerable of this commodity, and we did not get a rundown of exactly who bought it, but the export to OECD countries?

Mr. SPETH. I would imagine if they are exporting, they are, but I cannot say for sure.

Mr. LEGGETT. No, I guess EPA would say that they have done a prima facie good job in that they have cut down the utilization of PCB's over 4 or 5 years by 50 percent, and they have restricted it to closed systems.

Now they are surprised that the net results show that closed system limitation is not really all that closed, and second, apparently these PCB's tend to disseminate all over irrespective of attempts to limit. They do persist for a very, very long time.

There appears to be at this point very little correlation between reduction in PCB's and in fish and other items, reduction in production of PCB's.

Mr. SPETH. Well, Mr. Chairman, it is a phased thing, I suppose. We will have to stop some time.

Mr. LEGGETT. That is right.

[a] See footnote on page 234.

Anyway, we are now coming to the point where everybody is kind of coming up to speed, and we recognize that this is a problem that has got to be taken out of the environment. It does have a long life and after life, and multiple life, I suppose.

I think everybody now is getting reasonably polarized.

I would not call EPA arrogant, however.

Mr. SPETH. I called the corporations arrogant, not the EPA.

Mr. LEGGETT. I shall not comment on that.

Mr. SPETH. Let me just point out one other matter.

A number of times the question has come up as to EPA saying, on the one hand, that it does not like the legal authorities that it has to deal with. Yet, I think it is important to appreciate that EPA has not sought to amend section 307(a), for example, or to amend section 504, except in one instance in section 307(a) on a very limited basis, just to extend the deadline for 2 additional years.

Mr. LEGGETT. But you say they have a mandate there, and they have not carried out the law.

Mr. SPETH. We have to carry it one step further, and ask ourselves well, why has not the EPA come to Capitol Hill to get some of these changes, and you get two very interesting answers.

One of the answers is that they cannot get these things through the administration.

Mr. LEGGETT. So that is not EPA's fault, either, is it?

Mr. SPETH. That is correct.

The other answer is, they are afraid to get some of these issues up to Congress because they are concerned they do not have the support on Capitol Hill they need. And that is Congress' fault.

Mr. LEGGETT. What?

Mr. SPETH. Thank you.

Mr. LEGGETT. Mr. Anderson?

Mr. ANDERSON. No questions.

Mr. LEGGETT. Mr. Forsythe?

Mr. FORSYTHE. No questions.

Mr. LEGGETT. Mr. Oberstar?

Mr. OBERSTAR. No. questions.

Mr. LEGGETT. Mr. Mannina?

Mr. MANNINA. Two questions, if I may.

On page 5 of your testimony you indicated that EPA's new standard would be limited in certain matters.

What will fall through the cracks if the standards are limited.

Mr. SPETH. Well, it is my feeling that when you promulgate a standard on something as serious as PCB's you should make it apply across the board to anyone who might be discharging PCB's out of a point source, OK?

The PCB standards EPA is now discussing will be limited to manufacturing, and to the uses in capacitors and transformers. Anyone else who is discharging PCB's, for example, a recycling paper operation. or anyone else who might be using it, will not be covered. I am not in a position right now to identify across the board everyone who is discharging PCB's in the country, but there is some evidence that PCB's are being imported. There are uses of PCB's in the country that are going on which are outside of those categories that the General Electric plant falls into.