

R.C. Petering
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BEFORE THE
DEPARTMENT OF NATURAL RESOURCES

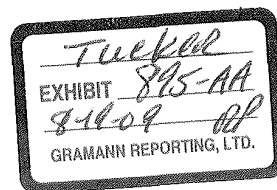
Public Hearing to Review and Receive)
Public Comment Upon Proposed Adminis-)
trative Rules Relating to the Dis-)
charge of Polychlorinated Biphenyls)
(PCB's) Into the Waters of the State)

Hearing Held

August 28 & 29, 1975

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BEFORE THE
DEPARTMENT OF NATURAL RESOURCES

Public Hearing to Review and Receive
Public Comment Upon Proposed Adminis-
trative Rules Relating to the Dis-
charge of Polychlorinated Biphenyls
(PCB's) Into the Waters of the State

Hearing was held in 421 South of the Capitol Building, Madison, Wisconsin, on
Thursday and Friday, August 28 and 29, 1975.

Presiding: EXAMINER JAMES CHRISTENSEN

Recorder: DAVID CROFT

EXAMINER: On the record.

The Department of Natural Resources of the State of Wisconsin has set at this time
and place a public informational hearing to receive comments on and consider proposed rules re-
lating to the discharge of polychlorinated biphenyls, also known as PCB's into the waters of the
State of Wisconsin.

Such comments and information received, regarding the presence and use of PCB's
may also constitute a basis for proposing or recommending state or federal legislation regulating
the sale, use and distribution of PCB's by this Department.

The proposed rules under consideration today are created pursuant and proposed
pursuant to subsections 144.025(1), 144.025(2)(d), 144.31(1), 147.01(1) and Section 227.014 of
the Wisconsin Statutes. The rules were proposed and recommended by the Natural Resources
Department—or excuse me, the Natural Resources Board at their July, 1975 meeting.

The provisions of Chapter 227, Wisconsin Statutes, requires that the Department of
Natural Resources hold a public hearing on this matter. The procedure of the hearing will be
guided by that same chapter.

Let the record show that notice of the hearing as required by Section 227.021,
Wisconsin Statutes, was published in the proper manner in the notice section of the Wisconsin
Administrative Register for the month of July, 1975. Also, notice has been sent to various
interested persons the Department determined were likely to have an interest in this matter.

To date I believe there's been also three public news releases regarding the matter
and the time and date of this hearing.

Again, the purpose of the hearing today and tomorrow is to provide an opportunity
to those agencies and persons interested in the proposed rules for oral comment. The Department
will also receive written comments, which will be given the same weight as any oral statements
made here today or tomorrow. As far as the time allotted or allowed for the written comment
submission, that'll be determined later today or early tomorrow.

It is my understanding also that Congressman Alvin Baltes conducted a forum for
public comment on PCB's in Pepin, Wisconsin on August 20, 1975 and that the record of that
forum is available to the Department for review if we wish it.

The procedure of this hearing, due to the number of persons participating, will be
as follows: First, there will be presentations by various parties requested to make those
presentations by the Department. Again, this will be considered the Department presentation.
Today, August 28th, the presentation by the Department will last somewhere between 10:00 a.m. and
3:00 p.m. We will then open the hearing to receive public comment.

If we have time between the hours of 10:00 and 3:00, we will both allow questions
and receive public comment.

Various copies of the agenda of the two-day hearing have been passed around. Again,
it's been changed somewhat, but it gives you an idea of the time sequence.

The hearing tomorrow, set for this same place, will commence at 8:30 a.m. and go until 4:00 p.m. Again, various agency representatives have been requested to make presentations on behalf of the Department and I believe the majority are from the Environmental Protection Agency.

Without further statements, I will now call on Mr. Stanton Kleinert, chief of the Surveillance Section, Wisconsin DNR, to give a presentation.

MR. KLEINERT: Thank you, Mr. Christenson.

My name is Stanton Kleinert. I am chief of the Surveillance Section in the Bureau of Water Quality, Department of Natural Resources. I am responsible for the Department's investigation of polychlorinated biphenyls, or PCB's, in Wisconsin. My remarks will be confined to a discussion of the information conducted by the Department concerning the PCB's.

PCB's are a family of chlorine-containing organic chemicals with varying properties. The common PCB's encountered in Wisconsin include Aroclor 1242, 1248 and 1254. The latter two digits indicate the percent chlorine in the compound. Each Aroclor produced is actually not a pure compound but a multi-component mixture containing lesser amounts of other Aroclors. In this report, all aroclors will simply be referred to as the PCB's.

More than 800 fish samples have been analyzed for PCB's by the Department of Natural Resources to date. The fish analysis program has shown that many fish from Green Bay, Lake Michigan, the upper Mississippi River and the Fox River near Portage, exceed the Food and Drug Administration Tolerance Level of 5 parts per million PCB's. The data to date is insufficient to indicate whether or not PCB residues are increasing or decreasing in fish, with the exception that surveys conducted in the upper Mississippi River, including Lake Pepin, indicate a reduction in PCB concentrations in the fish between 1970 and 1975.

The State Departments of Natural Resources, Health and Social Services and Agriculture have a working committee to review and act upon the monitoring data for PCB's in fish. We have also shared our information with neighboring states, the Environmental Protection Agency and the Food and Drug Administration.

In addition to the fish monitoring program, the Department has searched for sources of PCB's. PCB's have been found above the .1 part per billion detection level used for screening purposes in more than half of the sewage treatment plant effluents we have tested. The higher concentrations are most common in sewage treatment plant effluents serving industrial areas such as Sheboygan, Neenah-Menasha and Milwaukee. In most cases, however, the discharge of PCB's is less than one part per billion and .01 of a pound per day.

Tracing sources of PCB's reaching a large municipal treatment plant is a difficult and time consuming task. The Department is attempting to trace sources of PCB's reaching treatment systems where the final effluent exceeds 1 part per billion. At the present time, we know of only two municipal wastewater treatment plants in Wisconsin which exceed one part per billion, the Sheboygan and Portage facilities.

The main source of PCB's being discharged to the Portage treatment plant was found to be the NCR Appleton Papers Division Paper Capsule Plant in Portage. This facility had used PCB's in the manufacture of carbonless copy papers prior to the summer of 1971. After ceasing the use of PCB's and after repeated cleanings of the holding tanks of the facility, the company substantially reduced the discharge. Residuals still remain, however, in the sewer system and the sewer sludges, resulting in an effluent of several parts per billion at the municipal treatment plant.

The Department of Natural Resources has tested the effluents of 16 pulp and paper mills for PCB's. The testing has revealed that nine of the mills had measurable discharges which ranged from .1 to more than 18 parts per billion. The higher concentrations and quantities were found in the effluents of two mills which deink and recycle waste papers. These are the Bergstrom Paper Company Mill and the Fort Howard Paper Company Mill. PCB's are found in many kinds of waste papers. Because their solubility in water is very low, we believe that most of the PCB's discharged from waste paper mills are adsorbed on fibers and other particulate matter. Mill waste treatment systems which effectively remove particulate matter should also remove PCB's.

The Department has checked effluents from iron and steel foundries and aluminum foundries. The testing has shown that the cooling water effluents from three of five aluminum foundries sampled contained PCB's ranging from 11.5 to 335 parts per billion. Close investigation of one of the aluminum foundries, Meta Mold of Grafton, revealed the source to be leaking hydraulic fluids containing PCB's, which were being used in the die cast machines. Meta Mold is replacing these hydraulic fluids and is disposing of the old fluids by recommended disposal practices. We have found PCB's in the cooling water effluent of only one of nine iron and steel foundries which have been checked to date and that at a concentration of .9 parts per billion.

The electrical industry continues to use PCB's as dielectric fluids in some capacitors and transformers. Although the PCB is sealed in the capacitor and transformer units, some may be lost as a result of accidents or as a result of the disposal practices for defective units. In March, 1975, the Department corresponded with the major electrical companies in Wisconsin to determine current handling practices for capacitor and transformer fluids. The correspondence was followed by visits to many facilities. The companies contacted were aware of the PCB problem. But some were not aware of the recommended guidelines of the American National Standards Institute for Handling and Disposal of Capacitor and Transformer Fluids containing the PCB's. We also found that some electric companies were storing defective capacitors containing PCB's until a proper disposal method could be found. As a result of this survey, specific guidance was given to Wisconsin Electric Utilities for the proper handling and disposal of PCB's.

Snow samples were collected early in 1975 to determine if PCB's were deposited on land and water as fallout from the air. Analysis of the snow melt water from Racine, Kenosha, Madison and Milwaukee revealed concentrations from .17 to .24 parts per billion. It is suggested that a major source of PCB's in atmospheric fallout is the incineration of papers and other materials which contain PCB's.

PCB's are present in the sediments in harbors and streams near industrial areas. The sediments act as a reservoir where PCB's may be released slowly over a long period of time. Sediment samples have tested three and a half parts per million in the Milwaukee River, near the Capital Drive Bridge, nine parts per million in Superior Harbor and 72 parts per million in the Fox River below the outfall of the Portage Sewage Treatment Plant.

Presently the Department has one chemist and two laboratory technicians working full-time analyzing fish, effluents, sediments and other samples for PCB's.

In addition, Department district biologists and environmental engineers are called upon to collect samples and make surveys of industrial and municipal facilities and treatment systems.

The Department is a working member of the Lake Michigan Toxic Substances Committee with the State of Michigan, Indiana, Illinois and the Environmental Protection Agency. The committee held meetings on March 24 and May 22 to consider the PCB problem, has compiled information gathered by the various states and EPA and has released its report and recommendations for dealing with the problem in Lake Michigan.

The Department is also working as part of a task force group with the State of Minnesota, the Environmental Protection Agency, and the Food and Drug Administration, in responding to the problem in the upper Mississippi River. Work assignments have been made and task force members are proceeding with their various tasks, which include the analysis of water, sediments and fish and the investigation of suspected sources of pollution. Meetings of this group were held on May 23, June 2, June 18 and August 6. The task force has issued its first report on PCB levels in fish. Effluent samples obtained from the major dischargers to the upper Mississippi River are being tested at this time. The task force will meet again on September 15 to review and act upon the recent data.

In summary, although we have found many sources of discharge of PCB's, most of them are in trace amounts of less than one part per billion. Some of the sources, however, such as fallout from the air and discharges from waste paper recycling, account for larger amounts of PCB's. We know very little about the amount of PCB's which may be released from past accumulations in sediments in rivers and harbors. We know little about losses of PCB's which might occur as a result of leaching from disposal sites where capacitors and transformer fluids and other materials were disposed in the past.

We anticipate that PCB levels in the environment will progressively decline with declining use. We are searching for ways and means to further reduce discharges to the environment and welcome your participation here today to consider the effluent limitation approach to the problem. We are mindful, however, of the fact that other regulatory mechanisms may be needed to limit discharges to the environment.

Thank you.

EXAMINER: Thank you, Mr. Kleinert. Do you have a copy of that statement?

We have a few minutes. Would anybody wish to ask a clarifying question?

VOICE: Can copies of that be made available—that statement.

MR. KLEINERT: It's part of the hearing record. I could give copies, if necessary.

EXAMINER: It is part of a hearing record; it'll be available in the transcript.

Mr. Williams.

MR. WILLIAMS: (Inaudible)

EXAMINER: Excuse me. Could you use the microphone here so it goes on the record.

Please identify yourself.

MR. WILLIAMS: Allen Williams, here for Bergstrom Paper Company.

You indicated initially that you are lumping all of the Aroclors together and you would speak about PCB's generically, including 1242, 48 and 54. Can you, though, identify which of those Aroclors you were finding in these various fish that you were testing?

MR. KLEINERT: We can—we can in some cases. Like in the upper Mississippi River, the principal Aroclor that we're finding in fish is 1254. In lower Green Bay, the principal Aroclor we're finding is 1248.

MR. WILLIAMS: Thank you.

EXAMINER: Does anybody else wish to ask a question of Mr. Kleinert?

(No response)

EXAMINER: Okay. In that case, then, we'll go on with the presentations by the Department of Natural Resources. For the benefit of those appearing on behalf and at our request, I would request that they come up alongside Mr. Kleinert and speak into the microphone. That way if anybody does have questions, they can speak to them from the other microphone.

And I believe that the first person on the agenda is Mr. Henry P. Roberts, deputy regional director of FDA in Minneapolis.

And I also request that each person making a presentation please identify themselves and who they represent and if they are representing somebody, their title.

Go ahead, sir.

MR. ROBERTS: Thank you, Mr. Christenson.

Good morning. My name is Henry Roberts. I am the deputy regional director of the Minneapolis Office of the Federal Food and Drug Administration.

The Department of Natural Resources for the State of Wisconsin has asked me to testify on the subject: the rationale for the five parts per million temporary tolerance for PCB's and the FDA enforcement action for carp in Lake Pepin.

As part of my testimony, I am attaching the final order on polychlorinated biphenyls dated July the 6th, 1973 (38 Federal Register, page 18096). This order and the accompanying preamble explain in detail the overall problems of PCB's, the steps taken by FDA to control this problem, the tolerances established by FDA for PCB's in certain foods and the basis for these tolerances. PCB's are toxic industrial chemicals. Because of their past uncontrolled industrial applications and their chemical stability, PCB's are a persistent and widespread contaminant of the environment. As a result, certain foods including those of animal and marine origin, contain PCB's as an unavoidable environmental contaminants. In the case of fish, the transmission is through the water in which they live, which is contaminated by PCB's.

Because PCB's are unavoidable, temporary tolerances under paragraph 406 of the Federal Food, Drug and Cosmetic Act for residues of PCB's as unavoidable environmental contaminants were established. In establishing these tolerances, the commissioner of the Foods and Drugs took into account available toxicological data, which is summarized in the attachment and the extent to which PCB's in these foods are unavoidable under current good manufacturing practices.

On the basis of these considerations, the commissioner established the following temporary tolerances for PCB's: One, 2.5 parts per million in milk on the fat basis. Two, 2.5 parts per million in manufactured dairy products on a fat basis. Three, five parts per million in poultry on a fat basis. Four, 0.5 parts per million in eggs. Five, 0.2 parts per million in finished animal feed for food-producing animals, except the following finished animal feeds, feed concentrates, feed supplements and feed premixes. And six, two parts per million in animal feed components of animal origin, including fishmeal and otherby-products of marine origin and

in finished animal feed concentrates, supplements and premixes intended for food-producing animals. Seven, five parts per million in fish and shellfish, edible portion. The edible portion of fish excludes head, scales, viscera and inedible bones. And eight, 0.2 parts per million in infant and junior foods.

Additionally, the FDA is enforcing an action level of 10 parts per million for PCB's in paper food-packaging material, pending the completion of a public hearing to establish a formal tolerance under paragraph 406 of the Federal Food, Drug and Cosmetic Act.

I wish to emphasize that the tolerances established in 1973 were based on the best toxicological data available at that time. We recognize, however, that additional scientific studies, such as those conducted by Dr. Allen, who will be speaking to you sometime today, have been completed. And we are currently reviewing these studies to determine whether revision of our temporary tolerances is necessary.

As you know, FDA has jurisdiction over food only when it is offered for shipment or is shipped in interstate commerce. In the case of fish from Lake Pepin, we have found shipments of carp that exceeded the temporary tolerance of 5 parts per million of PCB's. Carp found to exceed this tolerance are subject to federal regulatory action. Such action might include seizure of the violated fish and the shippers of such fish are also, in appropriate cases, liable to criminal action or can be enjoined from future shipments. I wish to assure you that FDA will continue to devote its attention to the problem of commercial marketing of all foods, including fish that contain PCB residues.

I also wish to assure you that the Minneapolis Office of the Food and Drug Administration has been and will continue to work closely with the DNR of Wisconsin, the Wisconsin State Department of Agriculture and the fishermen to control this serious problem.

Hopefully our joint efforts will succeed in eliminating the problem in the lake, Lake Pepin, so that PCB's will be of interest only historically. I shall be happy to answer any questions that are appropriate to the hearing.

EXAMINER: Thank you, sir. Do you have a copy of your statement available for us?

MR. ROBERTS: Yes.

EXAMINER: Anybody wishing to ask clarifying statements or questions, please approach the mike. Would anybody wish to ask questions?

Please step up, sir. Identify yourself and who you represent when you get to the microphone.

MR. PAPAGEORGE: I am William Papageorge from Monsanto Company.

My question to Mr. Roberts, the program indicates that you were going to discuss the step-by-step rationale for the arrival at the five part per million level in edible fish. Would you please do that for us.

MR. ROBERTS: I can do this by reading the Federal Register, which is part of my attachment. It's a rather long, long document. It's going to take—well, if we're ready, you know, an hour or two, if that's—

MR. PAPAGEORGE: Is there any manner in which you can summarize it, sir? Just a brief summary?

MR. ROBERTS: Rationale—and I'm not a scientist. I'll be perfectly honest with you. I'm not a chemist. Is based on the amount in these particular foods that one would ingest over a period of time. It's based on those kinds of things and this is explained in here and it is based on, of course, as you probably know, the Japanese experience back in the '70's. And that is—well, maybe I can do it this way—I'll have to find—dietary sources, temporary tolerances, human toxicological data, would that be what we're talking about.

However, what I'm trying to do and I'm not trying to be lazy about this, but I just—I don't want to read an hour of the Federal Register. It's not that interesting reading.

MR. PAPAGEORGE: Well, my intent, Mr. Roberts, is not to take more time than is necessary, but I have been present in many discussions at which the setting of levels in food had been discussed and frankly, I'm still confused as to how they arrive from animal toxicity data, the incident in Japan, the type of diet that the American is normally exposed to and the arrival at five parts per million when I also know or have heard that that five part per million level existed long before it was ever published in the Federal Register and action levels and actions were taken as early as 1969, as best I recall.

So somewhere in the Food and Drug Administration, there must be someone who knows where that five part per million number came from and I have had difficulty finding how they have arrived at that number. I'm just trying to get some information.

MR. ROBERTS: You mean four and a half parts per million?

MR. PAPAGEORGE: Yes, why isn't it three; why isn't it 15; why isn't it 50? There must be some basis for the five part per million.

MR. ROBERTS: Okay. Let me read this to you. This is the dietary sources of PCB and this may help explain it.

The results of FDA's total diet studies for fiscal years '70 and '72 show that quantitatively, measurable residues of PCB's are equivalent to an intake of approximately 0.06 micrograms per kilogram body weight per day or 4.2 micrograms a day for a 70 kilogram man. Because of the sensitivity of the analytical methods used, PCB's may be present in levels too low to be detected. If lower levels could be measured, the dietary intake of PCB's from the total diet studies would probably show an increase. It should be recognized, however, that in rare instances some people could have more systemic exposures to PCB's in foods than those expected by eating a moderately well balanced diet, such as represented by the total diet samples. Hence, there is a need for minimizing potential human exposure. The total diet studies indicate that PCB's most frequently occur in the food composite consisting of meat, fish and poultry. Experience has shown that most of the PCB residues in this composite are in the fish and, to a lesser extent, in the poultry. And in the food composite consisting of grain and cereal products, experience has shown most of the PCB residues in this composite are derived from the paper packaging materials. FDA's food surveillance activities have shown that PCB's also occur in dairy products, eggs and packaged foods, in addition to packaged cereal products.

The temporary tolerances for PCB's, using the human toxicological data described above and I can go back and explain that if that's what we're talking about, the FDA concludes that for the short term, based on the lowest dose producing an effect an estimated biological half-life of PCB's, current levels of PCB's in the diet represent no immediate hazard. It is also true for the average total dose causing an effect in the Japanese for long-term exposure—for long-term exposure. However, based on the most sensitive Japanese patient, i.e., lowest total dose producing an effect, the possibility of potential long-term hazards necessitates reduction of levels of PCB's in food as soon as possible. In the interim, temporary tolerances are necessary to limit human exposure to those foods that may contain PCB's resulting from environmental contamination, which, as a practical matter, are presently unavoidable.

Those foods for which temporary tolerances are established include milk and dairy products, poultry, eggs and fish and infant and junior foods. Infants and younger children consume a greater amount of food per kilogram of body weight and thereby have a proportionately greater exposure than do adults. A separate temporary tolerance for infant foods and junior foods therefore reflects the possibility that undesirable exposures could result if combinations of certain PCB contaminated foods comprise a major portion of this age group's diet. In order to minimize the overall dietary intake of PCB's, individual sources of PCB contamination must also be appropriately minimized. PCB's have been shown to occur in packaged food as a result of PCB contamination of the paper food-packaging material.

Limitations on levels of PCB and paper food-packaging materials are therefore necessary to minimize the amount of PCB's which migrate into the packaged food. Since PCB's can be transmitted to and concentrated in edible portions of food-producing animals ingesting PCB contaminated feed—animal feed, represents another source of PCB's in the food supply. Limitations on levels of PCB's in animal feeds and animal feed components are necessary, therefore, to minimize frequency and magnitude of PCB residues in food of animal origin.

NOW, do you want me to go back and read more?

MR. PAPAGEORGE: No, thank you, sir.

EXAMINER: Okay. Thank you, sir. Does anyone else have any questions?

Step up and identify yourself and who you represent, please.

MR. STUIBER: I'm David Stuibler, University of Wisconsin Food Science Department. I'm a faculty member within that Department.

My question pertains to a statement that was just read which states that the animal, beef, pork, fat—chicken, egg, are the primary source of PCB's as far as the diet is concerned?

MR. ROBERTS: Yes.

MR. STUIBER: My question is where the hell does the animal get it? I mean, if we're talking about grains, we're talking about a chicken. They have a very controlled diet. Now, I mean, they don't absorb it from the air. Somewhere along the line they have to be picking it up.

MR. ROBERTS: Probably they're picking it up in the feed.

MR. STUIBER: Yes, well we practically eat the same thing. When you talk about grain or cereal, all right, they get a little lesser quality, but as far as the grains and the feeds going into these particular animals, we consume the same thing, so I assume, then, for all practical purposes, that I contain the same amount.

MR. ROBERTS: Well, remember they were chickens, now. Particularly we've got problems with fish meal and that is a major diet in some—at least some areas of the country. It may not be in—

MR. STUIBER: Primarily it's only 50 percent.

MR. ROBERTS: Wisconsin. But it is a part—well, that's enough if it's high enough. And you know, this—we had this problem, remember when the USDA had to murder all of the chickens down in Arkansas and Missouri.

MR. STUIBER: Right.

MR. ROBERTS: I've done—I am not aware of any data on beef or pork, but we're taking a very conservative approach because it can unavoidably be in the rations that food animals eat. We're going to include those under this thing.

MR. STUIBER: Well, I would just like to say that if we're going to condemn one food, we ought to damn well go back and look at everything that we're consuming.

MR. ROBERTS: Maybe we will.

MR. STUIBER: Well, I didn't think it should be maybe. I think we should.

EXAMINER: Okay. At this time, Mr. Stuiber, just keep it to questions. You want to make a statement later on, I'll give you a chance.

Anyone else?

(No response)

EXAMINER: Okay. Thank you very much, sir. The statement—can I have it? Please leave the statement to make it part of the record.

Okay. Is Mr. Kirschbaum of the Wisconsin Department of Agriculture here?

MR. KIRSCHBAUM: My name is Norm Kirschbaum. I am administrator of the Food and Standards Division of the Wisconsin State Department of Agriculture. I have been requested to discuss our department's food testing programs and the enforcement action that we took against carp in the Green Bay area as it relates to PCB's.

Our Department has the responsibility for the administration and enforcement of Chapter 97 of the Wisconsin Statutes, which is the state food law, as well as a number of food regulations promulgated under this law. This responsibility includes the licensing and inspection of various food operations as set forth in Chapter 97. We also inspect other food production processing and distribution operations that may not be required to be licensed. An important part of the total food inspection program is the sampling and laboratory analysis of the various raw and processed food products for adulteration and composition.

There are several sections in Chapter 97 which are pertinent to the administration of this law and to my statement here this morning. Section 97.01 defines the federal act as the federal food, drug and cosmetic act as amended. Section 97.02 defines an adulterated food. Without reading the entire subsections of Section 97.02, this section states that food is adulterated, one, if it bears or contains any poisonous or deleterious substance which is unsafe within the meaning of the federal act and two, if it is or it bears or contains any food additive which is unsafe within the meaning of the federal act. I cite these provisions since they are the basis for our using the tolerances and temporary tolerances established by FDA for pesticides, fungicides, herbicides and in this instance, PCB's. Fish, therefore, containing more than five parts per million PCB's are considered to be adulterated under Chapter 97 of the Wisconsin Statutes.

To meet this problem, our division has developed the following program: First, the objective, of course, is to permit only foods, including fish, to be sold commercially in Wisconsin marketplace that are below the temporary tolerances for PCB's. This will be done with as little trauma as possible to the food industries involved, including the fish industry.

But the primary objective that we feel we have is to continue to assure the consumers that foods consumed are not adulterated.

Two, a sampling program for fish will be continued and, where necessary, increased to achieve the above objective. A specific sampling schedule for different species of fish has been developed. Our primary sampling points will be at wholesale and at fisheries; however, a few select retail samples will be taken.

Four, our major emphasis will be sampling of fish originating in Wisconsin, but we do intend to randomly select samples of fish originating outside of the state.

Five, in fulfilling this responsibility of keeping our food supply safe, the department will continue to work jointly with the Food and Drug Administration and the Department of Natural Resources in preventing duplication of effort and meeting fish industry problems in supplying a wholesome food to the public.

In carrying out this program, early this spring we did sample and have analyzed in our laboratory samples from two lots of carp in the Green Bay area. These samples were found to contain 8.9 and 33.4 parts per million of PCB's. The two lots amounting to 975 pounds of carp, were placed under holding order under authority of Chapter 97 and disposed of as being adulterated food.

Just recently we were requested and did obtain five samples of carp that were in a holding pond in the Green Bay area to be sold for food. All five of these samples were found to contain more than five parts per million of PCB's, varying from a low of 13.1 parts per million to a high of 57.5 parts per million. The fish in the pond, amounting to 12,500 pounds, had been placed under a holding order and are not to be sold commercially as food. The owner is presently attempting to find a disposition for these fish. All of the carp involved in these two actions were obtained from the Green Bay area.

We have cooperated with the Department of Natural Resources in sampling and analyzing individual fish from Lake Pepin and other areas of the state. This project has been in the form of a survey and information gathering effort. We have not taken any official action on fish as part of this survey.

We are hopeful that through the combined efforts of the industries that use PCB's, the fish industry and the regulatory agencies involved, both state and federal, that we can eventually eliminate the problems concerning PCB's in fish and in foods.

I shall be happy to respond to any questions that may be pertinent to the issue.

EXAMINER: Do you have any copies of your statement, sir?

MR. KIRSCHBAUM: Yes.

EXAMINER: Thank you. Does anyone wish to put questions to Mr. Kirschbaum?

(No response)

EXAMINER: In that case, thank you very much, sir.

Is Mr.—Dr. George Handy present?

Will you please step up, sir.

DR. HANDY: I'm Dr. George Handy, state health officer, administrator of the Division of Health of the Department of Health and Social Services. My presentation is to establish the relationship of the Health Department to this particular problem.

Our statutory authority comes from Statute 140.05(1), which says that the Department of Health and Social Services shall have general supervision throughout the state of the health and life of citizens. It shall make sanitary investigations into the causes of disease, especially epidemics, the causes of mortality and their effect on the health of localities, employments, conditions, habits and circumstances. And further goes on to state that the department may empower the state health officer to act for the department.

In 1971, based on the federal department, or the FDA statement of February, 1970, and a five-state meeting held in September of 1971, we issued a warning on October 18, 1971, that the five part per million action level for PCB for market basket fish and that sports fishermen be advised to refrain from eating more than one meal per week of such fish and that pregnant women and children be cautioned to limit their intake to one average size serving of such fish per week. This was based on the available information at that time.

Mr. Donald Heaton of FDA, in January 30th of 1974, updated the status concerning PCB, which he read from the Federal Register, from a—this was a presentation given at the Governor's Great Lakes Regional Interdisciplinary Pesticide Council in Chicago on January 30, 1974. Following that, Mr. Voigt of DNR called a interdepartmental meeting of Department of Agriculture, Department of Health and Social Services and DNR on May 16th and from that meeting, the public release of DNR of 10th of June, 1975 and our contribution was to reiterate, based on lack of any additional information, of the action level of five parts per million. We feel that the Department has an obligation to publicize this situation, provide a warning to all citizens of the state and very closely work with these other departments on any changes of information.

The Department has an additional responsibility in terms of occupational health and that is the people that work for this material, to see if we can find out any evidence of specific occupational illness in those employees. To date, to my knowledge, there has been none generated and we're watching as carefully as we can.

That, sir, is my contribution.

EXAMINER: Thank you, sir. Do you have a copy of that?

DR. HANDY: I don't, but I'll write it and send it.

EXAMINER: Thank you very much.

Would anybody like to ask questions of Dr. Handy?

(No response)

EXAMINER: Okay. If there's no questions, thank you very much, sir.

Now, we are heading—we are ahead of schedule and for that reason we can take statements from the audience at this time.

Is Mr. Forster here?

Sir, would you please approach the mike and make your statement. Please identify yourself and who you represent.

MR. FORSTER: I am Albert K. Forster, State Treasurer of the Izaak Walton League of America in Wisconsin. I have been delegated on behalf of the state organization to present three exhibits. Number one is a current report by Francine Zeidman in August, 1975 issue of "Environment Midwest" on this problem of the PCB. And Mr. Kleinert went over many of the basic things he outlined on there, so I'm not going to waste too much time on that. But this is for the record.

Exhibit 2 deals with a resolution on toxic substances, including PCB, that was adopted at the National Convention of Izaak Walton League in Des Moines, Iowa on July 9th and 13th of this year, taking a definite position on use and application of these chemicals. I would like to read the substance of it.

Every year, thousands of new chemical substances are introduced to the environment through their manufacture and use and the disposal of industrial wastes. Accumulating evidence of serious environmental and health defects of such widely used substances as phenoxy herbicides, polychlorinated biphenyls, fluorocarbons, heavy metals, vinyl chloride, has intensified concern that other, as yet unidentified chemical substances may be exposing large segments of the public to grave health hazards.

Despite the magnitude of the risk, no comprehensive authority exists to require testing of substances before man and the environment are widely exposed to their effects. Existing regulatory mechanisms which concentrate on reacting to a known hazards rather than preventing the ones, come into play only after the environmental or health damage has been proven. This approach is clearly inadequate to protect the public from latent, longterm effects of exotic substances, the delayed effects of which many may not become visible until years and even decades following exposure to them. In the meantime, the entire earth is being used as a laboratory.

Therefore, the Izaak Walton League of America, assembled at convention at Des Moines, urges a comprehensive program be established to prevent damage to human health or environment from hazardous chemicals by one, requiring that potentially hazardous substances be thoroughly tested for safety prior to their introduction into the environment. Two, establishing the principle that manufacturers, users or dischargers of a substance suspected of being hazardous must bear the burden of proving the use of the substance as having low environmental or health effects—adverse effects. Providing for prohibition or stringent regulation of substances found likely to pose a significant risk to human health or environment.

Then we present another resolution here from our state meeting in Wisconsin concerning herbicides and phenoxy—all these chemicals that present a hazard, all related to base compounds found to be very pertinent and do not break down in ecosystem. Whereas damage from compounds containing tetra-dioxin to animal life in producing birth mutations and other defects,

Whereas, these same compounds are also strongly suspected to adversely affect humans as reported, but not proved beyond doubt and that tetradioxin and one of the ingredients of herbicides is extremely poisonous and may, under certain circumstances, produce additional tetradioxide in fires or when exposed to heat, and,

Whereas, airborne, these phenoxy herbicides affect all growth indiscriminately and when waterborne, is carried uncontrolled to other areas, or sinks to the beds of waters to affect that growth and,

Whereas, no studies have disproved any of the above statements, and,

Whereas, control in application, even with care and strict supervision cannot curtail the application within boundaries, so that it crosses all lines established as boundaries, local, state, national, international,

Therefore, Wisconsin Division of the Izaak Walton League in convention assembled in Stevens Point April 19th of this year, do resolve to oppose use of any of these chemicals and to encourage use of any other compounds and chemicals as are compatible with the environment and with population and/or human, until such a time as these phenoxy herbicides and other chemicals are proved safe to use in ecosystem.

We further resolve to work actively in support of legislation to control application of phenoxy herbicides and other chemicals until sure proof of safety for ecosystem is produced.

EXAMINER: Is that your statement, sir?

MR. FORSTER: Yes, I want to present that for your file.

EXAMINER: Thank you very much. I appreciate that.

Okay. Is Mr. Richard M. Manthe present?

MR. MANTHE: Yes.

EXAMINER: Would you like to make a statement at this time?

MR. MANTHE: (Inaudible)

EXAMINER: Okay. Do we have other appearance slips held that haven't been submitted yet as far as people who wish to make statements at this time?

Is Mr. R. A. Shade present?

Do you wish to make a statement at this time, sir, or would you wish to wait?

MR. SHADE: (Inaudible)

EXAMINER: Okay. Please step to the mike and identify yourself.

MR. SHADE: My name is Robert Shade, president and chairman of Shade Information System, Incorporated.

We are a Wisconsin Corporation established in 1965 and employing 250 people. We are a major converter and supplier of carbonless business forms, a major converter and supplier of office papers and business forms made from recycled paper, a significant supplier of post-consumer office waste paper to recycling mills in Wisconsin.

In connection with item three, the Shade Waste Not Program for redeeming high quality office waste paper was started on July 15, 1973. The Waste Not program was the first source separation system for recovering high quality office wastes established in the United States. This unique program is being successfully carried out in businesses of all types, state and local governments, federal agencies and educational institutions. The EPA has consulted with us, as the leader in office waste recovery, in developing guidelines for mandatory source separation in federal office buildings. Both EPA and the State of Wisconsin have established workable office waste recycling efforts in their own offices as a result of our Waste Not program.

The success of Waste Not has provided impetus to the growth of office waste recovery and is contributing to the solution of the problem of solid waste disposal as well as resource and energy conservation.

A statement of our corporate policy regarding PCB's may be in order at this time. First, we believe PCB's at certain levels are detrimental to society or to the ecosystem. Secondly, we believe additional PCB's should not be introduced as an additive to any product or system, as of now, unless alternatives would be more detrimental to society, and only then if nonpolluting disposal could be guaranteed. Three, we believe controls should be established to guarantee that PCB's are not unknowingly imported into this country. Those knowingly imported should be subjected to the same sale and use prohibition we apply to the domestic producers.

Four, we believe that a great deal more needs to be known about the various varieties of PCB's, their sources, measurement, safe level, removal and disposal before any meaningful action can be taken. Five, we believe that pre-existing PCB's should be reduced to a safe level on a national basis as soon as it is technically possible to do so.

Six, we believe that it would be premature to rule that Wisconsin cities and industries meet unattainable levels of PCB's in their water discharge because: (A) We do not know how much pre-existing PCB is already in the air, land and water of the state. (B) We do not know how, where or by what means additional pre-existing PCB's—PCB's, are being introduced into the air, land and water of the state. (C) We do not know how to officially remove and dispose of pre-existing PCB's. (D) We do not know how to effectively and continually monitor the level of the pre-existing PCB's in a water stream at the levels proposed.

In effect, the proposed rule asks Wisconsin cities and industries to solve a problem by unknown means to arrive at an incomplete solution that the results of which will be measured by unknown instruments.

Seven, we believe that immediate funding by both the public and private sector is necessary to determine the source, measurement, safe levels, removal and disposal of pre-existing PCB's so that effective controls may be instituted at the earliest possible date.

Our concern: We are concerned that a premature ruling might cause Wisconsin paper mills that use waste paper as part of their fiber supply to reject all office waste paper because of the possibilities that such waste might contain NCR paper produced before April 21, 1971. It is then our understanding that PCB's were used in the NCR paper manufactured prior to April 21, 1971 and those PCB's have been identified as a source of contamination. We further understand that no PCB's have been used in NCR paper manufactured since that date.

It is our contention that as of this writing very little NCR paper produced prior to April 21, 1971 is getting into the office waste stream. It is further our contention that such NCR paper will constitute a continually smaller part of future office waste.

We submit the following information without proof because no proof is available. These are the best estimates of individuals in our company and other sources considered to be qualified in the art. First, we estimate that multiple copy business forms represented less than 50 percent of total office paper by weight. This means that for 100 pounds of office papers, approximately 50 pounds would be multiple part business forms. Secondly, industry figures show that for the years prior to 1972 carbonless paper represented less than 15 percent of the multiple part business forms market by weight. This means that only seven and a half pounds of the 50 pounds of multiple part business forms would have been NCR paper.

Three, NCR paper contains three types of paper. First ply is always a coated back sheet, called a CB. The last ply is a coated front sheet called a CF. The internal plies are coated front and back and are called CFB's. Only the CB portion of the paper contained PCB's. Industry figures show that the average multiple part business form is an original and two copies. Therefore, the average form made from NCR would contain one CB, one CFB and one CF. This means that of the seven and a half pounds of NCR paper, five pounds might contain PCB's.

From the above, it is apparent that in the years prior to 1971, NCR paper containing PCB's could not have accounted for more than five percent of office papers. The question then becomes how much of the office papers used in the time when NCR paper was--still contained PCB's is presently in office archival files, because such files are virtually the only source of NCR paper containing PCB's. We estimate that all PCB containing NCR paper has been converted--had been converted to forms and used by the end user by the end of 1972, 20 months after NCR ceased using PCB's. If we assume that archival files for 1972 had 5 percent PCB containing NCR paper and files for 1973 and thereafter had no such paper, we must attempt to determine when archival files for 1972 and before will be destroyed. File retention and destruction programs vary by industry and by application, but let us assume that most files are destroyed in three years. This means that 1972 files will be destroyed in 1976 and 1973 files will be destroyed in 1977, although some files, for example real estate records, are supposed to be--are supposed to be retained in perpetuity. It should also be pointed out that many records are converted to magnetic computer tape and microfilm and the source documents are destroyed in the year used.

We believe that such file destruction programs account for less than 10 percent of the total office waste stream. Therefore, if we assume that NCR paper represented five percent of the 1972 files which will be destroyed in 1976 and file destruction represents only 10 percent of the office waste stream, we will arrive at the estimation that one-half of one percent of the office waste stream in 1976 will be NCR paper containing PCB's.

In 1977 and thereafter, the amount of old NCR paper being released to the environment will go down dramatically because most archival files for 1972 and before will already have been destroyed. There is no question, however, that some old NCR paper containing PCB's will be present in government and industry files for years to come.

We further estimate that only 10 percent of office waste is presently recycled. This means that in 1976, 90 percent of the office waste stream will go to solid waste disposal and it will contain one-half of one percent--one-half of one percent old NCR paper. And 10 percent of the office waste stream will be recycled and it will contain one-half of one percent of old NCR paper. In both instances, the PCB's are being released to the environment. To identify and remove this old NCR paper is no easy task. Unfortunately, there is no practical means of distinguishing between old NCR paper which contained PCB's and new NCR paper, which does not.

Our experience in operating an office waste program suggests that even a massive educational program aimed at the elimination of PCB containing papers could not absolutely guarantee the elimination of such papers from our recycling stream. Even if such an educational program could succeed in isolating this old NCR paper from our recycling stream, it would not solve the problem because such paper would either be recycled by mills in other states or disposed of by solid waste disposal systems which do not eliminate PCB's from the environment. In other words, we could only succeed--we would only succeed in eliminating this old NCR paper from Wisconsin recycling mills and we would not have guaranteed that it would be disposed of properly. That which is not recycled will indeed find its way into the environment via rain, air movement or water flow.

We cannot and the recycling industry cannot, provide the total solution to the overall problem of PCB's in Wisconsin environment from either, one, the continuing source of new PCB's which are not related to the paper industry or two, from the many and diverse sources by which pre--pre-existing PCB's are entering our waterways. The real answer is to provide the means by which PCB's can be effectively isolated and removed from the environment. This means does not now exist.

At best we can only begin to alter the existing impact to one identifiable segment of the problem--which means shifting that impact to other areas of the problem.

It is only through immediate public and private funding, we believe, and an ongoing dialogue between business and government that the information and technology can be developed to evaluate the overall problem and arrive at a meaningful solution.

Thank you.

EXAMINER: Thank you, Mr.--do you have a copy of that statement?

MR. SHADE: Yes, sir.

EXAMINER: Thank you.

Okay. Now I do have a couple of gentlemen scheduled for this afternoon who contacted me, but I believe they're here this morning and it's going to be up to them as to whether they wish to speak at this time.

Is Mr. Howard Ness present?

MR. NESS: Yes.

EXAMINER: Would you like to speak now, sir? Please step up to the microphone and identify yourself.

MR. NESS: My name is Howard Ness. I am representing the National Association of Recycling Industries, Inc., whose offices are located at 330 Madison Avenue, New York, New York.

By way of introduction, I would like to describe our association, NARI, and the industry it represents. NARI is now in its 63rd year. It is the leading and most comprehensive trade association in the recycling industry. It speaks for more than 700 member companies located throughout the United States, all of which share one common economic purpose, the recycling of solid waste materials into new raw material and products.

Our members are the recyclers of all types of metals, paper, textiles, rubber, plastics and other waste materials. In the paper industry, for example, NARI's membership includes all segments of paper recycling. Some of our members collect waste paper from various sources. Others sort, grade and process waste paper into new raw materials for sale to paper manufacturers. Our membership includes those—these consumers of recycled materials, the paper mills, and the exporters of waste paper. Similarly, in metals, our members include firms which collect scrap metals from solid waste, firms which recover, process, refine and convert scrap metals into new raw materials and finally, manufacturers who purchase these recycled metals for utilization in products for domestic consumption and export.

The recycling industry now processes over three million tons of nonferrous metals, 13 million tons of waste paper and millions of pounds of textiles and other materials annually. With the chairman's permission, we would like to include as part of our presentation for the record, the contents of a pamphlet entitled "Recycling Resources: A Guide to Effective Solid Waste Utilization". Most of the material contained on this booklet on recycling is the result of considerable research by our association in recent years, including data compiled as a research project authorized, conducted for, and approved by the United States Environmental Protection Agency. In addition, we would like to include for the record the following pamphlets that show the importance of recycling: "Energy in Solid Wastes: A Citizen Guide to Saving", published by Citizens' Advisory Committee on Environmental Quality. Second Book "What You Can Do To Recycle More Paper", publication number SW-143 and "What You As A Consumer Can Do To Help Encourage the Recycling of Waste Material", publication number SW-117-1. The latter two are published by the United States Environmental Protection Agency.

We believe, and every authoritative agency of the Federal Government concurs, that expanding—that expanded recycling is the most constructive step that can be taken to assure our nation the raw material supplies required for future economic growth. In the face of the rapidly depleted natural resources and at significantly lower energy requirements that are needed when raw materials are used—when virgin raw materials are used.

The 13 million tons of waste paper currently recycled each year represents 20 percent of the nation's total raw materials need for paper fiber. It also represents the conservation of 200 million trees each year that can either be left in place or used for other purposes. The EPA's "Report to Congress on Resource Recovery", dated February, 1973, indicates that the use of waste paper in the paper making processes replaces limited wood pulp supplies and represents energy savings of 60 to 70 percent.

Currently, only about 13 million tons out of an annual paper production of over 60 million tons are recycled. But 35 million tons of additional waste paper are recovered for raw material use. The doubling of our current recycling volume from 13 million tons to 26 million tons a year, a rate close to our World War II paper recycling level, would result in industrial energy savings of 55 billion kilowatt hours of energy or 32.5 million barrels of oil a year.

Further, since paper comprises almost half of the nation's collected solid waste, it represents another important energy source after recyclable materials have been extracted for new raw material uses. EPA states that about 80 percent of this nonrecyclable residue is combustible and can be recovered in the form of energy.

Of course, recycling also decreases landfill requirements. Each ton of material removed from the municipal waste stream leaves much needed space for tomorrow's landfill needs. According to a recent study by the National League of Cities and the United States Conference of Mayors entitled Cities and the Nation's Disposal Crisis, and I am quoting from that publication: "With almost half of our cities running out of current disposal capacity in from one to five years, urban America faces an immediate disposal crisis." We believe that effective increased recycling is truly in the best interest of the nation and the citizens of Wisconsin.

The recycling industry competes on a day-to-day basis with virgin raw material industries and, therefore, even the slightest suggestion that recycling paper is inferior to virgin product has a devastating effect on recycling. This is particularly important now that the recycling industry is being urged by the federal government and the American public to expand solid waste utilization both in traditional and new product areas.

Three years ago, when it was first determined that some recycled paper board contained PCB's, it was traced to the presence of PCB's in the manufacture of carbonless carbon paper produced by the National Cash Register Company, NCR. At that point in time, regulations were passed by the FDA to limit the PCB levels. Unfortunately, the PCB regulations were misinterpreted by many as conclusive findings that recycled paper was harmful to health and was therefore inferior to virgin paper. The evidence of the devastating effect of these regulations were as follows: When the proposed regulations were issued, many consumers of recycled paper immediately cancelled their orders after seeing scare headlines in newspapers which in some cases read "recycled paper kills". Shortly after the regulations were issued, legislation was introduced in the New Jersey General Assembly which would provide criminal penalties of up to \$50,000 for the manufacture, sale or distribution of any food packaging material made from recycled paper.

Clearly, the Food and Drug Administration did not mean or seek to focus only on recycled paper. It indicated that even some virgin paper products contained PCB's and that there were many other sources of PCB's, such as heat transfer fluids, hydraulic oils, lubricants, transformers and capacitors. Nor did the FDA mean or seek to produce such fear amongst the consumer of recycled materials, nor frustrate the purposes of the resource recovery act. In all fairness to this industry, which contains some 4,000 mill workers and many thousand more employees at the supplier and consumer level, we simply must set the record straight and prevent such damage from spreading in the future.

According to the FDA and industry data, we understand further that PCB levels in paper are continuing to drop as the production of NCR carbonless paper has been discontinued. Indeed, we have been informed that most paperboard now contains less than three parts per million, well within the FDA regulation of 10 parts per million.

The recycling industry is making every effort to seek out the contaminants, the NCR carbonless carbon paper made with PCB's and not use them where they would be detrimental to the health of the public. During the last two years, the recycling paper industry has seen the PCB level in recycled paper drop to less than five percent of its initial estimate and the industry is still diligently working to lower this level.

We strongly urge your agency to use your full authority to eliminate PCB's at the source. Ideally, it would be best if your agency had the statutory authority to direct a company, corporation or government agency to withhold all existing stocks of PCB and PCB containing material.

But at the very least, we urge you to seek, on a voluntary basis, the removal of all existing stocks of such products wherever they may be found. PCB's are not readily discernable. They may be buried on the shelves of many of your own offices or in the many of the hundreds of manufacturers' warehouses in the form of electrical equipment and miscellaneous fluids. Surely, these industries and agencies should cooperate in such a national problem, especially when such cooperation is the most effective and perhaps the only way to rapidly reduce PCB levels in all products. Finally, existing stocks of PCB's and carbonless carbon paper must be withheld from use and, if feasible, destroyed. We hope that your agency will initiate immediate discussions with those corporation and government agencies who stock such material, toward that end.

The recycling industry will do its share in cooperating to remove the PCB's from the environment. But to saddle the recycling industry with the full burden of removal, when it is not even the cause of the problem is completely unfair and discriminatory and not responsive to the total PCB problem, most of which is caused by industrial companies outside the recycling industry.

The recycling industry strongly supports the Department of Natural Resources in its effort to eliminate the PCB's from the environment. However, the imposition of the zero discharge rate at this time is unrealistic, unnecessary to achieve the objective and will have a devastating effect.

The proposed regulations will destroy the present recycling programs for office waste paper. This program has taken years to stimulate and put in motion. It is a meaningful program since it effectively recycles the high-grade paper that is always in short supply. Wisconsin has made excellent progress in all of its recycling programs. It is one of the leading recycling states of our nation, having demonstrated this by its excellent recycling legislation that was recently passed. To now pass new regulations that will, in effect, stifle existing recycling programs, would be a mistake.

It will erroneously imply a danger and inferiority relating to recycled paper products. Comprehensive federal and private testing programs over many year's period have fully and unquestionably proven the quality and reliability of recycled paper products and their nonhazardous relationship to one's health.

Other witnesses will tell you of the other detrimental effects of this proposal, including the loss of jobs, loss of industry expansion in Wisconsin and the loss of taxes to the state and the loss of costs of products.

We strongly urge this agency not to recommend passage of the proposed effluent rates, but to one, reexamine and reevaluate the whole PCB problem as it concerns Wisconsin and two, to propose a realistic plan for achieving the objective without imposing a regulation crippling Wisconsin industry and seriously damaging its ongoing efforts to maximize energy savings and solid waste utilization through recycling.

The recycling industry stands ready to cooperate with the Department of Natural Resources and to support any reasonable legislation that will control the effluents and reduce the discharge of all contaminants into the state waterways.

Such realistic legislation must do more—must do more to eliminate the sources of PCB's, thereby practicing preventive medicine, rather than inadequately treat the symptoms of the problem after the damaging PCB's have already infiltrated the entire economic system. Eliminate the entry of the PCB's in Wisconsin and you eliminate the source of the problem.

Thank you.

EXAMINER: Thank you, sir. And you have a copy of that?

MR. NESS: Yes, I do.

EXAMINER: Plus the pamphlets?

MR. NESS: Yes, right here.

EXAMINER: Thank you.

Now, ladies and gentlemen, since we are somewhat ahead of schedule and also since I want to get started at 1:00 this afternoon with our next presentation, we will recess for the noon lunch recess. It may take you somewhat of a time to find a place to eat. Please, if you have not submitted appearance slips and plan to be here this afternoon, submit the appearance slips to me before leaving.

Off the record.

(Noon recess)

EXAMINER: Back on the record.

Ladies and gentlemen, we're resuming the hearing which started this morning regarding proposed rules pertaining to effluent limitations of polychlorinated biphenyls to the waters of the State of Wisconsin.

My name is Jim Christenson. I'm an attorney with the Department of Natural Resources and am the hearing examiner for today and tomorrow.

The first part of the program this afternoon will be presentations by various individuals at the request and on behalf of the Wisconsin Department of Natural Resources.

Is Dr. Harold Humphrey here please? Would you please step to the front, sir.

DR. HUMPHREY: Are you ready?

EXAMINER: Yes, just please identify yourself and who you represent.

DR. HUMPHREY: I'm Harold Humphrey. I'm environmental epidemiologist with the Michigan Department of Public Health in Lansing, Michigan.

I was invited to come here today to describe a study which I'm directing in which the Department of Public Health is conducting and the federal—the Food and Drug Administration is supporting. And the study is an investigation of persons in Michigan who consume fish.

The presence of PCB's in Lake Michigan fish actually came to light during the 1968 hearings on DDT contamination of commercially marketable fish. Guideline levels, as has been mentioned today, have been set at five parts per million for PCB in fish.

The continued presence of excessive levels in Great Lakes fish has failed to show improvement, indicating a continuation of the overall problem.

Numerous animal studies have demonstrated a dose-related effect for PCB compounds. They are fat soluble, stored in adipose tissue. They are persistent and toxic effects appear to be related to the degree of chlorine content in the compounds. PCB ingestion, either directly or through contaminated food has been shown to cause, in animals again, liver damage, skin changes, disturbances in reproduction, pneumosuppression and abnormal type dysplastic cellular growth patterns suggestive of possible neoplastic transformations.

EXAMDER: Excuse me, sir. Could you speak up. They're not getting it out there.

MR. HUMPHREY: The PCB contaminated fish species of the Great Lakes represent a desirable sport fishery and although the general population receives a degree of protection through FDA regulations, seizures and etc., sport fishing, which represents a population who, by choice, consume millions of pounds of Great Lake fish. Sport fishermen do not receive this kind of protection. Thus the question does arise, what risk does consumption of sport fish represent to the health of this particular population group.

Knowledge of the toxic effects of PCB's on humans comes principally from an episode in Japan in 1968 and this is the now familiar Yushow (phonetic) disease, in which case—where over a period of time about a thousand people were exposed to daily—to rice oil, an oil used in their daily cooking and a variety of maladies were recorded in humans, including things such as increased pigmentation of skin and nails, swelling of the upper eyelids, impairment to vision due to eye discharge, numbness, edema of the limbs, persistent headaches, weight loss, fatigue, gastro-intestinal symptoms, including abdominal pain and disturbances in liver function. I merely mention these because when I describe the study later, we were asking people whether or not they had had such signs and symptoms.

The Yushow incident showed that the effect in this Japanese occurrence was a lingering one and that was suggestive of the possibility that in humans, there's a long biological half-life. Now, admittedly, consumption of Great Lakes fish does not represent a magnitude of exposure, as shown in the Japanese Yushow incident. However, the suggestion of a long biological half-life for PCB's in man, allows the assumption that if PCB's are ingested and if such ingestion continues, the compound could accumulate in tissues for a long period of time by this long-term, low level exposure or through internal recirculation of the chemical as it remains in the body.

Thus the habitual consumption of contaminated fish from the Great Lakes represents a hypothetical means for accumulated, perhaps a clinically significant dose of PCB's. To date, data concerning prolonged human exposure to low levels of PCB as represented by fish consumption in the United States has not been available. Likewise, the relationship between the quantity of contaminated fish consumed and the accumulation of PCB's in humans is unknown. Such information is necessary in order to assess the human health significance of the present situation in Lake Michigan. The study, entitled, "Evaluation of Changes of the Level of Polychlorinated Biphenyls in Human Tissue" was begun in 1973 by the Michigan Department of Public Health with FDA support. And this is the study I want to describe to you today. The field work phase was just completed this past spring and the analytical data is now being generated in our laboratory. I cannot give you what will eventually come out of the study, that is, the hard and fast analytical data, but I will be able to tell you how we've approached this problem and what the study—protocol is.

The investigation represents an attempt to study the effect of exposure to PCB's from consuming fish, primarily sport caught fish from the Great Lakes. And again, the absence of a decline in the levels of these materials in the lakes demonstrates the problem which was being addressed in 1973 does, indeed, still exist today as far as fish contamination is concerned. The PCB study has comprised two major efforts over the past two years. One is an epidemiological field survey and the other an analytical laboratory program.

The primary objectives for the study have been—and I've got five of them here. Number one, to identify exposing control populations in selected geographic locations where PCB levels are known to be excessive in the fish. To select participants for the study and collect suitable blood specimens, using acceptable epidemiologic techniques. Three, to record the intake of the PCB levels in the fish meals actually being consumed by participants. Four, to develop a sensitive laboratory method for detecting PCB's—PCB concentrations in human blood. And fifth, to determine by laboratory analysis, the concentration of PCB's in participant blood specimens in order to evaluate the ingestion of PCB via fish meals, the PCB levels in blood of humans who do and who do not consume these fish, the variations of PCB levels in blood due to

the seasonal fish consumption habits and lastly, to estimate the metabolic half-life of PCB's in the blood of humans.

The work for the study was done in four Michigan communities. I'm assuming everybody here is familiar with the State of Michigan. If not, look at the back of your left hand and the communities were Traverse City, Manistee, Luddington and South Haven. These are all communities that border on the Lake Michigan shoreline of Michigan. In addition, from the previous study that we had done on mercury, we had available control samples from Algenita and also from South Haven for testing for PCB's.

The residents of the communities were selected for the study on the basis of sport caught Lake Michigan fish consumption habits and were categorized as either exposed fish eaters or non-eater control people. In order to qualify as a "fish eater", the participant had to have consumed at least 26 pounds of fish per year and again, this would be freshly caught Lake Michigan fish. This is the equivalent of a half a pound fish meal per week. To be a control person, preferably they consumed no fish at all, but no more than six pounds per year was allowed to have a person qualify as a control.

The study involves approximately 200 persons, so when I mention communities, I'm not suggesting that we surveyed entire communities in the state, but rather these would be statistically selected portions of the populations of the communities. Persons were selected for participation on the basis of responses to a personal interview. The control group was selected by a randomly picking names from the Polk City Directories for these communities and then visiting the households so selected and the—upon visitation the decision was made as to whether the person could qualify as a control. So the controls in the study were randomly selected. The exposed people were either picked up through the random selection, which is a very minor portion of the study group, but more principally, the exposed group were identified by word of mouth or referral.

Sport fishing in the Great Lakes is a fairly visible hobby and it was quickly evident that various officials, friends, neighbors, family, could quickly identify people who were sport fishermen. These people were approached, identified and if they agreed they represented the exposed portion of the study. Of course, they had to consume at least 26 pounds of sport caught fish per year in order to qualify as an exposed participant.

A questionnaire was developed for use in the study and basically it dealt with trying to gain information from the people with regard to their—to the members in their family, the amount and—a special focus on the fish consumption that participant had, including a location of where they caught their fish, the species they ate, the frequency of eating these fish, the quantity of fish eaten and the gradation of their preference for species. Other information, such as occupation, major medical events and the occurrence of specific medical conditions was asked of these people also. The specific medical conditions that were asked of the participants included a fairly long list and many of the kinds of signs of symptoms that are typical of those reported from Japan for Yushow.

Over the duration of the study, which is—has been a two-year study, contact has been maintained with the participants to retain their interest in the study and to collect blood specimens. Now, a person who participated in the study, if they were a control person they'd have been randomly selected; they were interviewed once. It was confirmed that, indeed, they qualified to be a control. A 20 cc blood sample was obtained and that was primarily the end of their participation.

The fish eaters were located as I described, by word of mouth, tracking people down, talking to people in community groups or neighborhoods or what not, potential fish eaters were located, identified, interviewed. A good deal of questioning went on to confirm, indeed, that they qualified as fish eaters and these people were fully interviewed and asked to participate in a study for a prolonged period of time, which would include multiple samplings of their blood for testing.

In addition, exposed fish eaters were asked to maintain a dietary log and record when and what kind of fish they ate. Again, the emphasis always being on—not on commercially purchased or restaurant bought fish, but Lake Michigan caught fish. And also they were asked to save portions of their fish meals so that we eventually, from fish eater participants, would have a dietary log of their fish consumption habits and a sampling of the meals they had consumed over the period of time that we were taking blood levels. Obviously, what we're attempting to do here is see if there's a dose relationship going on.

The first year of the study 168 participants were identified, selected and interviewed in the summer and early fall of 1973. Of these, 33 were randomly selected control people and 135 were initially categorized as fish eaters. I won't go into the breakdown, but they were distributed over the four cities, with people from Traverse City composing the bulk of the 168 and approximately 20 to 30 from Manistee and Luddington.

The proportion of fish eaters to controls that were included in the study was intentional. We had fewer controls than we did fish eaters. This figure was arrived at on the advice of statisticians during the planning stage and as I mentioned earlier, we had control people from an earlier study of mercury in Michigan to draw on for additional control samples.

At the end of the fishing season in 1973, blood samples were drawn for all participants and it was intended that this sampling would provide a measure of PCB levels in these people—in the blood of these people at the end of a fish-eating season and would also provide data for future comparisons for the next year.

The following spring, spring of '74, a subset of the Traverse City group of fish eaters were sampled prior to the resumption of the fishing season in order to evaluate changes in PCB levels in these people during the winter layoff, again remembering where folks—folks go out and get fish from the Great Lakes and there is a definite time when you can and can't take a boat out, at least without risk of life and limb.

Another subset of participants was sampled at—two times during one day to provide a fasting and a nonfasting blood specimen. The point of this was to determine if, depending on the lipid mobilization of the body during fasting, if this also mobilized PCB levels in the body from their stores in the adipose, thereby changing the blood levels. And the secondary purpose of this was also to determine which kind of blood sample should be taken on a routine basis, whether it be fasting or nonfasting.

During the second year of the study, again the principal cities were Traverse City, Manistee and Iddington were revisited and approximately 100 people included in the second phase. Some of the fish eaters were from the previous year and some new people with an emphasis on higher fish consumption habits, were recruited. Now, these people, at this time, were followed in very great detail from the beginning of the fishing season to the end and when I say in detail, this—I'm thinking of multiple samples of blood during the summer, close maintenance of their dietary logs and records, encouragement to keep these up, reminder to save portions of their fish meal. Essentially what we were trying to do is make sure that the fish consumers were keeping as close track as possible of their actual consumption of Lake Michigan fish. And as I said earlier, this was—we were trying to—we will eventually attempt to see if there's a dose-relationship here that we can establish.

Blood specimens were collected during the summer to represent—several times during the summer to represent an increase—to represent changes in PCB level which might be occurring during the intake of fish. Then at the conclusion of the fishing season, the fish eater participants were asked to refrain from eating any further fish. In other words, abstain. And once their fish consumption ceased, that was the zero time, then samples were taken at 15 days, 30, 90, 120 and 180 days after they ceased eating fish. The attempt here was to see if we could evaluate a change in the PCB level in the humans—in the blood of the humans over this time and establish a half-life for PCB in blood.

That fairly well describes the protocol of the study and alludes to the kinds of things that we are trying to find. I might just add here that the analytical testing of the blood, the collected blood samples is done at the Michigan Department of Public Health Laboratory. A good deal of time and effort went into developing a suitable analytical technique, the complicating factor being the presence of DDT in the blood of most people and that causes interference in the identification of PCB and secondly, the affiliation of any PCB's in the blood with the lipid components to the blood requiring extraction—an extraction step. The third procedure that was finally agreed on is a fairly direct one using gas chromatography, but a number of different techniques to improve the sensitivity of detection of PCB in blood were tried and eventually rejected for the final technique that is in use.

The sensitivity of this procedure is five parts per billion concentration in blood and this is primarily being the peaks for Aroclor 1254 and 1260 are the standards that are being used to verify the PCB's that are being measured. And the recovery of PCB from spiked samples is running between 94 and 100 percent, so that the technique appears to be fairly accurate.

Now, I would like to conclude with a couple of things that we have come up with just in the last couple of days with regard to some things that we're seeing out of the study. Again, on the basis of tests on the blood samples, I can't make any statements yet regarding that because of the fact they're not available. However, we have taken a look at the response to the questionnaire portion—the portion of the questionnaire regarding the health symptoms. Basically, as I said a moment ago, this was a list, sort of a laundry list of symptoms asked in the way, in the sense of I'm going to list some health conditions. Tell me the ones you've experienced, when the condition began and if you saw a doctor for it. And then you run through a list of about 18 different things. These items included things such as numbing—numbness and tingling of the limbs, discharge and swelling of the eyelids, skin eruptions and problems with skin

pigmentation and the like. This is a recall type of list. And basically what has been seen as—so far as that is concerned, there's no difference between the fish eaters and the control people in their responses. No statistically significant difference.

EXAMINER: Does that complete your statement, sir?

MR. HUMPHREY: I have one more comment to make.

EXAMINER: Okay.

MR. HUMPHREY: One other piece of information which is beginning to evolve is a—the characterization of the fish consumption of people. The people classified as fish eaters or the exposed people, we found on the basis of looking at 75 of these, the range of fish consumption, poundage, was from 26 pounds to 260 pounds a year is what they recorded they ate. The bulk of the people, 56 out of 75, ate fish in the 26 to 60 pound range. Thirty-five people ate fish at the rate of 26 to 35 pounds.

Basically what I'm saying here is that it appears that fish eaters—we're talking about—about a meal a week so far as consumption rate. There were only ten people who ate greater than 84 pounds of fish per year and of these, only three were above 200 pounds of fish a year. Now, at 200 pounds of fish per year, that's approximately 20 fish per month. So again, this is not fully completed yet, but it appears that even when you seek heavy fish eaters, by world standards, these are not vast consumption quantities. And the—the other thing that characterized the fish eaters is they—although they catch the fish, they tend to distribute their catch among a family or friends, which leads to a number of people having an occasional fish meal at least and the amount of fish that they consume is not consistent from year to year. They might catch 50 pounds in one year and depending on the waves, the weather and the ability to actually catch fish. They may only eat 20 pounds the second year.

In conclusion, we're optimistic that this investigation will, for the first time, provide information about PCB's in humans from the Great Lakes situation. And we're optimistic that it will provide data on the amount of fish consumption by people in the Great Lakes area. The PCB dose received from Great Lakes fish, the body levels of PCB's of both control and exposed persons, annual changes in PCB level and half-life changes in PCB levels in fish.

Thank you.

EXAMINER: Dr. Humphrey, I just have—you will provide a copy of that when you're done.

MR. HUMPHREY: Yes.

EXAMINER: I just have a couple of real quick questions myself. Do I understand that the sampling, itself, the blood sampling is completed?

MR. HUMPHREY: Yes, that's correct.

EXAMINER: And when do you expect the results of the sampling to be published?

MR. HUMPHREY: We're obligated by contractual arrangement with FDA to have this data ready by the first of the year or during January.

EXAMINER: And would it be possible to provide the Department of Natural Resources with a copy of that study and the results?

MR. HUMPHREY: I expect it could be; yes.

EXAMINER: Okay. Thank you very much. Now, does anyone else have any questions of Dr. Humphrey?

Would you please step up here to the mike, sir. It is being recorded and that way we can get your statement. Please identify yourself.

MR. TILSON: My name is Ed Tilson. I'm trying to find how long the study is going to be continued. I might have missed that.

MR. HUMPHREY: The study has been going on for two years. It started in 1973. It was—the field portion was completed this past summer. It—the support—the financial support for the study has been a contractual arrangement with the FDA so so far as that phase of it is concerned, it is finished. Obviously the interest in the problem remains and it—at this moment there is no definite plan to go forward, but as generally the case with these kinds of things, I'm sure many intriguing questions will be raised by the results.

EXAMINER: Okay. Any further questions?

(No response)

EXAMINER: Okay. Thank you very much, Dr. Humphrey.

Is Dr. J. R. Allen present? Okay. Would you please identify yourself and make your presentation sir?

DR. ALLEN: I'm Professor J. R. Allen of the Department of Pathology at the University of Wisconsin. I've been doing research on the polychlorinated biphenyls for a number of years. In 1967, even before the Japanese outbreak of polychlorinated biphenyl intoxication, we were doing research on the particular effect of the polychlorinated biphenyls on the liver, particularly on the liver enzymes.

Following news of this outbreak, we modified some of our experiments to include some of the biological effects that might be experienced from exposure to the PCB's. Our first procedures were to try to establish the most suitable experimental animal model. And within a relatively short period, we found that the nonhuman primate developed the symptoms and the lesions similar to those that occurred in the Japanese outbreak of 1968.

In our initial studies we were trying to determine really at what level these compounds were toxic. Early studies had 300 parts per million in the diet, produced extreme morbidity and mortality within a period of two to three months. As was the case with the Japanese, these nonhuman primates; they were rhesus monkeys, developed a loss of hair, swelling of the face, accumulation of fluid underneath the skin, a loss of the eyelashes and a decided acne. Those that died, and all of them did eventually die, they had a severe gastritis, marked thickening of the walls of the stomach and ulcerations of the walls of the stomach.

In our subsequent experiments we fed another group of rhesus monkeys 100 parts per million in their diet. It was in a period of three weeks they began to develop the signs and the lesions that I had mentioned that occurred in the 300 parts per million group. And here again, within a period of approximately two to three months, all of the animals had expired.

In our next experiments, we decreased the level of intake of these animals to approximately 25 parts per million of the polychlorinated biphenyl and I must mention here that this is the PCB Aroclore 1248 that was used in all of the experiments unless I mention another compound. In the 25 parts per million group, we fed animals for a period of two months, and at 25 parts per million they developed the loss of hair; they developed the loss of the eyelashes, subcutaneous edema and a decided acne within a period of approximately three weeks. By two months, it was obvious that these animals were—they were ill and unless they were removed from the experimental diet they would have expired.

We took them off of the experimental diet and one of the six experimental animals expired two months after having been removed from the diet, here again with the classical signs and lesions of PCB intoxication. We have followed these six—the remaining five animals for a period of now approximately two years. After two years, they're still showing signs of PCB intoxication. These animals have been bred. We have had at least six infants from the five surviving animals. They are extremely small and average weight of a rhesus monkey at birth is about 475 grams. These animals invariably weighed in the neighborhood of 350 grams. They had detectable levels of PCB's in their tissues at the time of birth, thus indicating a transplacental movement of this material from the mother through the placenta into the infant.

As we left these infants on their mother and they nursed, there was an increasing level of PCB's in their tissues, thus indicating and substantiating the Japanese work as well as others that there was an accumulation of the polychlorinated biphenyl in the mother's milk and could be given to the infant at the time of nursing.

So in these experiments after two years, we have definitely shown that there is a persistence of PCB's in the mothers and there is a continued elimination of this material via the placenta to the infants.

Now, probably the—one of the more interesting experiments that we have done and this has just recently been completed, is we fed levels that were similar to and one-half that permitted in certain foods destined for human consumption. We fed levels of 2.5 and 5 parts per million. And you know, in certain fish products that they are allowed five parts per million, others, why—other food products certainly it may be less than this.

However, to our surprise, these animals at levels of 2.5 and 5 parts per million in their diet and they were consuming this on a continuous basis and not as man would as he eats fish or whatever it might be. They're consuming this diet containing 2.5 and 5 parts per

million within a period of approximately two months, these animals began to lose their hair; they began to lose their eyelashes. They began to develop chloroacne. Within approximately four months, they began to show irregular menstrual cycles. They had attained—particularly the five parts per million group had attained a relatively steady state of the PCB's in their tissues at six months.

We attempted to breed these animals to control males. We—in the 2.5 parts per million we were able to get—well, all of the animals conceived. And this we determined by mallus (phonetic) assays. All of the animals conceived and within a relatively short period of time, they—the five of them were able to carry their infants to term. The three remaining animals either aborted or resorbed their fetuses. These are the 2.5 parts per million.

Six of the eight experimental animals on the five parts per million conceived; however, only one of the animals was able to carry their infant to term. The remaining animals either aborted their infants or they were resorbed.

These data indicated to us that really there would appear to be no marked effect upon the ability of these animals to conceive, yet there appeared to be a decided effect upon their ability to carry their infants to term. We have carried these animals on this diet for over a year. They have still persist in showing signs of PCB intoxication. We are presently in the process of evaluating the biological effects of the PCB's on the infants, particularly as it relates to their physical status and to any behavioral or learning abnormalities that may arise in these infants.

We are also initiating studies that are underway at the present time to more closely simulate the intake that man may have as he eats the fish or other foods that are exposed to the PCB's. And hopefully within the next year we will have some data as to whether these levels will be toxic. However, at the present time we have not established a level of PCB when consumed on a continuous basis that is nontoxic to the nonhuman primate.

Hopefully the levels that we will—we are feeding at the present time will be nontoxic. This is one aspect of our studies. We have also done extensive metabolic studies concerned with the absorption, tissue distribution and metabolic fate of the polychlorinated biphenyls. This to us is quite interesting in that in these studies we have determined that there is, particularly with the lower chlorine isomers and I'm sure that it's already been mentioned that the commercial PCB's are composed of many isomers, that there is an entirely different metabolic fate of the PCB's in the nonhuman primate and in the laboratory rat. The laboratory rat is able to hydroxylate these compounds and excrete them quite readily. The nonhuman primate does not do this nearly as readily. It has to go through an intermediate metabolite known as the arene oxide intermediate. This particular arene oxide is capable of combining with tissue micro-molecules such as RNA, DNA and protein and may give rise to extreme deleterious effects. These studies are being pursued in detail in our laboratory at the present time.

We do not know and it is our concern what the low level exposure, particularly in the nonhuman primate, of these compounds will be—maybe not today, but in five years or ten years and this is our concern at the present time and these studies are being carried out in laboratory animals and also in quote, "the test tube", in vitro experiments.

EXAMINER: Thank you, sir. Only one question for myself. What's the lowest level of PCB foods that are being fed to the monkeys at the present time—the rhesus monkeys?

DR. ALLEN: The lowest level—the lowest level that is being fed to these monkeys at the present time that we have any data at all on is 2.5 parts per million in the diet.

EXAMINER: Okay. Thank you very much. Does anyone else have questions of Dr. Allen?

Sir, would you please step up to the microphone, identify yourself, state your question.

DR. HUMPHREY: I'm Harold Humphrey.

I'd like to know, have you had the Aroclor that you've been feeding, confirmed as to its purity? Are there any contaminants in it?

DR. ALLEN: This we have done and this is a point of I think all of our concern. There are two that I'm aware of that may be there in these Aroclors and certainly there's a recent report in nature indicating that some of the Aroclors are contaminated with the dioxins, which are very potent teratogens in some of the—and the LD 50 on these and some of experimental animals is quite low. The other are the dibenzal furans (phonetic), which are also rather toxic. So yes we have and it is, as far as I'm concerned, free of these particular contaminants. There are others, I don't know. These are the two that we have concerned ourselves with.

EXAMINER: Thank you, Dr. Humphrey. Anybody else have questions of Dr. Allen?

(No response)

EXAMINER: Dr. Allen, do you have a synopsis or a report that you could file with us?

DR. ALLEN: I'll find it.

EXAMINER: Thank you very much. I appreciate your appearance.

Okay. The next person appearing on behalf of and at the request of the Department of Natural Resources is Mr. W. B. Papageorge. Will you step up here please, sir?

You can just please identify yourself and make your presentation.

MR. PAPAGEORGE: I am—can everybody hear me? I am William Papageorge. I am William Papageorge, manager of product acceptability with Monsanto Company, located in St. Louis, Missouri. I've been associated in varying degrees with polychlorinated biphenyls for a little over 20 years. I have been intimately associated with them practically full-time for the past five and a half years. And during that period of time I'd just like to take this opportunity for a few moments to express three areas of concern I have which in my opinion prevent us from really identifying our problem and, of course, once we've identified it, take appropriate action to cope with it.

The one that comes to mind immediately is this tendency on many of us to use the acronym PCB to describe really over 200 different chemicals, many of which have different properties, both chemical and physical. Examples of that would be the rate at which these materials would degrade if exposed to similar conditions. There is a demonstrated difference. It's my considered opinion that if we could just turn the clock back and only use let's say 1221, a 1232 and even a 1242 and no others, we probably wouldn't be sitting in this room today. I just don't think a problem would have developed.

Another area that we might want to consider briefly, the presence of PCB's has been reported and they are described as being ubiquitous. They are found in places that have challenged us to try to explain just why and how would they get there. There are, of course, as you know, many reports in the scientific literature relating to PCB's. The last number I'd heard quoted were there were at least 1,500 known. Most of the reports that I personally have seen address themselves to reporting presence of PCB's in the environment. And invariably, those of you that follow the literature will note these are described as being equivalent to Aroclor 1254 or 1260. Now, some of the earlier work—this goes back to 1970, 1971, there were a few investigators that identified say an Aroclor 1248 occasionally or a 1242 and there was even a few that had a 1232 identified.

But as time goes on and the present time, more and more of these reports reflect what appears to be an Aroclor 1254. This ought to be telling us something.

The effects on the environment—we still need an awful lot of information to tell us a lot more about the fate and effect of these PCB's on the environment. There have been some speculated reports that try to tie in the presence of PCB's to some observed effect. Many of these early reports have been discounted since then. I have in mind, for example, the reference to the demise of the brown pelican off southern California because the egg shells just couldn't support the weight of the hen and the eggs weren't hatching. That was disproved by the laboratory located in Laurel, Maryland, by Dr. Robert Heath. There was a report in 1970 regarding the sea birds and seals in the north sea. That was discounted later by the ministry in the United Kingdom. There was no relationship established because they found that apparently healthy animals of the same species had higher levels of PCB in them than those that had met their demise.

Well, the only reason I mention those is to point out that we still lack a lot of information. Evidence that animals are affected or creatures are affected by levels of PCB's have generally, have to my knowledge—to my knowledge have come from laboratory studies. And in those instances the levels used appear to me to be higher than those found in the true, natural environments and then I personally find it very difficult to translate the pristine conditions I have personally observed in a laboratory with such situations as you might find out in the real world. And with complex materials like PCB's I personally wonder about this jumping into conclusions that we find ourselves doing.

Another area, and I think this is most important, is our ability to sample and analyze and get reproducible results within a laboratory and from laboratory to laboratory. We

have found within our own company between two laboratories, we find as much as plus or minus 50 percent variation. There is some dispute about ability of laboratories to come up with the same answer for the same sample. Under the auspices of the ASTM, there's a study now underway, a round robin, in which 12 laboratories representing industry, government, both Canadian and U.S. and commercial laboratories and academic laboratories to participate in a round robin and we are looking forward to see what the results will tell us.

So much for that. I was asked really to talk about past uses, current uses and amounts produced and sold in the United States. The past uses, as most of you probably know by now, were many and varied. They seem to really be a function of the economy, and its growth and a function of advancing technology. The initial uses were primarily, of course, the dielectric uses in transformers and capacitors. During World War II there was much developmental work going on so shortly after World War II these materials found themselves in uses such as special paints, inks, sealants, caulking materials, plasticizer for the then new synthetic rubbers. An attempt was made to use some of them in floor tiles to make them fire resistant. These kinds of uses. They go on and on. Virtually anything you can imagine, at one time or other, someone tried PCB's in them.

The big inputs came through about three specific areas. Following a serious fire in one of the automobile transmission plants in Michigan. The change from mineral oils to fire resistant hydraulic fluids took place. And PCB's played a big role in that, industrial hydraulic fluids. Not your automobile hydraulic fluid, not the airline hydraulic fluid, but industrial types. Generally where there's hot molten metal and high pressure hoses and they do leak and the intent is to keep fires to a minimum. Another big use that developed was the need for fluids that could withstand high temperatures to be used in heat transfer systems. As our technology evolved, the need for higher and higher temperatures came about and this offered an opportunity to use high temperatures and not have to resort to high pressures, which in many areas require licensed operators and safety devices of all sorts.

A third big use that came about in the early '60's was the application of the carbonless copy paper that we all know about. So each of these represents a sharp rise in use and as sort of a gradual increase following the growth of our economy.

In 1970—early 1970, Monsanto decided to withdraw from those uses which in our opinion represented almost a total and quick release into the environment. So we withdrew from all of these sealants, caulking, paints, varnishes, lacquers, plasticizer for synthetic rubbers, coatings for fabrics, all of the uses that as I said earlier, in essence amounted to full and easy release into the environment, either through poor incineration or disposal in sewage systems or open garbage dumps and the like. This occurred—then this went into effect in August of 1970.

The next material that we removed from use or the next application was its application in the carbonless copy paper and this started to phase out in late 1970 and the last truckload was delivered as I recall about April, 1971. And during that period it was a decreasing amount into that process.

Finally, in 1972 we withdrew from the heat transfer application because we had learned from experience that although these could be sealed tight systems, it turns out that we couldn't rely on this, and so we withdrew from the marketplace, forcing our ex-customers to seek alternative fluids and I'm told to this day they have not found any. We have not found any that are fire resistant. So they had to redesign their systems, introduce fire walls, sprinkler systems, fire detection devices and pay increased insurance premiums.

So today—and as of 1972 we sell only to the dielectric applications, such as the transformers and capacitors we've all heard of. And this is done under certain legal requirements from our customers. They don't like this and I can appreciate why, but they're asked to sign a document in which they assume full possession and ownership of the material as soon as it leaves our plant gate and they maintain control on it from then on out.

In conjunction with this withdrawal from the marketplace, we also found that we had to build ourselves an incinerator to dispose of the liquid wastes because we kept telling our customers don't dispose of it improperly and they always came back, well, if we can't do it the old way, what do we do with it? So we designed a liquid incinerating unit and we offer that service to a customer for a fee. There are, of course, since then commercial units also available operated by people in the business of disposal.

The production and sales data, I have here a chart that I'll leave with the examiner and there are a few copies for those of you who are interested. This information is the best we could put together from our existing records. It takes us back to 1957, gives us the full year for 1974 and on the last page is the first quarter of this year. The peak year was 1970, when we produced 85 million pounds and there's a breakdown there by use category and at the bottom of the page by Aroclore type that you might find interesting.

Currently we are producing at about the 40 million pound per year rate. We have shut down one unit that used to be located in Alabama and disposed of that unit. The production is concentrated in Illinois, across the river from St. Louis. Those 40 million pounds go into these dielectric uses. I'm told that this year in particular, it's about—half of it goes for transformers and the other half goes to capacitors. The ratio varies with economic conditions and the needs of the marketplace.

I'd like to point out some interesting pieces of information in this. Keep in mind the 40 million pounds used today go into sealed systems which we believe can be controlled to a satisfactory degree. This would indicate then that the additional 40 million, in essence, got out into the environment within the year. Once you reach some sort of equilibrium, amount put in equals amount that's escaped. So 40 million pounds per year are no longer entering the environment in this country. I am not trying to speak for the rest of the world. I like to think that something comparable is happening in Europe and in Japan, of course.

Another interesting bit of information, through the years we have tried, knowing that the higher the chlorine level, the more persistent the material, to shift downward in the chlorine scale and trying not to sacrifice dielectric properties or fire resistance. So we've eliminated the use of, for example, Aroclor 1260 in transformers. And our customers agreed to go with the use of 1254. We have gotten away from the use of Aroclor 1242 and introduced a distilled version of Aroclor 1242, which we refer to Aroclor 1016. This Aroclor 1016 contains one percent or less of the five chlorine and higher isomers. The old 1242 used to contain about ten percent.

Now, we're not sitting here saying that this is the panacea or the cureall. All we're saying is that we believe that this is a step in the right direction. Should any of this material get away from us, and it can happen, the chances of it being handled by the environment are that much better than they would have been with the higher chlorine isomers present.

We have been criticized in a way when people look at these numbers to say that the rationale follows this logic. Aroclor 1254 is the type found in the environment. Monsanto says that they have reduced the open uses and yet their report shows they make as much Aroclor 1254 as they used to in the past, therefore the problem continues. The fallacy in that type of thinking is that they do not take into account that 1254 used today is in a steel box into which—you can only get into it with a tool, a wrench, for example, to open up a pipe plug or what have you. In the past much of that 1254 ended up in adhesives and inks and caulking materials, varnishes, traffic paints and so on. So there is a decided difference in the type of application and its exposure to the environment.

Another change, of course, is the 1254 that is now substituted for the old 1260. So the amount of 1254 remains somewhat the same, but it's certainly in a different application.

I do not have a prepared statement, Mr. Examiner, but I do have the table and I also have a statement that describes our marketing policy which is available—anybody which I have paraphrased as I spoke.

EXAMINER: Okay. Fine. I'd like a copy of each if I could, please. Thank you very much.

Is that the end of your statement today?

MR. PAPAGEORGE: Yes, sir.

EXAMINER: Okay. Does anyone have questions of Mr. Papageorge?

Please identify yourself.

MS. WEIMER: I'm Linda Weimer with the University Sea Grant Program.

I wonder, can you tell me, are any foreign company selling PCB's in this country and if so, about how much of the PCB's consumed are coming from that source?

MR. PAPAGEORGE: I can tell you what I've been told by the Office of Toxic Substances at EPA. Now, there are representatives of that group in the audience.

EXAMINER: They're coming tomorrow.

MR. PAPAGEORGE: They'll be here tomorrow? I can only give you second-hand information. All I know is there's some coming in and that's been reported by EPA. And if they can't help you, I'd be happy to—whatever the examiner desires. What is appropriate.

EXAMINER: If you wish to give a paraphrase of what your understanding is, fine. We can verify that tomorrow with EPA.

MR. PAPAGEORGE: All right. I am told that in 1974, I'll try to recall the numbers as best I can, about 40,000 pounds of a material that has 42 percent chlorine was recorded as entering this county and about 350,000 pounds of a chlorinated turf fennel (phonetic), this is a three benzene ring group, which has about 60 percent chlorine was recorded as having entered this country. And if that turf fennel is anything like the material Monsanto produced when we were making it—we no longer make it, I would suspect—I would not be surprised that it contains up to about 10 percent of biphenyl in it and which would get chlorinated.

Does that help?

EXAMINER: Would you please step up the microphone.

MR. TILSON: My name is Tilson. Ed Tilson here.

I was in the—I was speaking with somebody in the electrical industry and he said that the name under which your product is marketed is Paranol; is that true?

MR. PAPAGEORGE: Pyranol is a trademark of the General Electric Corporation and we blend a material and package it for the General Electric Company.

MR. TILSON: Well, given that—what I'm trying to bring out here is that that might sound better, for instance, to make a reference to a paraffin compound, which this is not, as opposed to a benzene derivative, a dibenzene derivative which it is, which might alert people to the toxicity of it.

However, my question here is, how do you avoid troubles with trademark—trademark restrictions given that Pyranol is apparently a registered trademark of Abbott Laboratories for para-aminophenol.

MR. PAPAGEORGE: Sir, I'm not aware that that's true. All I know is Pyranol, P-y-r-a-n-o-l is a registered trademark of the General Electric Company.

MR. TILSON: Okay. That explains it because this is P-a-r-a-n-o-l. It's p-a instead of p-y.

MR. PAPAGEORGE: I'm sorry. That's right. P-y is the GE trademark.

EXAMINER: Any other questions?

Step up to the microphone please and identify yourself.

MR. BREMER: I'm Karl Bremer, U. S. EPA, Chicago.

I have a couple questions. Now, you indicated that you have an incinerator system where customers may send back liquid wastes; is that right?

MR. PAPAGEORGE: That is correct.

MR. BREMER: What do they do with their rags and their solids and so forth, this type of thing? I've encountered this on a couple of inspections where we have customers that will—they'll have liquid waste and they say "Well, yes. We can send that back to Monsanto." But during our rebuilding process and so forth, we have rags and other things that are contaminated with the product. What do we do with that? And we tell them, well, we'll ask you. What do they do with it?

MR. PAPAGEORGE: All right. That's a good question, a difficult question to answer because facilities for the proper incineration of solid material, are not to my knowledge available today on a commercial basis. There are a few small units where you can take a drum of material, sort of a muffle furnace and seal the door and let it evaporate or vaporize for a 24-hour period and destroy them in that fashion. But there is, to my knowledge, no commercial incinerator that will handle solid material that requires high temperature incineration. Therefore, lacking that resource, we have to reluctantly suggest, because we don't have a better answer, that they find a well operated, properly operated dry landfill and dispose of the material in that fashion. And that's the best we can do today.

MR. BREMER: Would you clarify something for me on your Arcelor 1016 and 1254. I saw a publication that was, oh, I guess in press or in progress and I notice some graphs and so forth in there and it indicated that you do have some degradation of 1254. And on looking at that data it seemed that 1016 was somewhat the same; is that true in terms of degradation?

MR. PAPAGEORGE: No, there is a closer resemblance to 1016 to 1242. I don't know which report you have in mind, but 1254 from the reports I'm familiar, does show an observable difference. There is not that much similarity. Do you have a bacteria study in mind or an animal residue study?

MR. BREMER: No, it was just one of your in-house reports and maybe someone could clarify that for me later, but it seemed that when I looked at the graphs in there, that the 1254 and 1016 were quite similar in terms of that degradation and this is why I expected that possibly in terms of persistence of 1254 in the environment that because of your production figures and so forth, in terms of 1016 that we might expect somewhat of the same problem or a similar problem with 1016. It's a concern of ours.

MR. PAPAGEORGE: I'd be very surprised—in fact, it isn't a rational conclusion, knowing what we know about the isomers present in 1016 and the isomers present in 1254. I think the chemist will tell you that there is—that's an easy difference to detect on the gas chromatograph chart. There is a definite difference in the two. And the 1016 is more closely—more closely resembles the fingerprint of 1242 and not 1254, so in degradation matters you will more likely find 1016 behaving more like 42.

I'd like to discuss that with you at your convenience.

MR. BREMER: Yes. Now, those experiments that we're talking about here and some of the in-house studies you're done have been done in the laboratory and you indicate there is that degradation. Why don't we see this sort of thing in a sewage treatment plant?

MR. PAPAGEORGE: Well, I don't know why you don't. We do. The village—the village treatment plant at Sauget, Illinois shows a definite distinct drop from the input that we put into it that the total stream that the village system gets, measures, I forget, something like say 10 parts per billion, just to pick a number of PCB's. The outfall is a definite reduction. So something is happening and of course we look at the sludge. The sludge plus outfall still is less than input. In as big a system as that, it's difficult to make a good material balance, but there's some indication that something does take place.

MR. BREMER: Well, what do we do with these contaminated sludges then? Do you have any recommendations for that? Contaminated sludges and sediments and the old sediments that we have there that are contaminated. Do we send those to a landfill or—

MR. PAPAGEORGE: That's—as I said earlier, lacking anything better, a landfill. I personally would like to see the day someday when this country has a network of incinerators that we can all use. But I'm afraid that's in the distant future.

MR. BREMER: I have one other question on shipment. When your Aroclors are shipped, for example, to GE or another appropriate company, are they shipped by tanker route or are they in barrels or how do they receive them?

MR. PAPAGEORGE: There's two modes of shipment—I'm sorry, three modes. Most of the volume moves by tank car on railroads. The second highest volume move is in steel drums of a special heavy duty steel because this material is, of course, heavier than normal oils that we run across in trade. The third mode is by tank truck. That is a very small portion of the total.

MR. BREMER: Do you have any idea on these modes of transportation? For example, by tank car or tank truck, how these are flushed or is the same tanker maintained for Aroclor? Is it ever used anywhere else?

MR. PAPAGEORGE: These vehicles, whether they be rail or motor, are dedicated to that service. Cleanout is very seldom required. If there is an accidental contamination, we clean them in our own plant through our own control system and it becomes part of our plant effluent, so we're very, very careful.

MR. BREMER: So that they cannot flush those at any other point in route then?

MR. PAPAGEORGE: Well, they should not and they're told not to and I have no evidence to indicate that they have tried to clean them en route.

MR. BREMER: —steel drums for transport are returned to you or—

MR. PAPAGEORGE: The only time we see the return drums is when return scrap material comes back to us.

MR. BREMER: You do receive scrap material then?

MR. PAPAGEORGE: Yes.

MR. BREMER: Not just liquid.

MR. PAPAGEORGE: Well, I meant scrap liquid.

MR. BREMER: Liquid?

MR. PAPAGEORGE: Right. No solid. I can't handle solid.

MR. BREMER: That's about all I have. Thank you.

EXAMINER: Thank you, sir.

Are there any other questions at this time?

Please identify yourself, sir.

MR. FORSTER: A. K. Forster, Madison, Izaak Walton League.

What amount of time and energy is devoted to medical research on the part of Monsanto so that the consumer will get relief when he eats fish that has over 5 ppm's of PCB and he doesn't have to limit himself to once a week or once a month? How can you overcome that? And has anything been done along medical lines—after all, we consumers, we want to know whether we could live after consuming fish or any food products that have an excessive amount of PCB. How can we overcome that?

MR. PAPAGEORGE: I appreciate your concern. I'm a consumer also, really. And this is not to say that your remarks are not appropriate. From the moment we were led to believe that PCB's could be a problem, this was back in the late '60's, we, through our medical department, which is responsible in Monsanto for toxicology studies and the like, visited the appropriate then-existing government agencies and remember at that time EPA was not in existence and I'm told that they were frustrated because they could get no guidance as to the types of studies that would lead us to better understand what these materials were doing to the environment and to people. Lacking any guidance, we came back then and decided we would conduct the studies that we have been conducting for years whenever we desire to register a chemical for food use. Not that we intended to petition the material for food use, but we felt that this was the proper way to go. Therefore, we asked the Industrial Biotech Laboratories, located in the outskirts of Chicago, to conduct two-year feeding studies with dogs and rats. They conducted, I think it was 120-day leghorn chicken studies. They conducted three generation reproduction studies and mutagenic studies and some aquatic studies, fish studies.

So we have done what we feel is a responsible bit of work in trying to define the chemical as it is normally done using animals and birds and fish. You ask what are we doing about health studies, we, of course, have always paid particular attention to our employees through the years, through the 40 years we manufactured these materials and I'm told by our medical people that there's nothing that shows up that is unique to that group of people. In the meantime, we are now in the midst of a study in which we are going back and looking at people who have worked in that department for long periods of time. Now, in our unit, individuals do move in and out of that department. The same people aren't there year after year after year. Some people seek different types of work and others feel that that's the work they wish, so they ask to work in it. So we do have a turnover. So far that study is not complete, but there's nothing that shows in this study that is different from the base population of people in the greater St. Louis area.

I don't know how else to describe our activities other than we feel this is unique for an industrial chemical. We have done more than ever's been done for industrial chemicals to date.

MR. FORSTER: Well, you're to be commended for that. Further, what is the statistical record of any death due to—due to overuse of PCB?

MR. PAPAGEORGE: I'm not aware of any death, in spite of what I—

MR. FORSTER: Human death.

MR. PAPAGEORGE: Human deaths. I'm not aware of any human deaths, in spite of the popular press articles, that have been attributed by the knowledgeable people and this—my source is primarily Food and Drug Administration toxicologists, that it's been attributed—directly attributed to PCB's.

MR. FORSTER: Thank you.

EXAMINER: Thank you, sir.

The gentleman in back. Please identify yourself, sir.

MR. JOHNSON: Henry Johnson, General Motors. The Chem Co facility in New York is listed by the Federal EPA as a hazardous waste facility. Aren't they also licensed by the State of New York to handle PCB contaminated combustibles?

MR. PAPAGEORGE: Did everybody hear that question? Yes, they are, to my knowledge. They are handling many PCB's; yes.

DR. MILLING: My name is Anton Milling and I'm just a---although I have done some studies with, in particular, prime dichloryl biphenyl, but I'm not presently involved in any chlorinated biphenol research. Well, you mentioned that your company has done studies on chlorinated biphenyls and the study was given to a biotest in Chicago; is that correct?

MR. PAPAGEORGE: The studies I mentioned with Industrial Biotest were the typical animal feeding studies; is that what you had in mind in reference to?

DR. MILLING: Yes, definite symptoms and so forth; is this what they were doing?

MR. PAPAGEORGE: Yes, that is right.

DR. MILLING: Okay. How does that study compare with Dr. Allen's findings, who just gave a report, I think, before you? Was it as severe? Were the findings as severe?

MR. PAPAGEORGE: I am not a toxicologist. I can report to you my understanding of the studies at Monsanto---had conducted for it and I'll have to leave it to you to compare with what you heard Dr. Allen mention.

Our studies with the rats and dogs can be summarized in this fashion. The high levels---and the studies were conducted at 1, 10 and 100 parts per million in the daily diet of the animals for two years. And as you know, the two-year period is near the life span of the rat. Of course, a dog lives longer. In the cases where the higher chlorinated material, the Aroclor 1254, 1260, at the high level, 100 parts per million, these symptoms were noted along with some minor ones, but the obvious ones are the animals exposed did not gain weight as rapidly as the controls. They were smaller in their growth increase. Also, the livers of these animals were enlarged and seemed to be trying to cope with the exposure.

Now, with the chickens, it appears the reverse is true; with the lower chlorinated, the Aroclor 1242, seem to affect the ability of their egg to hatch. We noted that at one part per million the eggs were hatching. At ten parts per million, no hatching. So we reran the studies at 2, 4 and 8 parts per million. We found an effect at 4, no effect at 2, so we concluded somewhere between 2 and 4 parts per million in the diet of the white leghorn chicken, its egg hatchability will be affected.

Reproduction studies, as I recall, at again the mammals, at the higher levels---the higher chlorinated mixture, as I remember, the second generation, second litter seemed to be affected in the reproduction.

DR. MILLING: Okay. Has there been any work done with Aroclor 1016?

MR. PAPAGEORGE: The work with Aroclor 1016 has---which came about later, was confined to the 90-day study, which was identical to the 1242. So we concluded that the two-year would probably look like the 1242.

DR. MILLING: So---well, it seems to me, then, that 1016 is not any less toxic; is that right?

MR. PAPAGEORGE: We have never---that is right. We've never claimed it's less toxic. We said it's more degradable.

DR. MILLING: Okay. Thank you.

EXAMINER: Further questions?

Please identify yourself, sir.

MR. HOPPLEKAM: Mark Hopplekam, Hooper Ecology Center.

You said that Monsanto signs a contractual agreement with customers, which lets

Monsanto off the hook, I guess, if any accidents happen or something like that, but my question is then therefore you could identify exactly where all your PCB compounds are going; right? Is that correct?

MR. PAPAGEORGE: We can tell you from our shipping record the delivery point. Beyond that we do not know whether it goes into a transformer, a particular capacitor or where that piece of equipment finally is used.

MR. HOPPLEKAM: But you do identify a shipping point and a customer, right?

MR. PAPAGEORGE: Yes, yes.

MR. HOPPLEKAM: Okay. Is that—could that be made public record or is that strictly confidential? I mean, could you tell the State of Wisconsin these are our customers in Wisconsin or would you be willing to?

MR. PAPAGEORGE: It's against our corporate policy, which is not unique to Monsanto, not to talk about our customers specifically. I can tell you, however, that through legal means, Federal EPA did get a list of our customers.

MR. HOPPLEKAM: Okay. One other question. With the transformers and the steel tanks, I was just wondering, do PCB's have a really stable, long life. I mean, has anyone compared the life of PCB's with these steel tanks?

MR. PAPAGEORGE: Yes, there is quite a bit of information. Again, keep in mind I am not in the transformer business personally and I am going to try to pass on to you my understanding. There are, for example, I'm told, transformers that were filled 40 years ago still in service doing a job. Apparently they're not stressed to the point where the fluid is damaged in any way and they keep doing their job in, day out and cause no problem.

On the other hand, we have varying degrees of success of how long that fluid lasts. Depending on the service the unit is placed under, maybe its design and maybe an oversize or undersized unit is placed in service so it's stretched more so it requires a little more attention than normal, so we get varying degrees of failure of the fluid. I hope that answers your question. It's a varied pattern.

MR. HOPPLEKAM: I thank you.

EXAMINER: Are there any further questions?

MR. VEITH: My name is Gilman Veith. I'm with the U. S. EPA in Duluth.

I share your concern over the inferences that people studying the environment sometimes make or feel forced to make. But in that same light, I have a great deal of concern over the inference that PCB's, because they cannot be accounted for on a mass balance basis, are degradable in the environment. And you mentioned, for example, you do see a decrease in the Sauget, Illinois sewage treatment plant when you try to do a mass balance of the effluent and the influent and the sludge and I'm wondering if you could provide for the hearing record data to, you know, that would have—I've done a few studies on sewage treatment plants. I find it very difficult to try to do a mass balance to really conclude anything and I'm wondering—we have seen, of course, the decrease in the effluent and whether or not it's absorption or stripping through the secondary—through the aeration, or through degradation, I haven't been able to conclude myself and I think it's important for a number of reasons.

One is there seems to be some concern that it is not possible to adequately treat PCB wastes to get them down, so that if there is a process to treat it, whether it just simply be biological absorption onto a flock, I think this would be quite useful. And the second thing is that when we look for degradation of compounds, if you want to test whether or not DDT does, in fact, degrade, you can find DDD; you can find DDE; you can find DDMU in the environment. If we want to get some indication that chloridane degrades, we can identify cyclochloridane as a residue in the fish. Yet when we come to PCB's, we do not see these metabolites, and I'm wondering if these compounds have been identified as degradation products in the sewage treatment plant and I guess the second part of that really is has Monsanto checked the losses in such plants due to just simply stripping. As you know, PCB's has a substantial vapor pressure and there seems to be growing information that aerial transport of PCB's as a source of contamination is becoming—maybe a significant route and a secondary—I mean an aerated sludge process could, indeed, simply be stripping the PCB's from the waters.

MR. PAPAGEORGE: Very good. For the benefit of those who don't know what we've done in our laboratory, we have tried to simulate in the laboratory, the situation that might occur in a municipal treatment system. We went to one of the local, municipal plants, obtained

the sludge as a culture and set up in the laboratory units in which we introduced the sludge with the proper nutrients and the ratio of water to sludge and bubbled air and the ratio that might be found in the—in the plant, a sewage treatment plant. We then add the material we wish to test.

Now, this test was not designed by Monsanto for PCB's. It's a test that was developed back in the days, you may remember, when we had the hard detergent, soft detergent problem. So we just mimic that situation. I recognize that this problem of evaporation of the material, the PCB's, the transport by the air stream running through the bath, or the deposit on the sludge itself could account for the disappearance. So we set up studies in which we pass this air through a series of absorbent bubble trains and all and check to see if the PCB's were out there, I forget how many, six or so bubble trains in a train. We assured ourselves after repeated trials that it wasn't there. We then looked on the sludge, itself, and satisfied ourselves that we could make this material balance and still there's a disappearance of that fingerprint. We have not and we were hoping others would start these kinds of studies, but we've been disappointed thus far. We have not identified the products of this degradation, which is your frustration and mine also. We don't know what it becomes because we've been asked this question, could the material that results have problems, maybe worse than the original?

We can't answer that because we do not know. We have made some studies on the amount of CO₂ evolved and it shows us that there is an oxidation going on. That paper, incidentally has been published in the "Journal of Environmental Contamination and Technology"—something like—I think that's the title. We've also had our Monsanto researchers in Europe publish a like kind of study and I'm sure you've seen Dr. Metcalf's work out of the University of Illinois. Those are the only three papers I'm aware of that address themselves to degradation of PCB's by microbes.

EXAMINER: Thank you very much.

Any further questions?

Please identify yourself, sir.

DR. VAN DUSER: My name is Arthur Van Duser. I'm a physician with the Department of Health and Social Services. And I apologize to the committee and to Dr. Papageorge if this question may have been asked before, but it relates to the problem, I think. Are you familiar and could you update me personally at least as to what's being done on the national level to prohibit or to change the importation of these materials? I think most of us feel that Monsanto is trying to do a good job, but we worry about what's coming in through imported sources or from manufacturers elsewhere.

EXAMINER: I believe that was touched on before.

Well, maybe you can give the answer again.

EPA will be here tomorrow with that same information, too, but go ahead if you'd like to repeat it.

MR. PAPAGEORGE: It's my understanding, sir, that our regulatory agencies do not have the statutes it needs to prevent the importation of this material.

DR. VAN DUSER: You are saying the gates—peripheral gates are certainly open as of the present time as far as you know.

MR. PAPAGEORGE: Yes, sir. You may have heard of the—the group of nations that call themselves the—that under the auspices or banner of OECD, the Organization for Cooperation Economic Development. These nations have an agreement regarding PCB's and the agreement reads as follows: "The producing nations, those producing PCB's, will sell them only to transformers, capacitors, nonfood heat transfer applications and as a functional fluid—hydraulic fluid in mining equipment." That's modeling into the Monsanto practice. Even in Europe we don't follow that practice. As an aside, and not definitely written in the agreement is that each of these nations presumably are to respect the member nations' attitudes, if you will, towards PCB's. So if the U. S., for example, does not go along with the heat transfer and hydraulic fluid application, they're not supposed to ship material into this country for that application. There is evidence that that's not being followed.

MR. TILSON: Ed Tilson here. I thought I'd like to read this off because this is from Manual of General Toxicity—if the specific name is needed I can get it at a future time. It lists under chlorinated diphenyl oxide, which have a high likelihood of being a decomposition product of PCB's, says under disaster hazard, "dangerous when heated to decomposition; it emits highly toxic fumes." And then under chlorinated diphenyls, it says under toxicology—this is an

extract, "oxides of chlorinated diphenyls are more toxic than the unoxidized materials." This was just by way of comment on the material that's already been presented.

EXAMINER: Okay. Thank you, sir. Are there any further questions?

MR. BREMER: Karl Bremer, U.S. EPA in Chicago. Forgot this one before.

I just want your general opinion. How necessary do you think PCB's are in electrical systems, particularly in transformers and is it because of electrical code that we're fighting with right now or what?

MR. PAPAGEORGE: The electrical code refers to fire resistance. So it's really fire resistance that is the benefit that we all enjoy, whether we recognize it or not. Without this characteristic, many, many of the units now installed in places that have high people concentrations or high property values like in factories and what have you, I think you can see the benefit of having a fluid that would not burn should the unit fail dramatically, with balls of fire being scattered in all directions.

MR. BREMER: Well, the reason I asked the question was I have had conversations with a number of electrical manufacturers and they indicate that technology is developed to a state where breakers and so forth, can be used, for example in a building in the event that you have this arcing and so forth that occurs in a transformer system that particular types of breakers and so forth can prevent the—you know, the actual arcing and burning or explosion of a transformer and I was wondering if we might, you know, be able to use some of this technology rather than kind of sticking with what we have.

And the other thing is the advent of the dry transformer, which we realize, you know, is a thing that takes more space. It's a different size and therefore, well, people are, you know, they're a little reluctant to use something a little different because of the way it has been done and you know that it's like this in—oh, you know, just in the building industry itself and in manufacture. But I just wonder if maybe we could—we could think of using our technology, up-to-date technology and use this type of, let's say a breaker system with another type of oil that, you know, would efficiently do the job rather than using something that we know—we've determined is pretty toxic and yet we keep saying, well, it is in a closed system, you know, and here we have something that, okay, it's in a closed system. Well, you have the other thing where just simple maliciousness on the part of some people where they'll—okay, they'll put a bullet hole in a transformer or something of this type. You have the fluid go out on the ground and/or you have a leaking of it just by, you know, defectiveness of the component or whatever it is. And it just seems like a vicious kind of circle, but I was just, you know, my consideration is—well, I think, you know, myself, that electrical code can be changed. You know, that it doesn't have to employ these in-house transformers in large buildings. They could be put outside. Technology could use the particular breaker systems that we have developed and we could use other substitute fluids which are available at this time.

It's just my—I just thought that maybe you felt the electrical code, you know, may be holding us back, too. I don't know.

MR. PAPAGEORGE: I am not personally qualified to speak for the electrical—I know really very little about the electrical codes and electrical engineering and the alternatives available in design. I understand there may be some people speaking on that matter later. You may wish to reserve your question for them.

MR. BREMER: Yes, fine.

MR. PAPAGEORGE: I just am not qualified to speak toward that.

MR. BREMER: Thank you.

EXAMINER: Any further questions?

(No response)

EXAMINER: Okay. In that case, thank you very much, Mr. Papageorge. I appreciate it.

At this time we'll take about a 15-minute recess and stretch our legs. It's pretty warm in here.

(Recess)

EXAMINER: Okay. We're back on the record, ladies and gentlemen. Please be seated.

We are entering into the public comment portion of the hearing today. I'd first like to call Mr. Jerry Diemer for comment.

MR. DIEMER: Thank you, Mr. Christenson. I'm here on behalf of Lt. Governor Martin Schreiber who unfortunately couldn't be here, but he has a statement that he would like me to read.

I would like to direct my testimony to two points. The first is to commend the Board of Natural Resources and the Department of Natural Resources for holding these hearings. For over a year, I have believed consideration of effluent standards for PCB's is a valid first step toward eradicating the documented dangers of PCB contamination. And I find it most encouraging that Wisconsin is once again taking the lead in protecting our environment.

The second point is that effluent standards are only the beginning, because effluents are only one of many ways PCB's are released into the environment. As a result, action to curtail PCB contamination will only be effective when PCB use has been restricted to the greatest extent possible. Hopefully, these hearings will provide enough information for the appropriate standing committees in the Legislature to take this action.

Currently only PCB's used in the electrical industry in transformers and capacitors are considered irreplaceable. I believe it is necessary that all other uses be carefully examined and in all cases where less toxic substitutes exist, PCB use should be banned. In addition, the essential uses of PCB's in transformers and capacitors should be critically reviewed in order to determine the feasibility of developing replacement products.

Further action by the Department of Natural Resources and the Legislature should be aimed at encouraging other states and the U. S. Environmental Protection Agency to follow Wisconsin's lead in considering effluent standards for PCB's and eventually banning all replaceable uses of the chemical.

Hopefully, also, these hearings will call attention to the myriad of PCB-containing products now being used for a variety of purposes. Although Monsanto Chemical Corporation is the only domestic producer, Great Britain, France, Germany, The U.S.S.R., Japan, Spain, Italy and Czechoslovakia all manufacture PCB's. Insufficient monitoring of imports makes it impossible to know how many materials containing PCB's enter the United States, or how much is actually manufactured worldwide. I should note that the Environmental Protection Agency has instituted a voluntary reporting program for imports containing PCB's. Unfortunately, the EPA has no statutory authority to mandate this information. However, toxic substances control legislation presently before Congress would provide the authority to gather necessary data.

Why would I mention the toxic substances control legislation at this hearing? Because this hearing, whether it considers effluent standards or an outright ban of nonessential PCB uses, is still reacting to the problem of chemical pollution with hindsight, not foresight. The real solution lies in ensuring the harmful chemicals never reach the marketplace.

Scientific evidence of the adverse effects of toxic materials mounts daily. Several hundred new chemicals appear in the marketplace every year. None of them are tested for possible harmful effects on health or environment. Only after the adverse effects are firmly documented is action considered. This is the case with PCB's and it was the case with DDT and Dieldrin.

Besides providing the EPA with the authority to demand data on toxic substances, a toxic substances control act would provide the mechanism for testing potentially harmful chemicals before they become an environmental or a health hazard.

Testing of materials such as PCB's before they become a problem, before they are allowed to be placed on the market, is the only prudent approach for the future.

This hearing will collect information for effluent standards for PCB's. I would ask that each participant, and all those who will use the testimony delivered here, be mindful of the fact that these standards are only one step. The success of the fight against the hazards of PCB contamination will be measured to the degree to which widespread intergovernmental action is achieved and the degree to which we realize that action based on hindsight will always be less than enough.

Thank you.

EXAMINER: Thank you very much, Mr. Diemer.

Is Mr. James Allen present? Mr. Allen?

MR. MADISON: Yes.

EXAMINER: Please identify yourself and who you represent.

MR. MADISON: For the record, my name is Allen Madison.

EXAMINER: Excuse me.

MR. MADISON: Home secretary, Congressman Les Aspin.

Mr. Secretary, members of the board, the hearing examiner, Mr. Christenson, first of all, I would like to thank you for the opportunity to submit testimony for these very important hearings. In view of the essential nature of this hearing and the number of people wishing to testify, I shall try to be precise and brief.

We are here to discuss the subject of PCB's, polychlorinated biphenyls. To residents of Wisconsin and others of the Great Lakes states, this is not a new problem and it is one which we are all striving to solve.

The Secretary and the Board of the Department of Natural Resources have presented us with two choices in this matter: (A), a ban of the discharge of polychlorinated biphenyls, either in pure form or in substance, mixture, products or compounds into state waters or (B), a limit of no more than .005 milligrams per liter of PCB as measured in a 24-hour composite sample, shall be discharged into state waters. I urge you to support a complete ban of the discharge of polychlorinated biphenyls into Wisconsin's waters. After long deliberation, I feel that this is the most expedient way to attack this problem.

Research into the harmful effects of PCB consumption or assimilation has been intensified in recent years due to the increasing awareness of the potential dangers of this toxic group of substances. We in Wisconsin are fortunate to have the advice and assistance of Dr. James Allen, pathologist at the University of Wisconsin, whose research on the effect of PCB's on rhesus monkeys has offered us an invaluable insight into the possible harmful effects these substances would have on humans.

What recent research has offered to us is a further strengthening of the opinion of many federal, Wisconsin and other Great Lakes states' agencies, that PCB's pose a potential long-term hazard to humans. On the federal level, the U.S. Food and Drug Administration has instructed that the maximum allowable concentration be limited to five parts per million. Recent research done by Dr. Allen on animals has shown that a dosage of five parts per million of the PCB's has produced toxic manifestations in a month's time. Lower dosages of PCB's have also been found to produce toxic manifestations.

This, then, leads us to ask what level of PCB concentration in the environment can be viewed as safe for human consumption. The answer to this question is that we just do not know. We do have evidence as to what effects certain levels of contamination have on animals, fish, birds, minks, monkeys, etc., and we have documented evidence of what a large dosage of PCB's can do to humans. This example involved 1,000 Japanese, who in 1969 accidentally ate PCB contaminated rice.

Because PCB's are retained in body fat, the symptoms of the contamination lingered in many for years. Longterm effects of this are still undetermined. Sixteen human deaths were attributed to this PCB poisoning. The babies of two pregnant women were still-born and the babies of nine women showed symptoms of chlorobiphenyl poisoning.

PCB contamination has hit very hard in Wisconsin industry and has the potential to hit harder. Contamination of fish in Lake Michigan, Lake Pepin, in the Green Bay Hatchery and along the Mississippi has laid a further blow to commercial fishing in Wisconsin. In addition to commercial fishing, sport anglers in certain areas have been advised to limit their intake of certain fish to one meal per week. I am sure that we are all aware of the federal and state investment of many millions of dollars to restore the Great Lakes fisheries and its habitat. This dual effort was to determine methods to control lampreys. This involvement was largely successful, but is being undermined by the even greater problem of PCB contamination.

The State of Wisconsin has the largest mink industry in the nation. The effect of PCB's on mink living near Lake Michigan has been documented. The National Waters Quality Laboratory has tested minks which had eaten fish with .6 parts per million of PCB's. These minks failed to reproduce and suffered a mortality rate of 71 percent. The possible long-term and even short-term effects this could have on Wisconsin mink industry could be devastating.

Wisconsin is also affected by PCB contamination of milk. There have been instances of milk contamination from silage which was stored in concrete stave silos. The PCB source was

traced to a sealant used on the inside walls of these silos. PCB's were found to be efficiently transferred from the silage to the cows' milk. The U.S. Department of Agriculture surveyed a number of farms around the country that were using contaminated silos. Levels of PCB residues in milk fat were approximately 10 parts per million. There have been instances in other individual farms of residue levels as high as 28 parts per million. It is interesting to note here that FDA guidelines for maximum PCB residue is equivalent to 2.5 parts per million in milk fat. The U.S. Department of Agriculture views this as a potential danger in farm families who drink milk from their own cows fed on contaminated silage. Potentially, intakes of PCB's for over 15 to 20 years could approximate the level of short-term intakes that caused the serious effects in Japan which I have mentioned.

The Wisconsin Department of Agriculture, the Department of Natural Resources, and the Wisconsin Division of Health, have fully cooperated with the U.S. Food and Drug Administration, the U.S. Environmental Protection Agency and other Great Lakes states in intensifying research into the sources and harmful effects of PCB and in setting tolerance levels. Their combined efforts have been vitally instrumental to determining the possible obliteration of this environmental and human toxic substance.

In 1972, the Monsanto Company sole producer of PCB's in the United States, voluntarily agreed to limit the sale of PCB's to those industries with closed systems. This agreement also limited the use of PCB's in the manufacture of electrical transformers, insulators, small capacitors and similar items.

It was hoped that this action and action taken by the Food and Drug Administration would limit the level of PCB in the environment. According to the U.S. Environmental Protection Agency estimates, PCB levels have risen in many areas and remain the same in others. This is not encouraging, to say the least, and is, in my opinion, a dangerous indication. What I feel the—what I feel the implications of this are is that our past monitoring, testing and control of the use of PCB's has not been strong or effective enough.

We are all aware of what the known PCB sources are and it has been my impression that many people would prefer the discovery of present unknown PCB sources before placing a ban on the use of PCB's. I believe, Mr. Secretary, that this is not the best way to attack this problem.

A ban of this industrial compound would necessitate an intense search into areas where levels of PCB's are either expected or thought to be located. It would greatly increase our knowledge of what PCB sources actually are. It would greatly enhance our efforts towards a total obliteration of this hazardous chemical.

Such a course of action has been urged by the Minnesota Pollution Control Agency and its regional task force, the Upper Great Lakes Committee of the Great Lakes Fishery Commission, and by Nathaniel Reed, assistant secretary of the U.S. Department of the Interior.

Mr. Secretary, I submit to the board today a three part proposal which I feel must be adopted to eliminate the PCB problem.

First, I ask the Department of Natural Resources to ban the discharge of PCB's into Wisconsin waters.

Second, I plan to initiate action on the federal level for an immediate ban on the new production and importation of PCB's and products with a PCB content. In reference to existing supplies of PCB's, I feel that a five-year phase-out of these supplies be enacted.

Third, I feel that it is necessary that an intense study of long-term health implications of the consumption of PCB's be made. This study should include a complete analysis of the nature of the more than 250 different chemical compounds of polychlorinated biphenyls.

The elimination of all source points of PCB contamination, both in Wisconsin and in other parts of the nation is contingent on the adoption of this proposal.

I also think that this board would be interested in knowing of actions taken by other nations of the world regarding the PCB problem. Sweden requires a permit for the manufacture and use of these industrial chemicals. The Canadian government is about to pass a toxic substances act, much stronger than the Toxic Substances Control Act being considered by the U.S. Congress. Japan, an industrial nation similar to the United States, has recently banned the production of PCB and has initiated a phase-out of existing supplies of PCB's, similar to what I have proposed.

The action I call for—a ban on the use, manufacture and importation of polychlorinated biphenyls—is not an unprecedented act. It will be, I firmly believe, to the benefit of the citizens of Wisconsin and of the United States.

Thank you, Mr. Secretary and the board for allowing me this opportunity to express my views.

EXAMINER: Do you have a copy of that statement, sir?

Thank you.

Mr. Donald Bach. Are you ready for your presentation, sir?

MR. BACH: I am attorney Donald L. Bach of the law firm DeWitt, McAndrews and Porter of Madison, Wisconsin. I appear today on behalf of the Wisconsin Paper Council, trade association for the pulp and paper industry within Wisconsin. There are 49 pulp and paper mills within Wisconsin operated by 34 major companies, with a total of 148 other associated plants, including converters and distributors, which are additionally located in Wisconsin. The pulp and paper industry employs 46,000 people, who produce an excess of five million tons of pulp and paper products annually. The total payroll for these persons is approximately \$410 million on which personal income taxes of \$6.5 million are paid.

The Wisconsin paper industry itself pays annual taxes to local, state and federal governments of approximately \$55 million. Wisconsin manufactures more than 11 percent of the total production of pulp and paper products in the United States and is the number one paper-producing state in the country. Although the paper industry is obviously extremely critical one to the state, it is not normal for the lay person or even many technical experts to know a great deal about its manufacturing processes. A number of elements are essential to the paper industry, among them being high concentration of capital investment, skilled labor, sufficient amounts of self generated or purchased energy, water and, needless to say, cellulose in the form of either wood pulp or waste paper. Most paper is made from the fiber of trees harvested from scientifically managed forests of which, within Wisconsin, more than 1.4 million acres are owned by the paper industry and managed under professional management plans. To date, more than 130 million trees have been reforested in the State of Wisconsin by the paper industry and on a current basis, an average of approximately two and a half million trees are being additionally planted every year.

Wisconsin, however, is not only the leading state in paper making, but also the number one state in paper recycling. At least 19 Wisconsin paper firms recycle fibers to some extent and several firms make a specialty of it, producing papers widely known for their adaptability and strength. A fifth of Wisconsin's annual paper production, about 780,000 tons, is made from recycled, post-consumer wastes. Recycled paper distributed from Wisconsin throughout the nation includes such things as paperboard, corrugated boxes, cones, folding cartons, industrial wrappers, solid fiber boxes, napkins, tray covers, roll stock, toweling, tissues, test liner, container chip board and a wide range of fine writing, printing, business and office papers.

Some Wisconsin paper makers have been producing recycled paper and paperboard since the turn of the century. As a result of such recycling, wood fiber resources and the use of residue from the manufacture of other wood products such as lumber and plywood are being extended each year. It is estimated that wood chips, slabs, edging, sawdust and the like provide 25 percent of all the wood used to make pulp.

We face a paper and fiber crisis in this country, although assuming that adequate forests are made available for the harvesting of timber, there is no immediate danger that the nation will run short of trees. This begs the point, however, that the nation is fast running out of solid waste disposal sites and continually overconsuming its natural resources, although, fortunately our forests are unique in that they are renewable resources.

It should be noted that paper products are at least 40 percent of the nation's solid waste, with garbage composing only 24 percent, metal 10 percent, glass 12 percent and miscellaneous items 14 percent. Since paper is approaching half of the waste bulk, recycling obviously is a technique with great environmental as well as economic potential. New York City alone spends \$6 million annually to dispose outdated issues of the *New York Times*. The unfortunate thing is that currently only 22 percent of the nation's paper is being recycled as compared to 40 percent during World War II in the United States and as compared to 40 percent today in Japan and West Germany, the two highest recycling nations in the world.

Now, should recycling be encouraged? The answer is obvious. It must be encouraged. Reading from Governor Lucey's charge to the recycling task force appointed by him in July, 1971, I quote as follows: "The ever-increasing demands upon the supply of our natural resources demonstrates the necessity for reuse of our waste materials. We cannot continue to simply dispose of society's wastes without jeopardizing our entire future. The present methods of solid waste disposal, such as landfill and incineration, pose a threat not only to our supply of natural resources, but also to our air, land and water. The shortage of land around our urban centers and the increasing levels of air pollutants leaves society no choice but to recycle our solid

wastes. If the present rate of increase and use of natural resources continues without regard for recycling, we may face a shortage of natural resources."

The report of the Governor's Recycling Task Force on solid waste issues and issued in 1972 in February, contained on page 26, the following statement: "It is appropriate to the task force charge to strengthen the traditional role of the Wisconsin industry in pulp and paper manufacture. Therefore, it is suggested that a singular opportunity exists here and now for expanding the base of paper manufacture by using essentially recycled fibers."

The same report on page 15, notes that in fourteen counties, that we are producing 200 tons—202 tons of waste newsprint per day, 101 tons of waste magazines daily, 101 tons of waste corrugated paper daily, over a thousand tons of mixed paper and other types of corrugated paper daily and 368 tons of wood daily. These are significant amounts. They are shameful amounts. There are volumes and amounts that America and Wisconsin recycling industries are dealing with, and in case of some of Wisconsin's paper companies, they have been dealing with since the very beginning of the 20th century.

What has Wisconsin as a state, in addition to its paper industry, done about it? Governor Lucey in June of 1974 signed Chapter 305, Laws of 1973, creating the Wisconsin Solid Waste Recycling Authority. This was a law strongly supported by the Wisconsin Paper Council, even though it did not directly affect the economic interests of its members. In that law, the Legislature clearly declared that the people of Wisconsin have a right to clean and wholesome environment and that prevailing solid waste disposal practices, i.e., landfilling, burning and the like throughout the state result in an unnecessary environmental damage, waste valuable land and other resources and constitute a continuing hazard to the health and welfare of Wisconsin citizens.

Manufacturing any product is not a clean, tidy process. Generally it is noisy; usually it is dirty and normally work with large machinery is involved. It normally takes skilled labor of which Wisconsin is fortunate to have an ample and sufficient supply. The point being, however, that in the manufacturing process, certain natural resources are consumed and related by-products are discharged or emitted as part of the process themselves.

Recognizing this impact on the environment on which it depends, the Wisconsin paper industry had expended prior to 1975 approximately \$126 million on water pollution abatement equipment. It is the estimate of the industry that within the next five years an additional \$153 million, at a minimum, will be expended for a total investment of approximately \$280 million for water pollution abatement equipment alone, not one cent of which is attributable to production equipment. In 1953 an average of 218 pounds of BOD per ton escaped to Wisconsin rivers from the paper mills. In 1972, this figure had been reduced to 65 pounds per ton, with the ultimate figure expected to be reduced even further. This is doubly remarkable when one considers that pulping can produce up to 700 pounds of BOD per ton of pulp produced and that the paper industry in 1953 was producing only 2.8 million tons of paper and paper products per year, whereas in 1972 its production had increased to almost 4 million tons annually. The removal of suspended solids from effluent also showed a marked decline between 1953 and 1972—from 92 pounds per ton to 39 pounds per ton, with the ultimate amount to decline even further in the future.

As to air pollution, prior to 1975 the Wisconsin paper industry had invested approximately \$34 million in air pollution abatement equipment and anticipates that between 1975 and 1980 it will invest at a minimum, an additional sum in excess of \$60 million. In rough figures, therefore, the paper industry in Wisconsin alone will have spent by 1980 approximately \$375 million for air and water pollution abatement equipment, approximately \$8,200 per employee on what is very environmentally necessary, but is unproductive by itself.

Now, on the issue of polychlorinated biphenyls, by this time in the testimony, I think I need spend a little time in identifying PCB's or their historical uses. I do wish to point out, however, that for an extended period of time, these substances have been used, particularly within the electrical industry. For example, for purposes that have been deemed and are still deemed to be socially acceptable and beneficial in terms of their ability to reduce explosion and fire and to protect human life and human welfare. One of the many varied uses of PCB's prior to 1971 had been in the carbonless copy paper, which has accumulated in the files of many businesses and numerous governmental agencies and have stayed there for some time, but from time to time, also gets sorted out and become part of the solid waste chain.

It has been only relatively recently that attention has been drawn to PCB's because of their widespread distribution in the environment. As a matter of fact, many commentators have referred to the fact that PCB's have become ubiquitous and that even a total cessation of manufacturing and the use of PCB's would not result in the rapid disappearance of the material, i.e., ultimate disappearance from the environment will take many years

regardless of any total ban, even if a total ban were desirable, which it is most emphatically not desirable.

At this point I wish to make very clear what should be obvious at this time. Waste paper collectors and recyclers do not manufacture PCB's, nor do they use them in their manufacturing process. However, to the extent that certain transformers and capacitors on their premises may or may not have PCB fluids in them, such materials might be on their premises. Further, to the extent that recycled waste paper does contain traces of PCB's, this contaminate is introduced into the industrial system and becomes part of the industrial waste discharge of the paper waste recycling facilities.

At this point, several very critical issues must be noted by the Wisconsin Department of Natural Resources, namely: One, quoting from the May, 1972 report of the inter-departmental Task Force on PCB's entitled PCB's and the Environment, I quote, "...more scientific information about PCB's is needed. Only general statements can be made about how PCB's reach the environment, how they reach target organisms and how much is present." We could not more fully concur with this analysis of the scientific level of knowledge or lack thereof about PCB's, nor more fully offer our assistance as an industry to cooperate with the government to achieve an effective system for assessing and controlling PCB's.

Two, you must understand that a very small portion of the total amount of PCB's manufactured domestically by Monsanto were used for carbonless paper, which is the chief assumed source by which wastepaper contains the PCB contaminant. Aroclor 1242 by weight containing relatively lower amounts of chlorine than other domestically produced and sold PCB's, was used in the production of carbonless paper. Between 1958 and 1971, at which time the use of PCB's in the manufacture of carbonless paper was ceased. Approximately 47.8 percent of Monsanto's PCB production was of Aroclor 1242. However, of its entire domestically sold production during those years, a little over 21 percent was used for plasticizer applications. Plasticizer applications include not only use for carbonless paper, but also for adhesive, textile and other surface coatings, inks, investment casting wax and sealants. Therefore, we know that something considerably less than 10 percent of Monsanto's total PCB production between 1958 and 1971 was used in the manufacture of carbonless paper, all of it being Aroclor 1242.

Three, to be emphasized repeatedly, since 1971 no PCB's of any kind have been used to manufacture carbonless paper.

Four, Aroclor 1242 used in the manufacture of carbonless paper has significantly different structural constituent characteristics, whereby its stability and persistence are less and its degradability appears to be significantly higher than its comparatively more highly chlorinated Aroclor relatives.

Five, based on studies reviewed by us, it is not Aroclor 1242, the carbonless paper Aroclor which has commonly been found in large concentrations in commercial fish.

All of the above can be restated concisely as follows: Only a small portion of total PCB domestically produced were utilized for purposes of manufacturing carbonless paper and as to those particular Aroclors, they are relatively less stable and persistent, appear to be more degradable and are less susceptible to accumulation in fish than are their related, more highly chlorinated Aroclors.

As a result, the impact of the waste paper recycling industry on the issue of PCB's, when taken in this light, is substantially put into a more proper and positive perspective.

As to the proposed DNR regulations, many studies have been published and many articles written relating to the existence of PCB's in the environment. The presence of PCB's in the environment, however, should not be assumed to imply a negative effect. In fact, including --again quoting from PCB's and the Environment, on page 17 it states. "At the levels in which they are found, PCB's do not appear to present an imminent hazard." Again, based on studies reviewed by us, we have seen no conclusive published report relating to the death of any wildlife species because of the presence of PCB's. The only reported mortalities have been those achieved in laboratory experiments. Most of those laboratory studies related to the higher chlorinated, more persistent PCB's, while most, if not all of the effluents proposed to be regulated, contained primarily the lower chlorinated, less persistent type.

No one can deny that the proposed DNR regulations are aimed most directly at the waste paper recycling industry in Wisconsin. Based on appearance, very little thought went into the drafting of these regulations and, in fact, they would appear not to represent the approach recommended by the DNR staff which is, presumably, more qualified than many lay persons, whether on the Board of the Department of Natural Resources or not, to make judgements of a technical nature. The adoption of either proposed regulation would be an economic catastrophe for the paper industry in Wisconsin.

Being concerned about the environment and attempting to do something about it are responsible goals and actions. As I have pointed out, the paper industry has been the leader in both areas in the past and will continue to do so in the future. However, I must comment that the suggestion of these so-called alternative regulations, with the full force and effect of the prestige of the Environmental Quality Committee of the Department of Natural Resources Board can be classified as approaching the irresponsible. Quote, "current scientific knowledge gained from laboratory animal experiments is often inadequate to allow reliable interpretation of the data in terms of possible effects on man. The scientific basis for interpreting such tests must be improved. The situation regarding PCB's is not significantly different from the problems of other toxic substances which cause concern when they come in contact with man, his food and his environment. Certainly continued vigilance on the part of the governmental agencies, industry, universities and many other agencies, both within and outside the government will be necessary to achieve an effective system for assessing and controlling the hazards of toxic substances, including PCB's." That's also from the report entitled PCB's and the Environment.

At this point we think there are several issues that the DNR should answer in the very near future. What is the toxic level of concentration and the degree of exposure necessary to achieve either mortality or an imminent hazard to health, to humans or wildlife?

What is the background level of PCB's in Wisconsin waters?

What Aroclors constitute these background levels?

In the fish being tested in Lake Michigan, Lake Superior and Lake Pepin and in various Wisconsin rivers, what Aroclors are being detected?

What is the background level of Aroclor 1242 in the waters most suspected of contamination by the Department?

Is it not true that Aroclor 1242 is more degradable and less persistent in the environment than its more highly chlorinated relatives?

Under what provisions of the Wisconsin Statutes do you propose to ban the discharge of PCB's?

Do you propose, whether or not you are required to do so pursuant to Wisconsin Statutes 1.11, to issue an environmental and economic impact statement prior to your promulgation of any PCB ban?

An ancillary problem that I'm sure the DNR staff has contemplated is the alternative methods of dealing with PCB's. Obviously burning contaminated waste paper is not the solution because unless such burning is done at extremely high temperatures and is in excess of 2,000 degrees Fahrenheit and in extremely efficient incinerators, the PCB's will simply be emitted to the atmosphere, to once again fall on land or into the water. Likewise, landfilling is not the solution because of the quantities of waste paper involved, thereby necessitating more landfills. Again using the material from the Interdepartmental Task Force Report on PCB's issued in May of 1972, it has been estimated that the total injection of PCB's into the American environment between the years 1932 and 1972 was approximately 30,000 tons in the atmosphere, 60,000 tons in the water and 300,000 tons to the landfill. Out of this total, remaining residues in 1972 were calculated to be approximately 20,000 tons in the air, which would be ultimately redistributed on either land or in water, 30,000 tons in water and approximately 200,000 tons in dumps. The conclusion is obvious, that PCB's in water are degrading more quickly than those emitted into the air or placed in the land.

I think it is time for us to recognize that we all know less than we would like to know about PCB's. Because of their persistence and because of uncertainties about their impact, the new production of this substance has all but been eliminated and is now used for only very specific and limited purposes. An inventory must be made of where PCB's are coming from, the type of Aroclors that are being discharged, emitted and landfilled, the best methods of decreasing these discharges, emissions and landfillings and to put some proper perspective on the existence of this substance in our environment. In the last legislative session alone, Senate Bill 339 and Assembly Bill 463 were introduced and would have required the state to purchase paper with a certain specified amount of recycled fiber in it. In addition, if you will view the current letterhead stationery of the Wisconsin Department of Natural Resources, you will note that it says on the bottom: "This is 100 percent recycled paper". If you will look further at the notice for board meetings of the Wisconsin Department of Natural Resources, you will likewise note the statement that "This is 100 percent recycled paper". Ladies and gentlemen, you are promoting the use of recycling. And we thank you for that. You are also promoting the disposal of PCB's. Let us take a reasonable approach to this problem together.

We appeal to you for reason. Let us admit together that we do not know enough

at least at this point to take a stand such as proposing these ill thought out proposals. The result would be an economic catastrophe for a significant portion of Wisconsin's paper industry. The commitment of this industry is to Wisconsin and its environmentally pure future. It has invested and will invest over \$300 million dollars prior to 1980 to accomplish this goal. It further has a goal common with Governor Lucey to decrease landfill sites and to recycle to the maximum solid wastes so as to preserve our natural resources and to beautify our state. It is indeed unfortunate that more reasonable and more well thought out proposals for regulations have not been brought forth so that some kind of an attempt could have been made even at this point of the hearings to work out some kind of meaningful regulations. We only hope, after the review of the entire hearing record, with written material to be submitted subsequent to the oral testimony that realistic, reasonable, feasible and responsible regulations will be proposed by the Department of Natural Resources, which will bolster its reputation as a defender of the environment, while at the same time, not place it in a position of ridicule because it has suggested regulations so badly researched that they have become negotiable prior to the time they are published for hearing.

Thank you.

EXAMINER: Thank you, sir. Do you have a copy of that?

MR. BACH: Yes, I do.

EXAMINER: Thank you.

Mr. George Reinbacher?

MR. REINBACHER: My name is George Reinbacher. I'm director of manufacturing for the Absorbent Products Division of Brown Company and the manager of its operations at the mill in Eau Claire, Wisconsin.

The mill at Eau Claire employs approximately 700 people and has an annual payroll in excess of \$7 million. We pay over \$100,000 annually in property taxes and are one of the major industrial employers in the Eau Claire area. During the past two years, we have spent almost two million dollars to reduce stream pollution and estimate that a similar amount will be spent during the next two years to complete the secondary wastewater treatment plant.

Our primary raw material, the secondary fiber or waste paper, which is shipped to us from all over the country. Annually over 70,000 tons of this material is repulped, cleaned and manufactured into usable sanitary products. Use of waste paper permits us to compete economically and also provides us with usable furnish when so-called virgin pulp is not available.

The problem of identifying and sorting waste paper is unique in that generally speaking, 1,700 to 2,000 pounds of various types of paper that we use are generally shredded and baled together in 72-inch bales. The material comes from printers, office buildings, department stores and recently, from municipal and private recycling centers. There is no practical way of sorting and identifying random PCB contaminated paper. Brown Company does not deliberately buy or use PCB in its productive processes. Nevertheless, the company is concerned that the proposed regulations will introduce an extremely serious problem in any paper mill using recycled paper.

Our industry is caught in a situation which is not of our making and over which we have little practical control. The whole concept of recycling waste paper is at stake. We firmly believe that where recycled paper is involved, the regulations must recognize the temporary nature of the problem, the low concentration of contaminants that is involved and the impracticality of identification and segregation of raw materials. Otherwise the whole concept of paper reuse must be reconsidered and greatly curtailed, which could result in economic disaster to the Eau Claire mill, as well as others using waste paper furnaces.

Thank you.

EXAMINER: Thank you very much, sir.

Thank you.

Is Mr. Patrick Morris present?

Mr. Richard Wand?

MR. WAND: My name is Richard Wand and I am the administrative vice-president of Bergstrom Paper Company. I am responsible for supervising and coordinate all staff activities of the company and I direct corporate efforts in the area of environmental management.

The Bergstrom Paper Company is a manufacturer of fine printing and writing papers and since our founding in 1904, we have been recycling waste paper to make our products. We own no timberlands and rely on waste paper for approximately 65 percent of our total fiber raw material requirements. Many of our products are produced from 100 percent recycled waste paper and we are the nation's leading producer of printing and writing papers from secondary fiber.

We have manufacturing facilities in Neenah; where we employ about 570 persons and until April of this year we also operated our mill in West Carrollton, Ohio, where we employed approximately 575 people. Economic conditions, resulting in declining paper markets, forced us to close our Ohio operation this spring. All but ten of our Ohio personnel have been terminated or placed on layoff and three paper machines with a daily capacity in excess of 400 tons of paper have been idled for an indefinite period of time, pending improved market conditions.

In 1974 and prior to closing our Ohio plant, Bergstrom produced 225,000 tons of finished paper and recycled 141,000 tons of waste paper. This averages 18 truckloads and 8 rail cars of waste paper each day for 350 days a year.

In Neenah we have an annual payroll of approximately \$7.5 million and we annually expend another almost \$2 million for fringe benefits. In 1974 we paid Neenah real estate and personal property taxes in excess of \$220,000.

Since 1952, when we installed one of the first wastewater treatment systems in the paper industry, our company has spent in excess of \$4.5 million on pollution abatement facilities. Plans for an additional \$3.2 million secondary wastewater treatment system for our Neenah mill are currently being reviewed by the Department of Natural Resources.

I give this background information by way of demonstrating our company's economic importance to the State of Wisconsin, to suggest our 70-year commitment to the cause of recycling, and to reiterate our concerns for protecting the environment.

In spite of the fact that recycling has been practiced since before the turn of the century, an alarming fact remains that the rate of recycling is actually declining in this nation. According to recent EPA figures, this country is recycling only about four percent of its textiles, 13 percent of its zinc, 18 percent of its aluminum and only 19 percent of its waste paper. This waste paper rate compares to a World War II rate of 27 to 30 percent.

Recently environmentalists have been among the strongest supporters of the concept of resource recovery, that is, recycling because it makes good common sense to tap our massive solid waste stream to recover materials which can be utilized at their highest economic value. Recycling saves tremendous amounts of energy. It greatly reduces the need to burn or bury solid waste, which now costs our municipalities a national average of \$26 for each ton. It promotes the conservation of our precious raw materials and it makes us less dependent, therefore, on foreign cartels and it results in substantially reduced air, water or solid waste pollution.

And yet we now face a proposed rule to totally ban the discharge of polychlorinated biphenyls, PCB's, into the environment. That, very simply, will put virtually all paper recyclers out of the recycling business and both the proposed zero discharge rule or the proposed rule to limit PCB discharges to .005 of a milligram per liter or five parts per billion, which, as a practical matter, constitutes a total ban, could well put the Bergstrom paper company out of business.

Allow me to elaborate on this. The Bergstrom Paper Company has never, to my knowledge, purchased PCB's for use in our production processes from Monsanto or from any other foreign or domestic supplier. PCB's are not and they never have been an additive to Bergstrom paper products.

In May of 1974, Bergstrom Paper Company cooperated with the Industrial Wastewater Section of the DNR in a survey of all of our mill conditions and wastewater characteristics as they related to the monitoring and reporting requirements of our NPDES permit. In analyzing a composite sample from our main outfall for PCB's, the Department found a discharge level of .0185 parts per million. It was assumed that the source of the PCB's was carbonless waste paper and our company assisted the Department by sending samples of such waste paper to the State Lab for testing.

In March of 1975, we were advised that the DNR had conducted additional sample tests on our effluent in February of 1975. The Department then requested that we first analyze our general types of waste paper process to identify the specific source of PCB's and to determine if it is practicable to significantly reduce the discharge of PCB's by eliminating certain kinds of wastepaper. And secondly to determine if leaking heat exchange fluids or hydraulic fluids could be a source of PCB discharge.

At considerable expense to the company, we complied with the Department request and conducted extensive tests on 14 wastepaper samples and on our hydraulic fluid. No PCB's were detected in the hydraulic fluids and the Department has been provided with the results of the paper sample tests. The important fact is that all 14 wastepaper sample tests showed some traces of either Aroclor 1242 or Aroclor 1254, ranging from less than .1 of a part per million to 3.6 parts per million. The vast majority of the PCB's detected in the wastepaper were of the Aroclor 1242 variety, which was the only Aroclor known to be used in the production of carbonless paper. We are advised that PCB's have not been used in the production of such carbonless papers since early 1971.

We are also advised by the Institute of Paper Chemistry that in order to detect PCB's in wastepaper samples at less than 500 parts per billion for Aroclor 1242 or 100 parts per billion for Aroclor 1254, which are the current limits of detectability, we would have to test massive quantities of wastepaper in order to arrive at a concentration level in which the minute quantities of PCB's could be identified and counted. Indeed, this lack of technical capability to accurately measure, much less continually monitor the PCB's in both the wastepaper we consume and in our effluent, would suggest to us that there is no known way to enforce either proposed rule short of closing all recycling operations.

In order to identify and eliminate those grades of wastepaper which currently show PCB contamination at mere detection levels, we would face both enormously expensive and physically impractical, if not impossible, processes. Few laboratories are even equipped to take on such a sampling or monitoring project on a regular basis.

The point we're trying to make is this. PCB's did exist—do exist in the environment today. Through the voluntary efforts of the manufacturer, Monsanto, and those utilizing the product, current consumption is limited to closed systems which minimize the entry of more PCB's into the environment. By placing a restriction on the discharge of PCB's, not necessarily by the manufacturer or by his customers, but by those recycling companies who find themselves inadvertently obtaining PCB's in their wastepaper, will result in catastrophic damage to our business and to the cause of recycling.

In the past few years, a number of programs have been implemented to separate materials from the solid waste stream. The proposed rules would be devastating to such efforts. For example, we recycle sorted office waste which comes to us as a result of a major office waste recycling program, which includes among its participants governmental agencies of the State of Wisconsin. From time to time, old carbonless papers from office files find their way into this program. A ban on PCB's would very simply put an end to the program. The Wisconsin Solid Waste Recycling Authority will face a similar problem in dealing with residual materials from a variety of establishments.

Representative Aspin has earlier suggested three approaches to the problem. We concur that additional health studies are necessary and we certainly concur with a ban on the import of PCB's. But with respect to his suggestion of a total ban on discharge of PCB's in effluent, which after all, is the subject of this hearing, we must point out that this is only possible through the termination of recycling operations.

We believe that there is no recycling mill in the country which could consistently meet a zero PCB discharge level, no matter how careful it might be in attempting to isolate old carbonless papers, since PCB's are a pervasive background component in a variety of wastepaper grades. The Bergstrom Paper Company, 50 percent of whose wastepaper exceeds the limits of PCB detectability, would be forced out of recycling were the Department to impose either of the proposed rules. Since we have no guaranteed backup supply of virgin pulp, we sincerely fear that a halt to our recycling would force us to go out of business altogether. The additional cost of purchasing virgin pulp would force such a major increase in the price of our products merely to cover this added expense that we could no longer compete in the paper markets.

Our objections to the proposed rules can be summarized as follows: Regarding both alternative rules, no. 1 and no. 2, your own Department staff at the June meeting of the board alluded to the finding of PCB's in melting snow, which illustrates the problems of achieving a zero discharge. To the best of our knowledge, there is no technological method for achieving a zero discharge of this possible contaminant and we believe a five part per billion limitation to be tantamount to zero discharge in view of current measuring technology and techniques.

Furthermore, we must respectfully suggest that there are a number of other issues which must be resolved before any PCB regulation should be considered. First, there is no physically practical or economically feasible method for continuously testing either wastepaper samples or effluent to insure either a limitation on any PCB contaminated wastepaper used in our production or consistent compliance with the discharge limitations being proposed.

Secondly, there is no evidence that restricting the discharge of PCB's will substantially reduce the number of PCB's currently in the environment since solid wastes currently being recycled would have to be disposed of either through landfill or incineration. In neither process is there a destruction of the chemical compound.

Thirdly, there is no substantial body of scientific knowledge to demonstrate that the ingestion of minute quantities of PCB's is harmful to human life, to the best of our knowledge. Indeed, we know a few laboratory experiments to assess toxicity in which Aroclor 1242, which is the one found in old, carbonless paper, has even been the test medium.

Fourthly, there is no evidence known by us which would suggest that Aroclor 1242 found in our effluent is the same Aroclor found to accumulate in the fatty tissues of fish, fowl or other wildlife. Indeed, though it has been documented that Aroclor 1242 was the most plentiful Aroclor produced by Monsanto, few traces of this variety are being found in the environment.

It is apparent from the testimony gathered at these hearings that legitimate questions of concern have been raised about PCB's. It is also apparent, I think, that we have great gaps in our knowledge about the effect, the degradability, and the economics of eliminating PCB's. We believe that it would be unconscionable for the Department to promulgate these proposed rules without better documentation, to show that the proposed discharge limitations are necessary; that they are attainable and that they are of sufficient benefit to merit halting recycling in the State of Wisconsin.

Since being alerted to the possible problem of PCB's, we at Bergstrom have attempted to cooperate with the Department of Natural Resources to the fullest. In our independent research, we have discovered that the only thing everybody seems to agree on regarding PCB's is that nobody really knows that much about them. Authorities are split on questions of toxicity. Experts disagree on safe alternative products. Scientists have divergent views on questions of PCB stability and degradability.

If there is a problem, those of us in recycling will do our share to find reasonable solutions to the problem. But a hasty, ill-conceived decision to promulgate either the proposed rules will raise economic havoc with an entire recycling industry, which, by its very nature, is one of the most environmentally considerate industries in the state. We strongly urge rejection of these proposals and the creation of an unbiased task force to review and research the PCB situation and the adoption of reasonable regulations if it is shown that regulation is necessary to protect the people of Wisconsin.

Thank you.

EXAMINER: Thank you, sir. Can you provide me with a copy of that statement?

MR. WAND: Yes.

EXAMINER: Thank you very much.

Mr. William Dryer.

MR. DRYER: My name is William Dryer and I am director of research and development for the Flambeau Paper Company. The Flambeau Paper Company is a semi-integrated sulfite mill and paper mill located at Park Falls in Price County. Flambeau employs 525 people and has an annual payroll of \$5,800,000. We purchase about 90,000 cords of wood each year from our Wisconsin or local loggers at a cost of about \$2,700,000. We pay \$4,100,000 in federal taxes; \$600,000 in state taxes and \$136,000 or about 25 percent of the City of Park Falls taxes each year. We operate in a part of Wisconsin which is considered to be a depressed area.

We produce pulp using the calcium base sulfite process. Our paper machines manufacture bonds, duplicators, mimeograph, Xerocopy, envelope, offset, manifold, register bond and many specialties. Since we are not able to produce all of the fiber required by our paper machines, we are known as a semi-integrated mill. We must purchase some kraft pulp, which is produced by the sulfate process and is the most readily available source of virgin market fibers. We also buy wastepapers to keep our paper machines operating.

During normal times, our purchased wastepaper consists of envelope clippings and other unprinted wastepaper. However, when market pulp is scarce, we will purchase other types of wastepaper and keep our paper machines running.

One other item I would like to explain is "broke". This is the name given to spoiled paper in paper mills and finishing rooms. It is generated by any number of causes during the

processing and packaging operation. If it is not contaminated, it is usually repulped and the fibers returned to the papermaking process.

The proposed Administrative Code provisions to prohibit or severely limit the discharge of polychlorinated biphenyls, if adopted in their present form, will have devastating effects on all paper companies in the State of Wisconsin which are not completely integrated. I would like to cite our company as a case in point.

While our sulfite mill has the capacity to produce about 125 and a half tons of pulp each day, our paper machines can use in excess of 290 tons of fiber during the same period of time. During normal times the difference is made up by using purchased kraft, our paper machine broke and our finishing room broke and purchased wastepaper.

Early in 1974, at a meeting of the Swedish Pulp and Paper Mission held in Chicago, we were told that Europe would soon be in importing rather than exporting pulp. The same set of conditions exist in the United States. We are expanding our papermaking capacity much—at a much faster rate than we are expanding our ability to produce pulp. During the summer and fall of 1974 when the demand for paper was high, Flambeau was unable to purchase enough kraft to fill its requirements. Even by buying all the wastepaper we could obtain, we still were unable to secure enough fiber to operate all of our paper machines continuously so that we could fill all of the orders for paper.

On December 3, 1974, we took our effluent samples from our outfalls and had them analyzed by a consulting laboratory for 24 chemicals, including polychlorinated biphenyls. To my surprise, our effluent contained 2.3 parts per billion of PCB's. My feeling was that our consulting laboratory had erred in their testing. After learning more about the nature of PCB's, I now feel that this test was correct even though we did not knowingly use any pre-1972 no carbon reproduction paper in our furnish.

PCB's will tend to stay with the fibers or particulate matter. Commercially there is no way of telling which broke contains PCB's and which does not, unless you can trace the origin of the paper back to its furnish. If broke was used in that furnish, then the origin of that broke must be traced back also. Probably some of the wastepaper we used when kraft was in short supply, was made from furnish containing some pre-1972 no carbon reproduction paper. Now some of the paper made by our company during the last three-quarters of 1974 contains PCB's. We know that part of what was made on December 3rd did.

If alternative 1 is adopted, I would have to advise our company to dispose of all our purchased wastepaper and all of our finishing room broke to paper mill—to paper mills in other states. We could no longer use purchased wastepaper in our furnish and we could use none of our finishing room broke until we were certain that it was manufactured only from virgin fibers. Our mill would never again run at 100 percent capacity, for during the times of recession we would not have orders to run at full production and during the times when the demand for paper is high, we would not be able to purchase enough virgin fiber to fill our needs. By having to use all virgin fiber, our furnish costs would raise and we would no longer be competitive with mills in other states.

If alternative 2 is adopted, we would try to operate as we did during the last three-quarters of 1974. We would not use office wastepaper, nor would we use NCR no carbon reproduction paper. Our purchased wastepaper sorting costs would increase and since other mills would have to use the same type of purchased broke as we are now using, we probably will have to find ourselves having to shut our paper machines down at times for lack of fiber.

The paper industry does not knowingly add PCB's to its products. The PCB's added prior to 1972 will decompose with time. Recycling of wastepaper will not increase the amount of PCB's in the environment. PCB's are concentrated in pre-1972 no carbon reproduction paper. Both the federal and state governments are large users of this type of paper. At present, the Department of Natural Resources discharge monitoring report form is printed on no carbon reproduction paper. Sooner or later these completed forms will have to be disposed of. Now is the time for government to find out which of their forms are contaminated with PCB's and which are not. Contaminated forms should be segregated and disposed of in a sanitary landfill. Forms free of PCB's should be certified as such and recycled. This would do more for reducing PCB's in our water and air than either alternative 1 or 2 and at the same time it will conserve our natural resources.

Thank you.

EXAMINER: Thank you, sir. Could I have a copy of that?

Is Mr. Lorman here? Mr. Milt Lorman?

Is there any other individuals representing the Wisconsin Paper Council present to give any kind of testimony?

Mr. Richard Rollins. Would you like to make a statement sir?

MR. ROLLINS: Thank you, Mr. Christenson. My name is Richard Rollins. I'm here on the behalf of the Electronic Industries Association, the EIA.

The EIA is a national association for the manufacture of electronic components and equipment. I speak on behalf of that body today and represent 14 companies that operate 16 plants for the manufacture of capacitors in this country. None of these plants is located in Wisconsin.

I would bring a few statements—a few questions in regards to what are capacitors and transformers and where they're used and we begin with capacitors and transformers are devices to store, control and direct the flow of electrical power efficiently and economically. PCB's are used as an insulating fluid in these devices. PCB filled capacitors are found, among other places, in outdoor lighting, fluorescent lighting, air conditioning and television receivers. PCB filled transformers are found, among other places, in railroad cars, apartment houses, large office buildings, industrial plants and utility substations.

The primary reason for the use of PCB's in capacitors and transformers is their quality of nonflammability. While certain present alternatives do have other needed characteristics, no present alternative provides the nonflammability demanded by our customers and by due regard for public safety.

Governmental agencies have recognized the need for the continued use of PCB's in restricted circumstances, namely sealed electrical applications. In 1972 the Food and Drug Administration exempted the safe use of PCB's in electrical capacitors and transformers from the requirement that PCB's no longer be permitted in food-related establishments. That's in the 38 Federal Register, 18096. In 1972, also, a Federal Interdepartmental Task Force found that continued use of PCB's in transformers and capacitors was necessary because of the significantly increased risk of fire and explosion and the disruption of electrical service which would result from a ban on PCB use. That is under the Federal Report No. IIF-PCB-72-1.

While recognizing the need for continued use of PCB's in electrical applications, one may not ignore the need for strict control over the discharge of PCB's. Thus, our membership has implemented controls resulting in a total daily discharge of less than 11 pounds, that is less than two gallons, and that represents .014 percent of the 79,000 pounds used daily.

Our handling and disposal practices are in accordance with the guidelines established by the American National Standards Institute, C107.1-1974.

Thank you.

EXAMINER: Thank you very much, sir.

Mr. E. P. Tilson. Would you have a statement?

Please identify yourself and who you represent.

MR. TILSON: My name is Edward Tilson and I'm an engineer-in-training, actually my PE license is pending review.

I represent, today at least, the Water Resources Center at University of Wisconsin. And this is a letter that the center has sent to this—to the attendees of this public hearing on polychlorinated biphenyls.

Dear Participants: This letter will hopefully serve to advise you that we at the center are also presently concerned with polychlorinated biphenyls, most especially as regards the Menomonee River Pilot Watershed Study being sponsored by the International Joint Commission and the U.S. Environmental Protection Agency. This study, centered on the Menomonee River watershed in the Milwaukee area, has PCB's as a selected water quality parameter within group C (organic) as determined on water and sediment samples.

This class of compounds will be a focus consistent with the stated objectives of the study. One, to determine the types and quantities of potential pollutants moving in flow systems toward Lake Michigan. Two, to define sources and characteristics of potential pollution in terms of urban land use and three, to develop a model to facilitate extrapolation of findings to other urban settings. It is, however, to be noted that identification is not so much directed toward individual point sources in this study as toward diffuse origins, that is, the correlation of parameters to land use.

In turn, manufacturing land use would be expanded to industry type according to standard industrial classifications. Further iteration would allow quantification of deviations from the derived calibration-coefficient means by sub-basin. The finding of PCB levels above limits of detection within the study area is perhaps consistent with its heavy industrial character, featuring chemical producers, electrical equipment manufacturers, machinery fabricators and transformer switch yards.

One of our staff is investigating the possibility of in-stream synthesis of PCB's from the waste products of industry present in the watershed. However, since this study is in its initial phase, I will not elaborate except to say that such a source has apparently not been hitherto considered. Certainly the ubiquitousness of this potential origin has much in common with the ubiquitousness of PCB occurrence, most dramatically in snow-melt waters. Yet even should such a mechanism withstand further scrutiny, this could not be construed as likely to exonerate other potential sources.

Hoping that our center's service is useful to you in the future—the signer is most sincerely, John W. Goodrich-Mahoney, specialist, water resources, for the Water Resources Center, University of Wisconsin in Madison.

I'd just sort of like to footnote to that that what could be said of this is that to the extent that some industries are saying that there is a problem of ubiquitousness, it is not to say that this isn't being looked into. And then the second thing might be to say that I was in a program, a graduate program in engineering, economic planning and within that program there tended to be a stress, rather than on money and cash flows, rather instead in terms of social resources. And one of the social resources which is not being properly applied today, the number of biologists and chemists such that when the applications come into Water Resources Center, the credentials are such that people would like to hire two or three of them, but they only have the funds to hire one.

And this certainly is a resource which could be increasingly applied to this problem of PCB's.

EXAMINER: Thank you very much, Mr. Tilson, I appreciate your testimony.

Is there any other person present this afternoon who wishes to make an oral statement at this time?

(No response)

EXAMINER: In that case, I only have—have two questions going to—a decision will be made by the Department with an announcement tomorrow. First of all, by a show of hands, how many persons in the room feel that they may purchase a copy of the transcript or feel they should have a review of the transcript?

Okay. Thank you very much. Now, a related question, as I stated earlier in the introductory remarks this morning. There will be a written comment period regarding the proposed rules and the subject matter of the hearing today. Now, a question has been raised and I believe it's been raised by, as one party, the Wisconsin paper council, as to the appropriateness of commenting after the transcript's been available so they could have a more detailed review of what was said. I'd like to know if there's any other parties who have that—share that same feeling. If there are, also could I have a show of hands of that?

Okay. This will be considered and I will make an announcement tomorrow regarding the comment period and also availability of the transcript. Of course, the transcript is always available for purchase, but the decision is being made now as to whether we'll make it available to all members of the public, at least in limited areas.

For your information, before I adjourn the hearing today, the hearing tomorrow will start at 8:30 in the morning and presently scheduled are four or five gentlemen representing the Environmental Protection Agency or the Office of Toxic Substances. So perhaps many of the questions you have or some information you're looking to can be given tomorrow.

Are there any questions before I adjourn the hearing today?

(No response)

EXAMINER: In that case, the hearing is adjourned 'til tomorrow 'til 8:30. Thank you very much.

(Hearing adjourned)

EXAMINER: Ladies and gentlemen, we're resuming the hearing regarding proposed effluent discharge limitations rules by the Department of Natural Resources.

As in the presentations yesterday, the Department of Natural Resources have asked various people from governmental agencies as well as industry to make presentations on behalf and at the request of this Department. It appears that this morning presentations will be made by representatives of the Environmental Protection Agency and that the presentations will last the bulk of the morning's testimony. This afternoon will be free for public comment and questions may be asked to the U. S. Environmental Protection Agency, although there will be no cross-examination.

With that, I'd like to call Mr. Glenn Schweitzer, who's the director of the Office of Toxic Substances.

MR. SCHWEITZER: A limited number of copies of my presentation will be available after I complete my remarks and particularly for the press.

I greatly appreciate the opportunity to present the views of the Environmental Protection Agency concerning the environmental problems associated with the manufacture, use, distribution and disposal of polychlorinated biphenyls. Since its initial days, the agency has been concerned with practical steps that could be taken to clarify and reduce the environmental risks attendant to commercial applications of PCB's. More recently, the agency has intensified its efforts to help insure that unnecessary hazards are effectively curtailed. Thus, we fully share your concerns and we will continue to work with state governments and other interested organizations in seeking feasible solutions to this problem.

In view of the background papers that are available and the detailed statements being presented by specialists at these hearings, I will confine my remarks to a brief review of the history of the PCB problem, recent developments which have lead to increased concern and the spread of EPA activities directed to PCB's. I will then comment briefly on a few aspects that are of particular concern to the State of Wisconsin.

In May, 1972, the Interdepartmental Task Force concluded that PCB's were highly persistent, could be found in all parts of the environment, could bioaccumulate in fish by a factor of up to 75,000 and could have serious adverse effects on human health. The task force urged discontinuance of all uses of PCB's except uses in closed electrical systems and called for early enactment of the toxic substances control act to provide a needed regulatory mechanism to deal with PCB's and other problems of this type.

Largely, as a result of the activities of the task force, the Monsanto Company, the sole U.S. producer of PCB's at that time, voluntarily limited its sales to manufacturers of closed electrical systems. Also, EPA promptly announced that it would begin restricting the discharges of industrial effluents so that the levels of PCB's in rivers and lakes do not exceed 10 ppt. FDA took steps to establish PCB tolerances for several types of food, ranging from .2 ppm in baby food to 5 ppm in fish and to limit PCB contamination in food packaging and in food plants.

As further followup to the task force recommendations, the General Services Administration amended its procurement specifications to ban PCB's in paper and the Department of Interior prohibited future use of PCB's in off-shore oil operations. The American National Standards Institute issued guidelines for industry on the use, disposal and labeling of PCB's.

Internationally, a decision of the Organization for Economic Cooperation and Development, the OECD, provides that PCB's shall not be used for industrial or commercial purposes except in certain closed systems. However, even in respect to the accepted uses, the OECD council decided that PCB's should be—should only be used when adequate environmental controls are exercised and when benefits outweigh the risks and recommended that countries work toward the elimination of PCB's in small capacitors. This decision leaves it to the member governments to go beyond the council agreements and, in effect, invites governments to phase out PCB uses wherever possible. Japan, in the wake of PCB contamination of rice oil that adversely affected 1,000 people, banned future production or import of PCB's. More recently, the Canadians have begun to collect necessary data for restricting PCB's pursuant to a new Environmental Contaminants Act which should be enacted this year.

Now, turning to recent developments. Recent research results have heightened concern over the toxicity of PCB's previously documented in the report of the Interdepartmental Task Force. Concentrations as low as 2.5 and 5 ppm have produced serious adverse effects in monkeys. I believe you discussed these effects yesterday. A still unpublished report indicates malignant liver tumors in rats exposed to one grade of PCB at levels of 100 ppm. Several reports of chloroacne among workers exposed to PCB's have also been received. Also, concentrations of 5 ppm in fish eggs have resulted in fry mortality.

In considering these effects, it is important to remember that there are eight commercial grades of PCB's and their toxicity characteristics may vary to some degree. However, there is no basis for assuming that any one of the grades is not a potential hazard. As a result of the FDA actions described above, the PCB levels in foods have been steadily declining. At the same time, however, the levels detected in fish and wildlife appear to have increased. Available monitoring data for PCB's in the ambient air, water sediment, soil or human tissues do not provide a good basis for estimating national environmental trends.

For example, analyses of water samples have seldom extended into the parts per trillion range and thus only rarely have PCB's been detected. Limited adipose tissue samples for fiscal year 1972 and 1973 indicate a slight downward trend with levels in excess of 3 ppm being observed. Unusually high levels of PCB's have been detected in recent months in the fish and I needn't tell you this, in Lake Michigan, Lake Pepin, the Hudson River and Southern California. PCB's have been detected in sludge from sewage treatment plants as well as in the effluents from these plants. PCB's have been identified in only two drinking water supplies during the past year. There have been at least five water spills involving PCB leakage from transformers during the past year and currently there are tens of thousands of capacitors, each containing several gallons of PCB's, awaiting disposal.

While Monsanto is believed to be limiting its sales to manufacturers of closed electrical systems, information has been received by EPA indicating that PCB reproprocessors may be selling PCB's for other uses. It is believed that most of the PCB imports, which exceeded 375,000 pound in 1974, are not used in closed electrical systems. Among the PCB uses which are known to persist in the United States at present are applications in investment casting processes, heat exchange fluid and hydraulic fluids. There are a variety of other potential uses of PCB's, although firm evidence of such current use is not in hand.

With regard to substitutes, Dow Chemical has developed a product for use in large power capacitors, and Dow Corning has a product which can substitute for PCB's in certain transformer applications. At least one of these substitutes is reportedly being introduced at the present time in Japan.

Now, turning to recent regulatory actions, in 1973, water quality criteria were proposed to limit PCB's to 2 ppt in ambient waters. Also a national effluent standard for PCB's was proposed under Section 307(a) of the Federal Water Pollution Control Act. PCB's were included in the advanced proposal of a hazardous substances list under Section 311 of the Federal Water Pollution Control Act in 1974. That section relates to spills of hazardous chemicals. Finally, NEDES permits that limit the discharge of PCB's have been issued for at least six facilities. Preliminary reports indicate that approximately 10 to 15 other discharge permits may contain effluent limitations for PCB's. In addition, the effluent guidelines promulgated for the steam electric power generating category contain limitations requiring no discharge of PCB's. A significant percentage of the permits issued for this category to date contain these limitations. And as you know, several states are currently considering imposing limitations on PCB's.

Now, I'd like to identify for you the spread of EPA activities currently in progress directed to PCB's. A water quality criteria level of 1 ppt will soon undergo interagency review prior to final promulgation. The originally proposed level of 2 ppt has been reduced in view of the recent ecological effects data. Detailed documentation necessary to support a national standard for water effluent discharges under Section 307(a) of the Federal Water Pollution Control Act, is being assembled with issuance of a revised national standard scheduled in the near future.

Proposed levels of harmful quantities of PCB's accidentally released into navigable waters and rates of penalties for such spills are currently being developed pursuant to Section 311 of the Federal Water Pollution Control Act.

A laboratory demonstration program is underway to develop and test control technology for treatment of PCB manufacturing wastes, including the aqueous effluent from PCB users and the discharge from leaks from transformers and capacitors.

The scientific literature concerning the health and ecological effects of PCB's is being reviewed. Further, a continuing research program is investigating the metabolism and effects of PCB's. As part of this program, several studies have examined the effects of PCB's in rats after long-term feeding regimes, especially effects on reproduction, liver function, carcinogenesis, and hemoglobin metabolism.

Collection and analysis of adipose tissues are continuing.

Several laboratories have been conducting research on the ecological effects and environmental fate of PCB's.

Studies of the behavior of PCB's in soil, particularly after spills and the likelihood that the PCB's might reach the groundwater, are underway.

Analyses of the technological and the cost aspects of substitutes for PCB's in closed electrical systems have been initiated. Technical assistance is routinely provided on the storage and disposal of PCB-containing wastes. In addition, test burns of capacitors containing such wastes in a high temperature incinerator are planned for 1976.

During the last few weeks, a number of additional activities have been initiated in response to the recent concerns that have been raised over PCB's and I'd like to just itemize those right now.

The National Academy of Sciences has been requested to give special attention to whether a drinking water standard for PCB is needed. Meanwhile, monitoring for PCB's in drinking water supplies is being expanded.

Information concerning the best sampling and analysis techniques for PCB's in different media is being assembled and reviewed to provide guidance to the regions, to the states, to contractors and other interested organizations involved in monitoring.

A limited number of ambient air, water, sediment, soil and fish samples are being collected and analyzed throughout the country. This data, together with existing data, will provide an up-to-date overview of the current levels of environmental contamination of PCB's.

In response to local concerns, several regions will be measuring PCB levels in effluent streams from industrial and municipal sources, receiving waters and associated fish populations to assist in relating specific discharges to environmental levels of particular concern.

Information concerning the use and distribution of PCB's and the level of PCB's in effluent discharges has been requested from 84 companies, which are believed to handle PCB compounds or mixtures in their operations. These requests for information have been made pursuant to EPA's authority under Section 308 of the Federal Water Pollution Control Act and Section 114 of the Clean Air Act.

A special review of past and recent data to assess the carcinogenic potential of PCB's is underway.

Test data on the chemical properties and potential bioactivity of substitutes for PCB's have been requested from Dow Chemical and Dow Corning.

Imported PCB's and polychlorinated terphenyls are being analyzed to identify possible contaminants. In addition, the techniques for detecting PCB's, PCT's and polybrominated biphenyls are being examined to determine whether interference among the substances prevent reliable analysis for any one of them.

General guidance for disposal of wastes containing PCB's will be developed. The Department of Defense, the General Services Administration, and other agencies are being requested to review and to amend as appropriate their procurement specifications and those of their contractors concerning the purchase of PCB's and materials containing PCB's.

Consultations with the Japanese Government are being initiated concerning their experience in implementing a ban on the production and import of PCB's.

Consultations with the OECD governments are continuing in an effort to determine the effectiveness of the 1973 decision in reducing the PCB problem on a worldwide basis and to encourage expeditious carrying out of the provisions of the 1973 agreement.

And finally, consultations are being conducted with the Canadian Government to inform them of our information and activities concerning PCB users in Canada and to coordinate future actions.

Now, the remainder of my statement I would like to direct to those questions that were specifically identified by the State of Wisconsin of being special interest during these hearings. First, with regard to the aquatic environment, EPA considers a PCB concentration of 1 ppt in the ambient water environment represents an appropriate goal for the nation. This conclusion is reflected in the Water Quality Criteria which are currently undergoing final review prior to promulgation and will be elaborated further by another EPA representative later this morning. We would suggest that this goal serve as very broad guidance in developing strategies on a nationwide basis and locally to control discharge of PCB's into our waterways.

However, we are not prepared at this time to provide more specific guidance on the control strategies that should be adopted nationally or locally concerning the regulation of individual dischargers. We are developing a nationwide strategy with a significant component of our approach to be reflected in a revised toxic effluent standard for PCB's scheduled for proposal early next year. At the same time, we recognize that a nationwide standard might not be adequate in addressing local problems in some areas and the control strategies adopted locally may of necessity require an elaboration of the national approach.

In any event, we believe that better information is needed concerning the specific facilities discharging into the aquatic environment before reaching a final judgement on a national standard. Also, it is important to clarify the portion of the PCB contamination problem which can be attributed to specific dischargers and the practical feasibility of reducing the discharges. As a key step in this regard, on August 16 we requested from 84 companies detailed information concerning their activities involving PCB's including details on their uses of PCB's and monitoring data in the effluent stream and in the receiving waters. With this information in hand, we believe we will be in a much better position to develop meaningful regulatory approaches which take into account the realities of current industrial activities.

Now, turning to the Toxic Substances Control Act, as I have indicated, EPA is currently utilizing or preparing to utilize authorities under the Federal Water Pollution Control Act which address the problem of effluents and spills containing PCB's in an effort to reduce the environmental levels of PCB's. Additional authorities may also be used if warranted by further information concerning levels of PCB's in drinking water or even possibly in air. However, each of these available authorities has a limited focus and none provides the most critically needed authority to limit selected uses and distribution of PCB's. Indeed, even with the cooperation of Monsanto to limit production as well as the use of existing authorities, it seems clear that the PCB problem will continue to persist in some form.

Under the pending Toxic Substances Control Act, however, EPA would have the needed authority and could deal with the problem in a far more effective manner. In addition, authority—in addition to authority to restrict the production and use of PCB's, the legislation would, if necessary, enable EPA to require testing concerning the health and ecological effects of the proposed substitutes for PCB's.

With regard to the limitations that might be considered under this legislation, the 1972 Task Force Report concluded that there were appropriate substitutes, presumably at reasonable cost, for all nonelectrical uses of PCB's. We have no information which would contradict this conclusion. However, we currently are carefully analyzing each PCB use and the technological, environmental and cost aspects of possible substitutes to insure the soundness of that original conclusion. Also, we are carefully reviewing the recent developments concerning substitutes for PCB's in closed electrical systems before reaching our final conclusions concerning the extent and character of limitations that would be appropriate under the toxic substances control act.

We are optimistic that we will have this new authority within a few months, but as you know, further movement in this regard rests with the Congress.

Finally, one key aspect of the Toxic Substances Control Act should be emphasized, namely the authority to review new chemicals before they are marketed and, if appropriate, require testing or take steps to limit the production or use, if there is reason to believe a hazard to human health or the environment might ensue. This preventive or front-end approach to the control of chemical hazards would provide a far more reasonable and more cost-effective approach than current efforts to correct problems after the damage has been done. Not only would the public benefit from the environmental point of view, but also the economic costs to industry would be minimized by taking actions prior to the time that major investments would have been made. It is clear that the past policies of allowing uncontrolled proliferation of chemicals such as PCB's into the environment, chemicals which have proven to be both persistent and hazardous can no longer be tolerated.

With regard to the experience in other countries, which is of interest to you, we do have some information from Japan which I would like to report to you. The most relevant foreign experience in regulating PCB's has probably been the recent efforts in Japan where PCB's have been under government regulation since 1972. The Japanese Government has recently provided us with some preliminary insights as to their experience. The following comments are based on initial reports we have received and we plan to obtain more definitive information in the near future.

According to information just provided by the Japanese Government, there has been practically no production, import, or export of PCB's in Japan since 1972. The only two companies which had been producing PCB's in Japan stopped production and suspended sales in early 1972.

One exception has been the production of PCB's for railroad transformers which was discontinued in September, 1973. Use of existing stocks of railroad transformers and condensers, but no new equipment using PCB's is permitted. Even this limited use is subject to the restriction that no discharge of PCB's to the environment may occur. Beginning in 1976, paper plants will be prohibited from accepting PCB contaminated paper for recycling and such plants will be required to build treatment plants which will meet general discharge standards.

Further, we understand that the import of equipment using PCB's has also been virtually eliminated as of September 1972 and for these few products which have been permitted into the country, importers must cooperate with the ultimate users to insure that the components containing PCB's are recovered and properly disposed. Disposal is regulated by the Waste Disposal and Public Cleaning Control Law which was amended in February, 1975 to include PCB's. Currently there are no regulations for labeling or handling PCB's.

The present limitations on the use, import and export of PCB's are based on Article 3 of the Chemical Substances Control Law which went into effect on June 10, 1974. Any manufacturer who wishes to produce PCB's in the future must apply to the Ministry of International Trade and Industry, although approval of such a request is regarded as highly unlikely. The Japanese Government projects that a total ban on PCB's will take effect in approximately six to ten years, when the current stock of equipment containing PCB's is exhausted.

The Japanese has established PCB contamination limits for fish and shellfish of 3 ppm for near-shore varieties and .5 ppm for ocean varieties. These limits are derived from a basic limitation for human intake of 5 milligrams per kilogram of body weight per day. Guidelines first set in 1973 for water quality and bottom sediment were revised in February, 1975 to not detectable, defined as less than .5 ppb for ambient water and 10 ppm for bottom sediment. These standards are not necessarily permanent standards, since they were set with current monitoring capabilities in mind. Under the Water Quality Control Law, the authority used in setting these standards, penalties are imposed for exceeding authorized limits. Monitoring of the water quality and bottom sediment by each prefecture is required by this law.

We have only very sketchy information concerning effluent limitations in Japan. According to the reports we have received, the Japanese Prime Minister's Office Ordinance based on Article 3 of the Water Quality Control Law sets the maximum permissible PCB concentration in effluents at the point of discharge into rivers or lakes at 3 ppm. Coupled with this limitation is a provision authorizing a penalty for exceeding the effluent limit.

The environmental levels of PCB's in Japan have subsided in the last two years and are expected to continue to diminish. In a 1974 survey of bottom sediment, including over 1,700 samples, 14 samples had PCB concentrations of over 50 ppm, 37 of 10 to 50 ppm and 21 of 5 to 10 ppm. In the previous year, some PCB levels had exceeded 10,000 ppm. No such peaks were found in 1974. Concentrations of PCB's in the milk of mothers were down over the previous two years, although 25 percent of the samples were contaminated.

The Japanese Association for the Disposal of PCB's is responsible, along with local Governments, for the collection and temporary storage of household electric appliance and other electrical equipment containing PCB's. The association will develop PCB treatment technology and treatment plants for disposal, although the latter effort has been delayed by public opposition to the selection of proposed treatment plant sites.

Substitutes for PCB's that are currently in use in Japan include for carbonless copy paper, alkyl naphthalene and alkyl phenylethane for heat transfer, diphenyl, diphenylether, alkyl diphenyl, alkyl naphthalene, alkyl benzene and mineral oil and for transformers and capacitors, mineral oil and silicone oil.

In conclusion, I would like to stress that EPA intends to continue to give high priority to the problems associated with PCB's. The recent data on toxicity and levels of environmental contamination have heightened our concerns and have stimulated considerable new activity.

Much is known about PCB's and much more will be known in a few months as our current data collection efforts are brought to fruition. In recognition of the national interest in the PCB problem and particularly the interest in the Great Lakes area, I am pleased to announce that in late fall, EPA, in cooperation with other federal agencies, will sponsor a national symposium in Chicago to further clarify selected aspects of the PCB problem. The State of Wisconsin herewith receives our first invitation to participate.

I'll be pleased to try to respond to questions if that's in order.

EXAMINER: Thank you. Do you have a copy of your report, sir?

MR. SCHWEITZER: Yes.

EXAMINER: Thank you very much. Does the Department have any questions of Mr. Schweitzer?

MR. KLEINERT: Mr. Schweitzer, I'd like to address some questions to the efforts of the EPA to establish effluent standards for PCB's. Earlier EPA had proposed an effluent standard for PCB's and I understand from your comments here this morning that this general, standard concept isn't something that you're pursuing right now. You're more or less looking at industries as groups in trying to reach limitations on discharge; is that correct?

MR. SCHWEITZER: I think what you're saying is correct, but I'm not sure the implication is correct. We have not necessarily abandoned the notion of a national—we are planning to propose a national standard for PCB dischargers. Whether that standard will be a series of numbers directed at specific types of discharge or whether it will be one number is undecided at the present time. Is that responsive to your question?

MR. KLEINERT: I think so. What is the timetable or could you make an estimate when effluent standards would be established nationally?

MR. SCHWEITZER: The timetable for proposing a standard is late February. I cannot give you a more specific—I can't give you a timetable on when this data would be promulgated final or when it would go into effect. I think the promulgation date depends largely on the reaction of the interested parties and the public to the proposal and the length of time that the hearings would take. The date at which the center would be effective would depend on whether or not the finally promulgated standard is challenged and if it is challenged the time that the court litigation takes. So I can't give you a date for when the standard would be promulgated final, nor when it would be effective, given the uncertainties involved in going from a proposed standard to one that's in effect.

MR. KLEINERT: I have another question on your comments on the Japanese actions. I believe you indicated that the Japanese have established an effluent standard of three parts per million; is that correct?

MR. SCHWEITZER: That is the report that we have received from the Japanese government. We have—it is a preliminary report; it has not been confirmed and I really don't know what it—I raised my eyebrows when I saw that number myself, but I wanted to give you what we have and that's all we have and we have not confirmed it. But we do have a report which says that. Yes, sir.

MR. KLEINERT: Okay. Thank you.

EXAMINER: Mr. Schweitzer, just one quick question before I open the rest of the program up to questions, you stated that there will be a national symposium in Chicago in late fall. Do you have any tentative date—definite date for that symposium.

MR. SCHWEITZER: November.

EXAMINER: Okay. Thank you. Now, ladies and gentlemen, I'll open it up to questions. Please try to confine your questions to remarks Mr. Schweitzer made. There will be technical people here from the—from EPA.

MR. SCHWEITZER: Mr. Chairman, may I make one—if there are any questions of a policy nature, I would prefer to take them at this time. There are—technical people will be happy to answer technical questions, but if they're policy questions, now is the time to ask them.

EXAMINER: Okay. Fine. Would anybody like to ask him questions?

VOICE: Are copies of your statement available?

MR. SCHWEITZER: We have a limited number. I think that we had something like 20. I just—

EXAMINER: All right. The question was whether there was copies of the statement and Mr. Schweitzer's response was approximately 20.

Any further questions?

(No response)

EXAMINER: Okay. In that case, thank you very much, Mr. Schweitzer.

Is Mr. G. D. Veith present?

Please identify yourself and who you represent.

MR. VEITH: My name is Gilman Veith. I'm a research chemist with the Environmental Protection Agency at the National Water Quality Lab in Duluth, Minnesota. My duties there involve the development of analytical methodology for isolating and identifying persistent organic chemicals in natural waters and aquatic organisms and research concerning the bioconcentration of organic chemicals in aquatic organisms.

My testimony today will be taken from completed and ongoing research and it will show that the PCB's are bioconcentrated in fish by factors greater than 100,000. It will emphasize that the PCB residues resulting bioconcentrating from 10 parts per trillion of PCB's in the water have jeopardized the food resources of Lake Michigan and will discuss, in part, the rationale used for the one part per trillion water quality criteria for PCB's.

There are really three points I'd like to make today and our bioconcentration studies have shown these. The first is that bioaccumulation of PCB's in fish can be modeled by pharmacokinetics and appears to respond to a first order uptake model. The second is that the residues in the fish at steady state, being somewhere in the order of 30 days, is directly related to the water concentration that they are exposed to and that the decrease in the—of the fish residues cannot be expected without a decrease in the water concentrations. Third, once PCB's are accumulated by fish, elimination of the PCB residues is immeasurably slow in elimination studies exceeding three months. Consequently PCB residue concentrations—I use the word concentration rather than total burden or a residue. The PCB concentration in fish from contaminated waters decrease only by dilution of body mass through growth.

More important than the direct toxicity of PCB's to aquatic organisms in establishing effluent regulations for the protection of the environment are the extremely high fat solubility and persistence of these chemicals. Research during the past five years has shown that although PCB's exhibit acute and chronic toxic effects in fish at concentrations comparable to those of other chlorinated chemicals, the high fat solubility of the PCB's caused fish to accumulate hazardous residues, that is, with respect to consumers of the fish, from water concentrations far below the concentrations that affect the fish directly.

This tendency to form residues from PCB's in water is measured by a concentration fat bioconcentration factor, which is a ratio of the concentration in the fish to the concentration in the water and the bioconcentration of PCB's in fish for the more highly chlorinated compounds, exceeds 100,000 times the concentration in the water.

The second property of PCB's is the fact that these chemicals do not degrade in the aqueous environment as rapidly like the bulk of the natural chemicals which comprise wastewaters. The resistance of these chemicals to degradation causes them to persist in waters far below the discharge and the accumulation of residues in waters such as the Great Lakes may be, in fact, directly related or the direct result of PCB usage many miles from the lake.

The terms "degradability", "more degradable" and "nondegradable" have all been applied to PCB's. And the data show that only the PCB's containing one and two chlorines have been degraded by microorganisms in natural water systems and that PCB's containing three and four chlorine atoms similar to those of Aroclor 1016 and 1242 have shown some selective degradation, as well as complete resistance to degradation under wastewater treatment conditions for periods of time far exceeding those commonly employed in waste treatment facilities.

Equally important, any reservoir water tends to accumulate PCB's in the biota and the sediments. They act more or less like any biological reservoir acts, like a fiord. Consequently, low level discharges may lead to a growing accumulation of PCB's in large water systems, such as the Great Lakes.

Regarding the bioconcentration studies that we've done, an understanding of the bioconcentration of chemicals in organisms is essential to understand the dynamics of these chemicals in the environment. Considerable confusion exists regarding the relative significance of various uptake mechanisms, due in part to the absence of detailed definitions of the system's study. Much of the early literature assumed that bioconcentration in the aquatic environment was based on the trophic level or food chain concepts.

However, exposures of fish to water containing these hydrophobic chemicals demonstrated that fish can bioconcentrate chemicals directly from the water. Uptake can be approximated by a first order rate process and that process appeared to be that of chemical partitioning from the water to the lipids in the animal. This has led to proposals where food

chain bioconcentration—the food chain bioconcentration model is rejected in favor of a chemical partitioning model. As with many kinetic models in dynamic systems, multiple pathways are often observed and the relative significance of the various rate expressions is really dependent on the conditions imposed. Therefore, the selection of either a food chain model or a chemical partitioning model for the aquatic environments requires that the conditions of the ecosystem be considered and defined.

The bioconcentration of PCB's in laboratory studies where the mixtures are added directly to the water have been studied for numerous aquatic organisms and the observed bioconcentrations for PCB's varies with organisms of different lipid content and different exposure conditions.

I'm including two—Appendix I and II, which are studies by Nebeker and DeFoe at the Duluth Laboratory as well as a paper of my own that show that the bioconcentration for Aroclor 1254 in fathead minnows ranged from approximately 110,000 to 240,000 and that the bioconcentration factors for predominant PCB mixtures in the fathead minnows, that is fish generally less than ten percent lipids, at 25 degrees, ranges from 30,000 to approximately 250,000. That is, what I'm describing here is the range that we've seen for the commonly encountered PCB isomers and as you get more highly chlorinated, the bioconcentration factors are greater.

In 1970, the annual report of the Fish Pesticide Research Lab in Columbia, Missouri, showed that the bioconcentration factor for Aroclor 1254 in the scud was approximately 22,000. It was also 45,000 after 48 hours in *Daphnia magna* and 13,000 in mosquito larvae after only 24 hours. What I'm trying to do here is just describe—there's a lot of organisms that have been studied and they all seem to be in somewhat of the same range of exceeding 10,000 and over 100,000. After 60 days in an exposure to Aroclor 1242 and Aroclor 1248, the maximum bioconcentration factor in *Gammarus* was found to be approximately 30,000 and 50,000, respectively. Also, the bioconcentration factors ranged from 20,000 to 60,000 for bluegills and catfish exposed to Aroclor 1248 and Aroclor 1254.

Some evidence exists that the bioconcentration factors measured in the laboratory are essentially the same as those found in the river environment. For example, appendix I shows that the laboratory derived bioconcentration factor for Aroclor 1248 in fathead minnows range from 100,000 to 240,000. Appendices III and IV is a report on PCB's in the Milwaukee River system and the near-shore environment of Lake Michigan, report that goldfish in the lower Milwaukee River accumulated Aroclor 1248 approximately 70,000 to 200,000 times the estimated PCB concentration in the water and that difference is dependent largely on the fat content of the fish.

In May—in the May, 1973 report to the Lake Michigan Toxic Substances Committee, the Michigan Water Resources Commission presented evidence that the maximum concentration of Aroclor 1254 in the Saginaw River shad was 165 micrograms per gram, whereas typical water concentrations were about one microgram per liter to a maximum of 2.9 micrograms per liter. This is equivalent to a bioconcentration factor of 60,000 up to perhaps 150,000, which seems to be in good agreement with the laboratory-derived concentration factors.

Also presented in this report is data to show that the concentrations of PCB's in the intake waters in the municipalities along the Lake Michigan shore are, with one exception, all below ten parts per trillion—ten ng per liter. This indicates that the maximum concentration factor for smelt in the lake where the main concentration is on the order of 2.7 micrograms per liter, is approximately 300,000 and that the maximum bioconcentration factor for large trout may be as high as 150—or 15 times 10^5 . So that's 1,500,000.

Appendix V presents data concerning the mean concentrations of PCB's measured in Lake Michigan—or Lake Superior fish captured in 1972 and 1973 from western Lake Superior. The data indicate that the PCB concentrations in smaller, low lipid fish, contain up to approximately 1.5 micrograms per gram—parts per million, whereas a large trout—PCB's in large trout have been measured up to 5.6 micrograms per gram.

Also presented are estimates of PCB's concentration in the western Lake Superior water intake and a bioassay control tank of the National Water Quality Lab in Duluth. These estimates were made using a foam plug extraction technique in triplicate, perchlorinating the extracts to form decachlorobiphenyl and measuring the decachlorobiphenyl formed. The data indicate that approximately one to two ng or parts per trillion of PCB's, measured as Aroclor 1254 are present in the western Lake Superior near-shore waters.

The mean concentration of the smaller fish of the order of .9 micrograms per gram, which would indicate an overall bioconcentration factor in Lake Superior fish of approximately 900,000 or—that's right.

In summary, the data from the Great Lakes demonstrate that the PCB's are present in the waters of Lake Superior and Lake Michigan at concentrations below ten parts per trillion, but the concentrations of PCB's in the fish are more than 100,000 times the measured concentration in the water and that the PCB residues which bioconcentrate in fish from water concentrations below 10 ng per liter have produced PCB residues in Lake Michigan fish particularly that are significantly in excess of the FDA tolerance of five micrograms per liter and more importantly, the effect level of consumers, such as minks and subhuman primates.

And I'd like to introduce in the record at this time one correction that was made yesterday. I believe someone attributed the mink feeding studies that have gone on to the National Water Quality Lab in Duluth and this is an error. We have—to my knowledge have not mink feeding studies, but the two major groups that are doing this are Bob Ringer at Michigan State University, working with the mink ranching and Platteneau at the University of Walton in Canada.

Now, concerning the rationale for the water quality criteria for PCB's, it has been stressed that the rationale for water quality criteria for cumulative chemicals, such as PCB's, consider the result of environmental monitoring programs in order that the ramifications of the criteria can be assessed. Data on PCB's in the environment indicate that the large bioaccumulation factors produce residues which are of primary importance. For example, as has been discussed, Nebeker has shown that .45 micrograms per liter of Aroclor 1254 produced 50 percent reduction in midge reproduction; 1.3 micrograms per liter produced 50 percent reduction in Daphnia reproduction; 1.8 micrograms per liter produced 50 percent reduction in fathead minnows. DeFoe, in Appendix II that I'm including here has shown that approximately 300 parts per trillion of Aroclor 1248 and Aroclor 1260 were the highest concentrations not producing a discernible effect in the fathead minnows. And although the 300 ng or parts per trillion of PCB's is an approximate no effect level for these fish species studied, the residues accumulated in these fish at that concentration of the water was approximately 250 parts per million in the animal.

Although the 300 parts per trillion did not produce a statistically significant chronic effect in the fish, the residues accumulating in this fish at this concentration would prohibit the use of this fish as a biological resource for humans due to the FDA action level of five micrograms per gram.

Moreover, in this 14 and a half parts per million of body weight of Aroclor 1254 in the diet of coho salmon have caused complete mortality after—in 240-day feeding studies, suggesting that the high residues in small fish may endanger predator fish.

Since PCB residues are an important—a more important consideration than direct effects on aquatic organisms, criteria are proposed by considering residues in relationship to the FDA tolerance level of five micrograms per gram. In NWQL experiments, the residues in fathead minnows exposed for 20 days at 300 parts per trillion were approximately 250 parts per million. To assure the five microgram per gram or parts per million residue is not surpassed, the concentration of PCB's in the water would have to be reduced 50 fold to approximately six parts per trillion in the water. That's case one.

Case two, the mean concentration of PCB's in Lake Michigan coho salmon is approximately 15 parts per million and Ringer et al that I just alluded to, have shown that these residues cause complete mortality in the mink. These data indicate that two micrograms—that these data indicate that two micrograms per gram of PCB's in coho salmon should be a maximum concentration fed to mink.

The concentration of PCB's in the open Lake Michigan is estimated to be less than 10 parts per trillion and to obtain the residue tolerance proposed by the FDA for Lake Michigan fish, at least a three-fold reduction, even if the levels are at ten parts per trillion, a three-fold reduction in the water to a maximum of 3 ng per liter or more—3 ng per liter or more likely less than 3 ng per liter would be necessary for this reduction to the FDA limit.

To attain an eight-fold reduction in the fish residues for mink feed, 1 ng per liter is likely to be the largest concentration possible if these fish are to be used for mink feed.

Concentrations of PCB's in western Lake Superior has been estimated to be .8 of a ng per liter, with approximately 50 percent relative air. The mean concentration in Lake Superior fish range from below 1 microgram per liter to—in the smaller fish to 3 micrograms per liter. This is a mean concentration now in the larger trout. However, a larger trout presently contain—some larger trout presently contain more than five micrograms per liter. This suggests that increasing the water concentration to 2 or 3 ng per liter would therefore jeopardize the commercial marketability of the Lake Michigan fish, if not the entire ecosystem.

Because of the mounting evidence, such as the above from both field and laboratory studies on bioconcentrations of PCB's and the adverse effects of PCB residues on the aquatic resource consumer, proposed water quality criteria for PCB's is one part per trillion.

EXAMINER: Do you have a copy of that?

MR. VEITH: Yes.

EXAMINER: Okay. Does the Department have any questions?

MR. KLEINERT: Dr. Veith, I'd like to ask a question about the form of the PCB's in the fish. The higher percentage chlorine Aroclors are commonly found in the fish, the 1254 and the 1248. Yet we find in our monitoring that a lot of the PCB that we're identifying is 1242. Is there a selection in the retention in the fish of the various kinds of PCB's?

MR. VEITH: Well, as I—there's probably two problems here that we have to identify. One is that you have to be certain that you're analyzing the water that the fish spends most of his time in and then you can't be certain that the fish isn't going into harbors. So that often-times if Aroclor 1242, for example, is monitored in a river system, you can't, you know, expect necessarily that you're going to find Aroclor 1242 as the predominant PCB mixture in the receiving water, such as Green Bay or Lake Michigan or the Great Lakes.

A second and more important consideration is there is—there does seem to be a preferential or a higher bioaccumulation of the more highly chlorinated PCB's and as I indicated, the range for Aroclor 1242 up to Aroclor 1260 seems to be on the order of between 30,000—all of them fall in the range of 30,000 to 250,000. And—so that given equal quantities of these two chemicals in the water, you could expect to find twice as much Aroclor 1254 in the fish as you could of the more—the lower chlorinated compounds. And coupled with that is a common practice of the chemist to dilute the extract in the fish analysis so that the major peaks are on scale and what this does is it means that the smaller peaks, that maybe they're actually in greater quantities, are neglected, and the electronic capture response for a gas chromatograph increases very remarkably as you go up adding more chlorines. It just makes it much more sensitive so that you can detect smaller quantities of Aroclor 1254 than you can Aroclor 1242.

And so that coupled with this—with the increased bioaccumulation and then the techniques of the chemist to scale to the biggest peak to quantitate, they essentially ignore peaks which are—look minor, but on a mass weight basis they definitely aren't. And it's completely inaccurate to say that the 2, 3 and 4 chlorine PCB's do not exist in Lake Michigan. It's true that the predominant compounds that are observed by gas chromatography resemble Aroclor 1254, but we have presented evidence—GCMS analysis clearly show that the di-, the tri- and the tetrachloro isomers are there and so these compounds aren't mysteriously disappearing from the environment.

I mean that may be an incorrect statement. I can't really say that they are not disappearing, but at least they are present; they are not showing up in the larger lake systems.

MR. KLEINERT: Thank you.

EXAMINER: Can we obtain a copy of that?

MR. VEITH: Yes, sir.

EXAMINER: Okay. Thank you. Does anyone else have questions of Mr. Veith?

Please approach the front and identify yourself.

MR. SCHRAUFNAGEL: My name is Schraufnagel, Department of Natural Resources. I have a question—

EXAMINER: Speak into the mike, please. That way we can hear what you're saying.

MR. SCHRAUFNAGEL: The question I have is I follow your reasoning on the one part per trillion, but is there any difference or variation for more eutrophic waters or waters that have more sediment, for instance, the Mississippi River or Lake Winnebago. Do you think that would make any difference on the magnification or the amount in the water that would accumulate in the fish?

MR. VEITH: Well, I guess I don't have any evidence to directly relate eutrophic waters with the bioconcentration, but there does seem to be, you know, some evidence that the—state of eutrophication of a body of water will effect the PCB concentration in the water. That is, you'll have just a lot more organisms present to adsorb the material out of water. The bioaccumulation is in all of the organisms in the water.

As to the availability and I guess the question to be raised would be the availability of adsorbed material or whether or not there's—if you measure the total water sample, the availa-

bility of all of the PCB's present and I don't know that this is a question to be considered, for example in the Lake Michigan, Lake Superior systems. However, in the river systems, as I mentioned, the Milwaukee River system, and especially up above Estherbrook Park has large masses of algae. In fact, they usually get the algae blooms in these reservoirs where these fish were taken from and so I don't know—I cannot say with any data that the presence of suspended material in the river does or does not affect the bioconcentration factors and this is a very hard thing to get a handle on and I think it's the main reason for looking for field investigations that would help to verify the—help us to interpret the laboratory results that we're getting.

MR. SCHRAUFNAGEL: One more question and that is the range of reliability on your tests in water. How—with what results—accuracy of results can you get in the one trillion—one part per trillion range?

MR. VEITH: Well, I think I indicated, certainly when you get down at that level, we have, I think, approximately a 50 percent relative air in the data. And the waters, I think, can be routinely measured. This is—I'm speaking of lakes and some streams can be routinely measured—well, have been for five years, on—at approximately 10 part per trillion level, but of course, well, I believe I could perhaps defer that question to a speaker later on who will discuss the analytical methods, but my feeling would be that that is the option of a chemist, is to consider the sample that he's analyzing and do—use his discretion to come up with the—what he can say and what he can't say about the sample.

MR. SCHRAUFNAGEL: Thank you.

EXAMINER: Thank you, sir. Does anyone else have questions?

(No response)

EXAMINER: Okay. In that case we're going to take a five-minute recess so we can arrange to copy of—the statement's that Mr. Schweitzer made. Thank you.

(Recess)

EXAMINER: Okay. On the record.

We'll continue with the presentation by request and on behalf of the Department of Natural Resources and I'd like to request Mr. Fairless. Is he present in the room?

Before this gentleman gives his presentation, we are getting copies of the statement made by Mr. Schweitzer. If there aren't enough, we'll try to get more and if that doesn't even work out, we'll take the names and send copies of those who need them.

Okay, sir.

MR. FAIRLESS: My name is Billy Fairless. I'm deputy director of the Central Regional Laboratory, Region V, U.S. EPA. My statement will describe the analytical procedures that the Central Regional Laboratory uses to perform routine monitoring analysis for PCB's and other pesticides.

We collect one liter samples in glass bottles with teflon lined screw caps. The first portion of an extracting solvent is used to rinse out the bottle and is added to a two-liter separatory funnel with the bottles. The samples are extracted twice with 100 milliliters of 15 percent volume by volume ethylether/hexane and once with hexane. The extract is dried with sodium sulfate concentrated to about five milliliters in a Kuderna-Danish evaporator. The volume is then reduced to four milliliters using a stream of dry filtered air, diluted to exactly four milliliters and split into two portions.

Portion I is spiked with phorate placed in a two milliliter vial, fitted with a screw cap and analyzed for phosphorus-containing pesticides. The analysis is performed on a Perkin-Elmer model 900 gas chromatograph using a flame-photometric detector in the phosphorus mode. The instrument is equipped with an automatic sampler suggested for a 10 microliter injection and a Perkin-Elmer PEP 1 gas chromatographic data reduction system. We use a six foot by one-fourth inch glass column packed with 4 percent SE-30 and 6 percent OV-210 on 80 to 100 mesh gas chrom Q for the original analysis and a 6 foot by one-fourth inch glass column packed with 1.95 percent OV-17 and 1.5 percent OV-210 on gas chrom Q 80 to 100 mesh for confirmation. Gas chromatograph conditions are as follows: the inlet temperature is 250 Centigrade, detector temperature is 240 degrees Centigrade. The oven is programmed from 200 degrees Centigrade to 265 degrees Centigrade at four degrees per minute. Carrier gas is nitrogen at a flow rate of 60 milliliters a minute.

The second portion of the extract is placed on a column of Florisil, with one-half

inch of sodium sulfate at the top and the bottom of the Florisil for drying purposes.

Two fractions are collected from the Florisil. The first is eluted with 200 milliliters of 6 percent ethyl ether in hexane and the second with 200 milliliters of 50 percent ethyl ether in hexane. Each of the fractions is concentrated to less than two milliliters in the same manner as used for the extract, diluted to exactly two milliliters with hexane, spiked with Dieldrin, that's the 6 percent ether fraction, or Aldrin, that's the 50 percent ether fraction and placed in a 2 milliliter vial with a septum cap for gas chromatographic analysis.

Each fraction from the Florisil column is analyzed using a Perkin-Elmer model 3920 gas chromatograph equipped with a two-column injector splitter, automatic sampler with 10 microliter syringe, two columns leading to electron capture detectors. And the same PEP-1 data reduction system is used. Columns are both 6 feet by a quarter inch glass. One is packed with 4 percent SE-30 and 6 percent OV-210. The other with 1.95 percent OV-17 and 1.5 percent OV-210, both on 80 to 100 mesh gas chrom Q. The oven temperature is 205 degrees Centigrade; the carrier gas is 5 percent methane in argon for both columns.

A measured aliquot of each sample from the 6 percent ether fraction which is thought to contain PCB's as based on the gas chromatogram we obtained from that fraction, is removed from the vial and placed onto a column of deactivated silicic acid. The first fraction is eluted with hexane, 45 milliliters and the second with 150 milliliters of 80 percent methylene chloride, 19 percent hexane, 1 percent acetonitrile. Each of these fractions is concentrated to less than two milliliters as previously described, diluted with hexane, spiked with Dieldrin and placed in a vial for gas chromatographic analysis. The fractions are analyzed for PCB's and pesticides on a Perkin-Elmer model 3920 dual-column electron capture detection system.

A quality assurance program is maintained to measure the precision and accuracy of the results. The program includes scheduled calibration of all instruments used in the analysis to insure that they are working properly. To monitor possible contamination of the samples while they are being analyzed, reagent blanks are run after each step of the analytical process. That's extraction, Florisil chromatography, silicic acid chromatography and gas chromatography. Some samples are divided in half and one fraction is spiked with a known amount of the compound we're analyzing for. The recovery of the spike insures that there are no unusual chemicals in the sample that would interfere with the analysis. As a final check we analyze three standards with each group of up to 35 samples to insure that the total analysis scheme is working properly.

A procedure similar to this is being used by the State of Wisconsin. The detection limit for this procedure I've described is between .1 and .5 micrograms per liter of a specific PCB. Variable detection limit depends on the amount of other organic material in the sample. Duplicate analysis of real samples run at different times in our laboratory, agree to within 10 or 15 percent at a concentration of approximately one microgram of PCB per liter of water sample. In a recent round-robin study in which samples were sent to the six laboratories--state laboratories in Region V, that's Indiana, Illinois, Michigan, Minnesota, Wisconsin, the laboratories reported values between 0.82 and 2.2 micrograms per liter for a sample that actually contained 1.5 micrograms per liter of Aroclor 1254. It's my opinion the chances of misidentifying a PCB using these procedures are negligible if the concentration is above 1 microgram per liter.

As a final comment, I would note that we can include a chlorination step in the analytical procedure, which chemically changes all of the PCB's to decachlorobiphenyl. If this is done, we lose the ability to identify the specific PCB's, such as Aroclor 1254, 1251, or we can lower the detection limit to between 50 and 10 ng of PCB per liter sampled. Therefore, in summary, it appears that there is no particular problem with analyzing water samples for individual PCB's concentrations above .5 micrograms per liter or for total PCB's at concentrations above .05 micrograms per liter.

EXAMINER: Thank you, sir. Does the Department have any questions?

MR. KLEINERT: No questions.

EXAMINER: Do you have a copy of that presentation?

Thank you. Are there any other questions. Thank you very much, sir.

Mr. Francis Early.

MR. EARLY: My name is Francis Early. I'm a physical scientist in the Process Control Branch at the National Enforcement Investigations Center of the Environmental Protection Agency.

I am here today to address the problem of reducing the discharge of polychlorinated biphenyls to public waters. A problem of real concern at this time must be the relatively high discharge concentrations shown from certain pulp and paper mills which are deinking paper.

VOICE: Speak up, please.

MR. EARLY: Yes. From certain—a problem of real concern at this time must be the relatively high discharge concentrations from certain pulp and paper mills which deink paper. For the record, let me briefly sketch the general process used for deinking paper. The deinking pulp producer buys wastepaper which is carefully selected for the end product which he intends to make from the deinked pulp. These papers are slurried in hot water with wetting agents or dispersants and an alkaline or acidic agent to adjust the pH. Other chemicals are used as required. Once slurried, the paper, now undeinked pulp, is screened and cleaned to remove undispersed materials, pieces of metal and grit. The actual deinking usually takes place in a series of washers which are often operated in countercurrent process streams. The undeinked pulp enters the system of washers at one end while the clean water is introduced at the opposite end. The deinked pulp and the dirty water, in turn, are discharged at opposite ends. A primary objective of this process is to recover quality fiber, free from ink, chemicals and pigments, as required by the needs of the end product paper, one or more stages of bleaching may also be used.

Where do PCB's enter this process? In the wastepaper which is the raw material for the process. They are discharged with the dirty water because they are essentially associated with and attached to the pigments and are removed during the deinking process. Having removed the undesired material, which includes PCB's in this case, with water, the processor now is faced with a problem of removing the PCB's from the water before discharge, or recycling the water to their process.

These waters can be given primary and secondary treatment in order to meet the requirements of the NPDES permit program, which require close control of biologic oxygen demand and suspended solids, along with other requirements.

We note here that there is extensive literature on the presence of PCB's in water and their introduction into the food chain. However, few of these—little of this literature addresses how the PCB is present in the water. Dr. Peter Schoor of the Gulf Breeze Environmental Research Laboratory, in an article which will soon be published in September or October this year, in England in the international journal, Water Research, has demonstrated that Aroclor 1254 is soluble in water at concentrations of less than .1 part per billion. What this means is that any of the material present in water in greater amounts than this must be either in the form of attachments to suspended solids or in the form of an emulsion stabilized by a surface active agent. Since only a small portion of the total amount of PCB material can be in true solution, the limiting—true solution states limiting the discharge of these materials can be enhanced by improved suspended solids removal and effective secondary treatment for the removal of oxygen-consuming materials.

The effect of improved suspended material removal on PCB discharge is intuitively evident, since a significant portion of PCB is undoubtedly attached to the suspended particles, because all PCB's are extremely lyophobic in water and therefore have a strong tendency to coalesce with other materials of like nature and to adhere to lyophobic sites on suspended particles.

The reduction of PCB's to be gained by secondary treatment needs a little more explanation since colloiddally dispersed PCB not removed by an effective primary treatment probably is stabilized by a surfactant; it should be very sensitive to biologic treatment. To expand, the dispersant or surfactant which is stabilizing the PCB particle must be biodegradable, since natural surfactants are biodegradable and by national policy, all commercial surfactants must be. Since the surfactant—once the surfactant has been degraded far enough to destroy its ability to emulsify and stabilize PCB particles, the PCB removal problem or solution becomes the same as in the primary treatment except the suspended material that will carry the PCB will be the biomass, which in the secondary clarifier or stilling basin will carry down the PCB.

This fact is confirmed by recent data from California, which show PCB sludge magnification factors of up to 9—of about 9 to 1. Although PCB's may have been ingested by the organism of the biomass, it is likely that it is just carried down as with the biomass. In either case, it will be effectively removed from the water with the secondary sludge.

In conclusion, I think we can say that although PCB discharges from these deinking paper mills now tend to be rather high, we can look forward to significant reductions in discharge concentrations as the programmed and projected treatment systems required by the NPDES program become effectively operational.

Thank you.

EXAMINER: Thank you. Do you have a copy of your report?

MR. EARLY: Yes, I do.

EXAMINER: Any questions? Do you have any questions?

MR. KLEINERT: Mr. Early, from your comments, it's your belief that the removal of suspended solids or the effective removal of suspended solids will tend to effectively remove the PCB's; is that correct?

MR. EARLY: Yes, remove a portion. I'm not sure how much.

MR. KLEINERT: The other factor involved in addition to removing the suspended solids is the second part of the—

MR. EARLY: That is correct. The biologic treatment system—an effective biologic treatment system.

EXAMINER: Those questions were put to Mr. Early by Stan Kleinert, Department of Natural Resources.

Does anyone else wish to have questions of Mr. Early?

(No response)

EXAMINER: In that case, thank you very much, sir.

That's it for the EPA, isn't it?

MR. KLEINERT: Yes.

EXAMINER: Okay. In that case, the presentation by the Department of Natural Resources, with the aid of various other agencies and industries is concluded. We will now continue with public comment by various parties who have attended this hearing for that purpose. I'd like to first call on Mr. Dennis Bessenecker, Dow Corning Corporation.

MR. BESSENECKER: Yes, my name is Dennis Bessenecker from Dow Corning. I'd like to enter this statement for the record relative to the use of Dow Corning 2-1090, dielectric liquid as a replacement for PCB's in power transformers.

Q2-1090, dielectric liquid is Dow Corning's version of a polydimethylsiloxane fluid qualified for use in electrical applications. The technical feasibility of using silicones in transformers has been shown by over 20 years of experience in military speciality transformers and several years of use on the Japanese National Railway and use in a number of power transformers in the Midland, Michigan area. In addition to these actual applications, support for the use of silicones is contained in over 30 years of accumulated data on dielectric properties and compatibility with materials of construction. Concern for fire, explosion, health and environmental hazards strengthens the rationale for using silicones.

Silicone liquids of the type advocated for this application are much less flammable than typical transformer mineral oils and actually have a higher flash point than many PCB containing transformer liquids. And although these silicone liquids will burn, they have a relatively low heat of combustion, a high flash point and fire points and have been shown to be self-extinguishing in static pan type burn tests. They appear to offer a level of fire safety greatly superior to mineral oils and only less—slightly less than PCB based liquids. The silicone liquid suggested for use in transformers has been evaluated by Underwriter's Laboratory and has received a flammability classification number.

Simulated transformer explosions involving a PCB based liquid, a silicone liquid and a mineral oil showed that only the mineral oil continued to burn after the explosion. There was no fire with either the PCB or the silicone.

Following a review of the extensive data, several insurance companies have given their permission to pursue the use of silicone liquids in transformers used by their customers. Because no general policy has been established to date, insurers have indicated that they will evaluate each application on an individual basis.

Silicones, often used in small concentrations in the preparation of certain foods, have a very low level of toxicity. The toxicity to mammals and aquatic life and plants have been investigated and continue to do so. The extremely low toxicity of silicones make it difficult to detect toxic reactions in the test subject. Studies directed towards determining the tendency for silicones to bioconcentrate have been negative. It was not possible to show that bioaccumulation was occurring.

It has often been stated that silicones are persistent because they do not biodegrade. Although no evidence of biodegradability has been shown, silicones do degrade in the environment. Contact with soils and water causes the liquid to rapidly depolymerize to volatile species. Once airborne, these materials are chemically degraded in the presence of ultraviolet light. Known chemistry also suggests the possibility of chemical degradation in water.

The present listed price of silicone fluid is approximately twice the price of PCB liquids and I'd like to make a comment on that after I conclude. However, the price differential would be expected to decrease as the volume of silicone fluid used increases. The cost of monitoring, controlling, spill cleanups, the potential—possible liabilities and disposal should be much less for silicones. Thus, in the long term, the total cost of using silicones would probably not be greatly different from the total cost of using PCB's.

And the comment I would like to make is the fact that we are on a program right now of commercializing the silicone fluids; it is available. With our rebate program in our efforts to accumulate and extend our data bank or let's say, service life data, we are offering a rebate system and with the rebate below the listed price of silicone fluids, we are very close to PCB's at the present time.

EXAMINER: Do you have a copy of your statement, sir?

MR. BESSENECKER: I have a number of copies.

EXAMINER: Okay. Just leave one for me. I think you can leave the rest there.

Thank you very much.

Is Groff Collett present? Please step up for a statement.

Okay. Please identify yourself before you make your statement.

MR. COLLETT: Yes. My name is Groff Collett. I'm general manager of Paperboard Products for Consolidated Papers of Wisconsin Rapids, Wisconsin. This is the recycling area of our business, in which we procure used or waste paper and recycle it to make paperboard. This recycled paperboard is ultimately converted into such items as folding cartons, paper cores and cans, and various laminated paperboard products. We have one machine manufacturing paperboard and this machine supports the employment of approximately 340 people in central Wisconsin. Annually we consume or recycle about 33,000 tons of post consumer waste, keeping it from the solid waste stream. The payroll for this operation was \$4.6 million in 1974 and federal, state and local taxes amounted to about \$1.3 million.

We share your concern with our environment and have made substantial effort to prevent any of our operations from having a deleterious effect upon society in general. Consolidated has invested more than \$40 million in environmental improvement programs; we anticipate capital and operating expenditures for environmental control will amount to \$26 million for the three-year period, 1975 to 1977. We also feel strongly the responsibilities we have to our employees for maintaining stability of employment, as well as providing a fair and reasonable return to our shareholders.

We believe the DNR is serving its intended purpose when calling possible hazards to the attention of the public and to the attention of those who have control over the processes which are believed to be responsible for this potential problem. We very frankly do not know at the moment the extent to which our operations are a source of PCB discharges to the state's waterways. Excuse me. We are aware that certain types of waste fiber containing PCB's and essentially all the normal grades of reclaimed fiber which we use at Consolidated could possess extremely small amounts of PCB's. Since we have not been engaged in the production of paperboard for direct contact with food, we have not been making routine analyses of the PCB input into our process. It is only within the last few months that we've been made aware of any potential danger to the state's waterways as a result of our recycling operations. When this was first called to our attention, primarily through the press and I'd like to digress from our prepared statement for just a moment and say that this fact that we got our information originally primarily through the press, is a matter of some concern to me. I thought that we had established the long record of a willingness—showing a willingness to work with the DNR on all problems related to our environment. As we have done, we've shown a willingness to work with such government agencies as the state recycling authority. And our industry has worked with the FDA in establishing information on PCB's in food board.

Unfortunately, the first contact we had with the DNR on this whole matter is when we got notice that they were considering regulations that have the threat of putting us out of business. Let me go back to my prepared statement.

When this was first called to our attention, primarily through the press, we immediately attempted to make some determinations. Unfortunately, our hasty effort was largely fruitless since our sampling techniques and now appear to have been less than representative of actual conditions. The truth is that we—we sent samples to an outside agency for analysis; they came back and they reported that it wasn't detectable at their level of one part per million and we threw up our hands and said that was inadequate. The state's talking about five parts per billion, not parts per million. And now we're starting all over again.

While our report states that our effluent did not contain measurable quantities of PCB's, a review of our techniques has convinced me that they are inadequate. So we have now embarked on another testing program which we believe will be much more meaningful. This program is going to cost us thousands and thousands of dollars and unfortunately, we are not at all sure of what the results will mean when they are completed. I say this because we are testing only the influent and effluent to our paperboard machine, which is the only machine in our company utilizing waste fiber, which is the reported source of PCB's. If we detect the presence of PCB's, we then have to determine the effect of our 7.9 million dollar treatment plant now under construction will have on this effluent.

Given this situation, what are the alternative courses of action which are available to our company. You understand we have very few facts and I really doubt that there is anyone in this country who can claim to have enough facts on this matter to know the best course of action for a single company, state or the entire country. There are only a few things we know with reasonable certainty. One of these is that the PCB's are present in small quantities in most of the normal grades of wastepaper or reclaimed fiber. In some cases, the presence is probably so small as to be meaningless. They are reported to degrade very slowly. To the best of my knowledge, there is no practical way of removing them from our environment unless they can be collected and incinerated at very high temperatures.

The second fact is that we have been in the recycling business in central Wisconsin since 1917 and had hoped to remain in profitable operation for many years to come. If we are banned from discharging any PCB's at all with our present technology, we would have to back away from the use of wastepaper. Up until now, we have been encouraged under national environmental goals and yes, under Wisconsin goals as well, to support reclamation programs for the recovery of these waste fibers and recycling them into paperboard.

If the DNR bans all discharge of PCB's, we have one of several alternatives. We could consider switching to virgin fiber. We firmly believe that the cost of this switch in central Wisconsin would be prohibitive and it is not an economically supportable alternative.

The second alternative is attempt to be more selective in our reclaimed fiber procurement and I believe this could achieve some reductions in the PCB's we take into our process through the use of wastepaper. Our research personnel tell us that the complete elimination of PCB's by this method is impossible and a substantial reduction would be an extremely costly and probably unreliable procedure.

With a zero discharge requirement, I quite frankly see absolutely no way we could continue to reclaim waste fibers.

Then we ask what rate could we achieve? Honestly, I do not know. At the moment, the five parts per billion level sounds so close to zero that I believe it would have the same impact. The whole subject matter is much too new to even have a meaningful opinion on the subject.

Another alternative is to consider various treatment processes on the PCB's which might be present in our effluent. We are willing and even anxious to do this and will start with the completion of our treatment facility previously mentioned.

I realize that there can be many errors in the thoughts I have set forth here. But I believe that they are honest and logical thoughts based on the information presently available to me. Time will probably do a good job of pointing out the errors and I guess that is the only point I can make with you today. Hasty action that leads to unrealistic levels of PCB discharges could have a very adverse impact on our recycling operations and on the economy of central Wisconsin. It would undoubtedly bring ours to a halt and put 340 people out of work. This might be the result, even though the effect on the presence of PCB's in our environment could be nil. I urge you, therefore, to take the time and make the effort to study the serious impact of these proposed—these proposed regulations will have upon our economy and the conservation of our natural resources.

We welcome the input you make to our technical understanding of the problem and we would be glad to cooperate in your studies and the evaluation of alternatives which are available to us in order to protect our environment.

Thank you.

EXAMINER: Do you have a copy of your statement?

Thank you. I appreciate your appearance.

Mr. W. Allen Schenck. Present?

Please identify yourself and proceed.

MR. SCHENCK: My name is Allen Schenck. I'm vice president, technical and environmental, for Menasha Corporation, Neenah, Wisconsin.

I'm speaking for the John Strange Paperboard Division of Menasha Corporation. This paperboard mill manufactures combination boxboard from recycled paper and has done so for over 25 years. Two hundred and fifty people are employed at this location. The annual payroll is \$3 million.

Up to January 1, 1975, John Strange had invested \$400,000 in water and air improvement. One million, one hundred thousand dollars will be spent in 1975. These expenditures are a high percentage of the net worth of the mill. The plant is in compliance with all environmental orders. Approximately 75,000 tons of paperboard are produced annually. The principal products are tube and can stock, carton stock, chipboard and cylinder specialties. These products are, and historically have been made from 100 percent recycled fiber. The present grades of recycled fibers used are 50,000 tons of old corrugated, 25,000 tons of mixed paper, 8,000 tons of news. These products are purchased principally through recycled fiber dealers.

No PCB's are used in the manufacture of combination box board. There are no known PCB's in electrical or hydraulic equipment in the mill. Of the total annual product at John Strange, about 20 percent is utilized in food packaging. Combination boxboard for food packaging is made from recycled fibers selected to minimize PCB's. Board which exceeds ten parts per million, the PCB is diverted to nonfood end uses.

Ten parts per million is the interim level set by the Food and Drug Administration for food packaging materials. Experience in the manufacture of these grades has demonstrated that in the course of 24-hour run or longer, peaks of PCB's above ten parts per million can occur. However, the frequency and intensity of these peaks has decreased dramatically since 1971, when PCB's stopped entering the wastepaper use and reuse cycle. This trend is industrywide. Data collected from the majority of combination boxboard mills in the United States shows the following: in 1971 87 percent of the board made met the FDA limit of ten parts per million. In 1972, this had increased to 94 percent. In the last half of 1974, it was 98.5 percent. In the first half of 1975, it was 99.5 percent.

The data for 1974 and 1975 each represent over 2,000 analyses. They were collected from 70 percent of the combination boxboard mills in the United States as part of a quality—cooperative quality assurance program with the Food and Drug Administration. The data is submitted to demonstrate that PCB levels are decreasing rapidly. It should again be pointed out the recycled fiber utilized in the manufacture of these boards was selected to minimize the presence of PCB's. There is no practical method to select PCB free paper in bale form. The selection I speak of is based on the grade and the source of the wastepaper and cannot be foolproof.

We have no definitive test data on the PCB concentration in our effluent. As a result, we do not know the distribution of PCB between the outgoing paper and the outgoing effluent. If the conservative assumption is made that the finished board has two parts per million of PCB, that 80 percent of the PCB in the raw materials stays in the paper, that 20 percent goes out in the effluent and that the effluent amounts to 3,000 gallons per ton of paper. The concentration of PCB in the effluent would be 40 parts per billion. It appears that a maximum permissible level of five parts per billion could not be maintained with available recycled fibers.

John Strange Paperboard could go to virgin fibers, but they most certainly would not stay competitive with combination boxboard mills in other states. If this operation was discontinued, it would mean the loss of the jobs and the loss of the payroll outlined at the start of my statement. This would also mean that 85,000 tons of wastepaper would have to be disposed of by means such as landfill or incineration.

There are undoubtedly other sources of PCB, but the current level of PCB's in recycled paperboard result from actions occurring prior to 1971. This source of PCB has been discontinued. The level of PCB is expected to decline and the broad base data presented supports this. We cannot escape the fact that PCB's are in the recycled paper system and they cannot be legislated away. They are, however, declining rapidly.

It is requested that the proposed rulings not be implemented. It is requested that the State of Wisconsin, through Department of Natural Resources, devise a practical method of monitoring PCB's to be certain that the downward trend continues as expected.

Thank you.

EXAMINER: Thank you very much. Could you provide a copy of that at your convenience.

MR. SCHENCK: —I'll get it retyped.

EXAMINER: Thank you very much, sir.

Milton Lorman.

MR. LORMAN: My name is Milton Lorman, president of Lorman Iron and Metal Company, established in 1913. Our business is a scrap processor of ferrous, nonferrous and fiber scrap. In laymen's terms it's scrap iron, scrap metals, such as copper, brass, aluminum, zinc, lead, and scrap newspaper, cardboard, ledger grades, some of them called the sulfite grades. We employ 65 to 80 people. Our payroll is \$622,379 per year. Our state and local taxes only last year were \$53,294.

Any material we process, particularly wastepaper, reduces the amount of land required for the landfill use. The statistics that I have show that 60 percent of the solid waste in the landfills is composed of paper fiber. The conclusion I hope that you draw is that we are today the largest conservationist, ecologist and/or environmentalists.

Because of the nature of this hearing, I will dwell on the wastepaper aspect. Besides our present plant in Fort Atkinson, by means of industrial revenue bonds, we are building a half a million dollar plant for the recycling of wastepaper in Janesville, Wisconsin. Aside from this prepared text, it's frightening to know that I'm going—as an entrepreneur, putting this much money in an investment and it may not work. I mean, it could possibly be cut out. So I have—very apprehensive at this point. But this plant, as well as our present plant, purchases newspapers via paper drives, cardboard, tab cards, ledger grades, which is either old or new, business forms of any kind, from commercial establishments, industrial plants, banks and printing companies. This material is sorted by hand into specific grades of wastepaper to be shipped to the paper mills. The following are grades of paper segregated and baled by the paper stock dealers to be shipped to paper mills. I've listed some of these just to make you aware that it's just not wastepaper. There's specific grades. There's no. 2 mixed paper, no. 1 mixed paper, super mixed paper, box-board cuttings, no. 1 news, overissue news—I'll skip some of these—get into possibly the ones that would be—well, in the mixed paper, it's very easy that somebody threw away a federal form that's got the PCB in it. In the ledger grades it might be in some industrial plant that has some old records. But to our—so I'm just trying to give you some of the grades that we have.

There's also 46 grades of wastepaper from our trade association and national association recycling industries. They're all listed here to give you an idea of what the grades of paper are and the specifications. The ones that—and other grades that would be affected here could be the—what we call no. 1 sorted colored ledger, manifold ledgers, and so forth.

The effect of no PCB discharge to us, a scrap processor, is related to what the paper mills will purchase. In the area of the high grade papers that come from the banks, industrial plants, it is possible we will not be able to ship this paper to the mills if they are curtailed in their purchases. What does that mean? As you go down the line the alternative would be to take the material to the landfill and we would charge these institutions. One thing I would like to point out very emphatically, the scrap processor pays for everything when the economics are there. They pay people for it, which helps circulate money. At present, our customers are paid for what we pick up. Total restriction of PCB would affect the economics of our customers and our operations.

At present we have no means of identifying PCB type of carbonless paper from other carbonless grades of paper. If there is a means of identifying the chemical, we do raise this question, can we sort it out economically? Again, if we cannot, it will go to the dump. Pardon me, the landfill.

It appears to me if we cannot process the material, it ends up in the landfills. That PCB will still end up in the water table or our environment. PCB was banned from the use in carbonless paper a few years. The amount in the wastepaper should be considerably reduced. I'm speaking as a layman, not as a technical person and I found this in other grades of scrap that we have handled throughout the years. When it's stopped at the source, it eventually just dwindles. My fear is that I have an example of a 100-ton—could be thousands of tons of paper. It could be because somewhere there was 10 pounds or 100 pounds of carbonless paper. I don't know the chemistry of the specific PCB. I'm not mentioning pure PCB. But just think of it, maybe 50 pounds of carbonless paper and say 100 or 1,000 tons of paper. If it's possibly there, we'd have to throw it in a landfill.

The paper recycling industry has had enough problems. This is the first time we've had anything that really involves the environment. We've had unfair freight rates, unfair tax advantages compared to paper mills who do not use wastepaper; if you'll pardon the expression now, harassment by the DNR in attempting to license us. We're in court on this issue right now and sales tax discrimination resulting in a Supreme Court case. The confusion that I'm trying to show you is that we are supposed to be the greatest ecologists and conservationists. We have the public backing. We have the legislative backing. But we're constantly having problems with the—shall we say the bureaucrats in our state.

I'm aware of the danger of PCB's. In my views, I express the effects on our industry. I feel the answer is in the control by a realistic percentage than a total ban. At this point in history I feel the dye is cast. There cannot be a total ban. It will end up—that is, from the wastepaper point of view, it will end up in our environment whether it goes through the paper mill or the landfill.

EXAMINER: Do you have a copy of that presentation, sir?

MR. LORMAN: I just gave it to you.

EXAMINER: Oh, okay.

Attorney Bach, as I understand, you want to make a motion and a summary?

MR. BACH: My name is Attorney Donald L. Bach and I represent the Wisconsin Paper Council, the trade association for the pulp and paper industry in Wisconsin.

Mr. Examiner, for the record and because of the extreme complexity of the issue, we would like to formally move the tribunal to grant a 30-day period following the furnishing of transcripts in which written briefs and comments could be made.

EXAMINER: That motion will be taken into consideration and the determination made prior to the closing this morning.

MR. BACH: Thank you, Mr. Examiner.

On behalf of the Wisconsin Paper Council, I'd like to summarize the key points in the testimony and positions offered by council members over the past two days.

One, we recognize that there is a potential problem with the introduction of PCB's into the environment.

Two, the paper industry has not created this problem. The paper industry does not use PCB's in its processes and the paper industry finds itself caught in the middle of this controversy merely because of its recycling efforts which would be halted by the adoption of the proposed rules.

Three, the proposed regulations place an incredible burden on our industry, requiring removal of PCB's to levels one thousand times smaller than the Food and Drug Administration's temporary tolerances as applied to food board.

Four, our industry has a history of cooperation with government agencies to reduce PCB levels in our finished products. We will continue to cooperate with the Food and Drug Administration and with the DNR to find solutions to the PCB problem.

Five, we strongly support strict controls on the manufacture, distribution and use of PCB's and we favor a national ban on the importation of PCB's.

Thank you.

EXAMINER: Thank you, sir.

Before we continue with further public comment, does anybody wish to comment or speak to the motion made before this hearing today? Being the 30-day comment period requested after availability of the transcript?

(No response)

EXAMINER: Mr. Richard Manthe, would you wish to make a statement at this time?

MR. MANTHE: (Inaudible)

EXAMINER: Okay. Thank you. Mr. Manthe will submit a written statement.

Is Mr. Edward Tilson present?

Is there anyone else present at this time that wishes to make an oral statement?

VOICE: I have a question on the transcript. How and when would they be made available and has that been decided?

EXAMINER: Okay. The question went to the availability of the transcript. I think before going further we'll take between five and ten-minute recess to consult with the recorder. The hearing is closed for five minutes.

(Recess)

EXAMINER: Ladies and gentlemen, please be seated and we'll continue with the hearing.

Okay, ladies and gentlemen, the motion of the Wisconsin Paper Council regarding comments has been considered. The determination is that the comment period will be extended from today's date through 30 days after availability of the transcript, or November first, whichever is earlier. It appears at the present time the transcript may be available by the 20th of September. All parties filling out an appearance slip will be notified by letter as to availability of the transcript and the cost. There also—at least my recommendation will be limited availability to the public of the transcript in at least the six district offices of the Department and the Madison office so that the public may view the transcript without cost. The district offices are located in Spooner, Wisconsin, Rhinelander, Green Bay, La Crosse, Eau Claire, Milwaukee.

Okay. Mr. John Troglia. Is he present?

MR. TROGLIA: My name is John W. Troglia and I am chief station engineer for the Wisconsin Electric Power Company. I am a graduate of the University with a Bachelor of Science Degree in Electrical Engineering. I'm a registered professional engineer in the State of Wisconsin.

I've been employed by the Wisconsin Electric Power Company for approximately 15 years, during which period I have served as substation design engineer, generation and transmission planning engineer and project engineer responsible for distribution of substation design. In my present position, I'm responsible for the design of transmission stations, bulk power substations and power plant switchyards on the Wisconsin Electric Power Company System.

I'm an alternate member of the National Electrical Code Committee Panel #13, which is responsible for those code articles dealing with transformers, capacitors, resistors, reactors, transformer vaults and equipment and systems of over 600 volts in general.

I'm a member of the Unit Substation Subcommittee of the ANSI High Voltage Apparatus Committee and a member of the IEEE.

My testimony today is in behalf of the Wisconsin Electric Power Company and the Wisconsin Public Service Corporation.

I would like to state at the outset that the operations of the Wisconsin Electric Power Company and the Wisconsin Public Service Corporation do not appear to be greatly affected by either of the two proposed rules regarding the discharge of PCB's into the waters of the State of Wisconsin. Our only use of PCB material is in capacitors and transformers which are closed electrical systems. However, other industries in Wisconsin are greatly affected and the above remarks should not be construed as diminishing their problems.

Our presentation today is concerned with submitting information to the Department of Natural Resources regarding current uses of PCB's by the electric utility industry, Wisconsin Electric Power Company and Wisconsin Public Service Corporation. We understand that a Monsanto Corporation representative, among others, will present material concerning the technical, economic and scientific aspects of PCB manufacture and usages so we will not address those areas.

The best statement of the history of PCB's in the electric industry, including benefits, risks and alternatives is contained in Chapter 2 of the American National Standard Institute Guidelines for Handling and Disposal of Capacitor and Transformer Assemblies Containing Polychlorinated Biphenyls, C107.1-1974, a portion of which I should like to read into the record at this time.

Chapter 2.5 was Interdepartmental Task Force on PCB's. An in depth study of PCB's has recently been completed by five executive branch departments of the federal government. This

Interdepartmental Task Force on PCB's issued their report entitled Polychlorinated Biphenyls and the Environment in May, 1972. The following conclusion is quoted from page 4 of this report.

The use of PCB's should not be banned entirely. Their continued use for transformers and capacitors in the near future is considered necessary because of the significantly increased risk of fire and explosion and the disruption of electrical service which would result from a ban on PCB use. Also, continued use of PCB's in transformers and capacitors presents a minimal risk of environmental contamination. The Monsanto Company, the sole domestic producer, has reported voluntarily eliminating its distribution of PCB's to all except manufacturers of electrical transformers and capacitors, unquote.

We should also like to submit a copy of the entire ANSI Guidelines for the record.

The only use made of PCB material by Wisconsin Electric Power Company and Wisconsin Public Service Corporation is in closed, in other words, sealed electrical systems, such as transformers and capacitors. Handling procedures have been adopted by both companies that parallel the ANSI Guidelines. However, pursuant to the July 9, 1975 letter from Mr. Brooks Becker, director of the Bureau of Air Pollution Control and Solid Waste Management of the Wisconsin Department of Natural Resources, to all Wisconsin electric utilities, Wisconsin Electric Power Company Task Force has been established to reevaluate WEPCO policies vis-a-vis the recommendations in that letter. Company policy is now being revised to insure that in the future scrapped transformers and capacitors will be sent to approved disposal centers, which are all outside of Wisconsin. Wisconsin Public Service Corporation also initiated positive controls on the disposal of PCB on June 22, 1972. Since that date, all scrap capacitors and transformers containing PCB have been collected and stored centrally, pending disposal in accordance with recommended guidelines. It should be noted that the recommendations in Mr. Becker's letter were basically to follow the ANSI guidelines.

In summary, it would seem apparent that the DNR is well aware of the voluntary efforts of industry to guard against the potential dangers of PCB materials. We have outlined in brief the history of PCB's including the benefits, risks and alternatives. There are compelling reasons, both technical and economic, for the continued use of these materials.

EXAMINER: Thank you very much, sir.

Is there anyone else at this time who wishes to make a public statement?

Mr. Tilson, are you ready to make a statement at this time?

MR. TILSON: (Inaudible)

EXAMINER: Okay. Let's recess for five minutes.

(Recess)

EXAMINER: Okay. Ladies and gentlemen, back on the record and there'll be an oral presentation with slides by Mr. Tilson.

Mr. Tilson, please identify yourself, who you represent and present your statement.

MR. TILSON: Okay. Okay. My name is Ed Tilson and as I say, my PE license is pending review. I'm—today I'm representing Committee to Expose Carcinogen Coverup and the affiliation there is with Center for Public Representation.

This—I may not be too articulate because I really didn't quite have things together. I was hoping over lunch to put things in a more finished form and I won't be reading from anything. It'll be more extemporaneous.

During the presentations we heard leading up to this, a lot of material was brought out in the record that I've more or less been researching and becoming aware of myself previously. And I've been very intrigued with the work of Dr. Allen because you see there I think a major environmental—well, it's actually a public health problem. This is one thing I want to say that this is not, I don't think, an environmental problem so much as it is a public health problem and I think that the handling of this matter, polychlorinated biphenyls, points up that public health has actually been somewhat slighted as a process of the past few years, because there have been a lot of Departmental mergers on the federal and state level in which public health has largely been thrown into environmental agencies and in that sense, there has not been sufficient awareness of the problems that can develop into major public health problems—major public health—you'd almost call it catastrophe, although I've seen that word sort of misused during the hearing.

As a result of my own experiences in working in the environmental field as an engineer and seeing that most engineers gravitate toward administration, I've been kind of disappointed at the way in which engineers approach these kinds of situations and I've been more positively impressed in the way biologists approach them. In other words, I've gotten the feeling that engineers working for biologists are a better team than biologists working for engineers. And I think the basic reason for this is that engineers tend to think in terms of things, in terms of quantities, in terms of getting something done, producing results. And I think that that's not the kind of approach you're going to want when you're dealing with things that can lead to public health problems.

I think this is pretty well pointed up in 1st Corinthians, in which the quote is that "God hath chosen the foolish things of the world to confound the wise and God hath chosen the weak things of the world to confound the things which are mighty." And all life is really founded on a chain which evolves from very simple unicellular organisms and the various toxins which were put into the environment can affect them and can affect the entire life chain. And I think this is a thing which we're seeing with PCB's, because even though the quantities are very small, around the limits of detection, this—this is part of the problem that there's extensive bioconcentration of these to levels wherein fish—they're approaching—they're approaching levels that could probably, in years to come, induce liver cancer, stomach cancer, birth defects, reproductive malfunctions, and the concentrations are in the fatty tissues, which shows up in very high concentrations in the liver and also in the brain.

The brain is a very complex thing, the—they—esoteric neural pathways. I do think there is a problem here no matter how much certain industries try to play this down by presenting what they feel is economic catastrophe for them, when in actual fact, I don't think that's the case.

I have some maps up here in which I point up some of the—the sources of PCB's. I don't know where Monsanto's plant is located, but, of course, they've presented themselves previously. I tend to have a feeling on this that transformers tend to be a fairly conservative use of this material from which it's reasonably difficult for it to get into the environment. I think a very high priority should be placed on developing a substitute and there are reports that substitutes do exist. This was what people on the Natural Resources Board have said.

From that standpoint, I'd like to see this replaced, even in transformers, but in the meantime, the critical thing probably becomes to limit imports, given that many of these corporations are said to not be following Monsanto's self-regulation. Nonetheless, transformers—they were a target, for instance, when I was at Stanford during the radical unrest. The transformers were shot up a lot and, of course, whatever was in them leaked out. So, I mean, that's always something to be considered that even what you consider as conservative is not always conservative use of materials.

The industry that I'm essentially concerned with is the paper industry and this is not because I feel that the paper industry or the specific sector of it which deals with deinked paper and carbonless copy paper is not making an effort to clean up, but I think there's an inherited problem from past years and I'll come back to this later, but people at DNR on the technical level, the lower level professionals, have tried to call attention to this. And yet what has come out of there has not really called attention to this and I'd like to return to that later.

The—I—the sources which are a problem with this are Ward Paper Company in Merrill and then there's National Cash Register subsidiary, which I understand is at Portage. Appleton Paper is a subsidiary of National Cash Register. I'll point to these on the map over here.

EXAMINER: Before you go any further, Mr. Tilson, would you please state what the maps are?

MR. TILSON: Okay. This is the—the one on the left is an aerial map. It's a pretty good map for illustrating things, I think. And the one on the right is a regional planning map put out by the Sea Grant Program.

EXAMINER: What area does the regional map cover?

MR. TILSON: Of Green Bay.

EXAMINER: Okay. Also let me caution you, Mr. Tilson, we perhaps only have ten minutes left of tape, so.

MR. TILSON: I mean this is Merrill and this is Portage down here. I don't think that these are major problems. Merrill, maybe, but any sediments from Merrill will be picked up and—like in Peterwell reservoir. (Inaudible)

I'm not too familiar with that. But in any case, carbonless copy water, one of the higher concentrations is a relatively recent use of this. I understand PCB's given their peak stability have been used in premiums for about 40 years, which means you have a problem of 40 years accumulation.

Now, in Green Bay, I'll try to go to my slides. The companies involved in this are Bergstrom and Neenah, possibly American Can Company, because I understand PCB's are used to get the—to get like wax paperboard type products, like milk containers and things like that, paper cups out of the molds. Combined Locks has Appleton Paper for Combined Locks. Again, National Cash Register is a subsidiary. U. S. Paper at DePere and I had difficulty finding it because it doesn't appear on this map. It seems to be very obscure.

And then, of course, Fort Howard, which has a person on the Natural Resources Board, John Brogan, and then a third kind of problem exists in Green Bay, because that's where the sediments go to. I tried to do some field sampling and I'll return to that in a second.

I guess I need the lights off now.

Okay. Let's start. This is a statue of Bridges (phonetic), the ancient Heltic river goddess. This is about 3,000 years old. What I'm trying to say by this is that 3,000 years ago our ancestors didn't pollute the environment. Whether they would have if they could have is a question, but the thing is what will the environment and the public health generally be like 3,000 years from now.

Okay. This is Portage. There was sort of an abortive trip out there looking for National Cash Register. While we were still in the air we couldn't find it too well. Later on, I found roughly where it was before I got a sample. I thought that was it, but it turned out to be a hospital or a school or something. It has a cross on it in any case.

Now, you can see sandbars on the river that caused us problems because we were using a sea plane and things are backwards, I can see. It will be a problem later on. We took this seaplane and we went out and came back. Later on I used the land plane. This is very hard to see that there are cows here, and DAR is really down on cows because cows don't pay a lot of taxes and they don't employ a lot of people, so cows are—and farmers are very much under attack.

This is going to be very rough because this is backwards. I was given misinformation on how this carousel worked. Could we stop the tape and everything while we change it, because it'll really be a problem.

EXAMINER: Okay.

(Off the record)

EXAMINER: Back on the record.

MR. TILSON: I'll try to go through these really fast. This is a—this is Kimberly-Clark. While sulfite process is not involved in this, there is a possibility that deink pulp from the deinking plants is used in kraft pulp, so at least one of these should be picked out to look at.

Here's Bergstrom outfall. This is algae. And I'm suspecting that algae and weeds are bioconcentrators of this initially getting into the fish. This could be used to—that in a positive kind of way by—rather than using pesticides, just weed harvesting, weed and algae harvesting and then you're bioconcentrating these residues in the past 40 years in the algae.

This is working downstream. It becomes a little obscure in here because one of these—I think this may be Kimberly-Clark at Kimberly which since the Neenah Plant doesn't lend itself to very good sampling because the sediments are roughly scoured out. It's rock bottom there and this—wait a second, this one here—I think this is the National Cash Register at Appleton—at Combined Locks, Appleton Paper, which has been involved in carbonless copy paper.

Okay. There it is again. This is Nicolet Paper, which I thought was U.S. Paper, since U.S. Paper doesn't appear on the regional planning map. But in any case, U.S. Paper is off to the right on the same bank as Nicolet Paper.

And Fort Howard, which is—and there you see the outfall with the plume extending downward. And this is coming up over it. And on the right you see the treatment plants. I mean money is being spent, I think, to clean this up presently and maybe a little bit of an improvement is needed in that. But the problem is an inherited one from the past 40 years and there I'm being left off at Neenah to face the hostile natives.

This is the most exotic piece of sampling equipment I had because I managed to get some of that mud later—they're excavating at Neenah for some sort of outfall. Here we see some of the algae and some people fishing. I had a lot of pictures of people fishing that didn't come out—one of which was like people taking baskets of fish away. So I mean it's no one fish a week. I mean, this is an area where there's very—some people are involved in very heavy fish consumption and there's a little boy even, you know, a little boy with his grandfather, I mean it would have been a really good picture, I think, to show this problem.

This is the Bergstrom Paper outfall. Here's an area, I think, where sediments have accumulated from the breakdown of the fibers coming out of the plant and there's a lot of lily pads. Well, what was interesting was that there was like an oily alime covering a lot of this plant material and the plants' cells were oily. I think that these plants are probably preferentially taking up oily material; it's part of their metabolism. And I think this might be a thing which could be explored.

This is a landfill which is being put down in that area and I think this might be the best way to contain a lot of these sediments. If you put a clay layer, which is then run over by sheepsfoot rollers, to provide an infiltration barrier and you do groundwater studies to make sure that there's no major groundwater flow through this area. But this would be a way of retaining any sediments that are found to contain large amounts of PCB.

This is Kimberly-Clark. This outfall was apparently plugged. It's a measure of the progress that is being made.

This is down near Menasha. This is, I think, this would be an outfall that would pick up material from American Can Company, possibly Strange Paper Company, John Strange. That's American Can looking under the trestle. This is very largely rock bottom. That's what I used—my delicate professional hands are not used to the rigors of the norm. I'm really sore.

This is American Can again. And this is John Strange. I'll try to get this a little bit better into focus, but it shows that they're using wastepaper also, so this is quite extensive, this problem.

American Can—and this is returning. I'll just show where the sediment areas were. This was the one from Bergstrom and Kimberly-Clark might be putting out. American Can, John Strange, Menasha Corporation. I don't think is involved in this; Strange does use some wastepaper, probably not very much. American Can may use it as a release from the malt. But anyway that second sludge bank is down here. We also have sludges all along this shore, the west shore of Little Lake Buttes des Morts. A lot of sediments.

Kimberly—this is where Kimberly-Clark is—so that a spot check could be made on kraft paper industry. Combined Locks where Appleton Paper is. I think at that time it was called Combined Mills.

I'll point to U.S. Paper and this is Fort Howard over in here.

And Fort Howard is this projection where there are shallows adjacent to it. See this is Fort Howard in here.

And in Green Bay, this is—I'll show Atkinson's Marsh, which was recently filled with sediments from Green Bay. That has been since filled and Army Corps of Engineers was allowed to fill that if they used sheet piling to keep the wastes from getting back.

This is where most of the wastes have accumulated actually, out in Green Bay, where you would probably find very good sample—samples showing high PCB content.

The interesting thing is that money exists to clean this up. There's \$15 million in Section 115 which apparently a lot of people don't know about, because I think if they had known about it, they would have spent less—really less effort in trying to see that it didn't come out. Instead they would have maybe admitted to it. But I don't know. Maybe that money is gone now.

This is a clamshell dredge. I don't think that would be a good sort to use. There's a lot of resuspension from that, and a dipper dredge the same thing. A cutter head is for very hard material. This, I think, maybe would work pretty well in the area of U.S. Paper in DePere,

Fort Howard at Green Bay and actually out in the—in the eastern portion—western portion rather of Lower Green Bay. This is a suction device. And there is a source called jetting at laminar flow rates, jetting at benthic deposits at laminar flow rates, which indicates that there is—there's not much suspension—resuspension of pollutants observed when jetting, when the laminar flow rates are done. In other words, when it's done very slowly.

And James Jones of the Army Corps of Engineers feels that very much could be done along this line if the proper techniques are followed. In other words, the industry has not been too—it's been sloppy and he thinks there's a need to clean up there.

This is a floating dry dock. I thought maybe this would be a way of—not so much a floating dry dock, but an equivalent thing which has doors across. A landing ship dock could be used to remove these sediments, but now I don't think that's the best way. I think it would be best to put up, not so much sheet piling, but like a breakwater kind of effect, like retaining wall and fill in the area behind that over a period of time, using this technique for dewatering of dredged areas. This is from civil engineering. And then what could happen would be it would be made into a landfill and a clay layer for infiltration barrier could be put over that.

EXAMINER: Okay. We have about two minutes.

MR. TILSON: Okay. In closing, I'd just like to sort of say that I don't—I really don't feel that the Department of Natural Resources, not withstanding this conference, has really been on top of this problem to the extent they should be, because there really has been memorandums around on this since 1971 and in 1973 EPA almost had to—if you read the Great Lakes reports and such, the EPA was really the people that are pushing DNR on this.

And I'll read from a report, the Booz-Allen and Hamilton report for reorganization of DNR and one of the things they say is that "long chains of command lend themselves to delegation problems since it can become difficult to determine who in the chain is personally responsible for specific results. They can also create unnecessary organizational distance between professionals at a lower level who have detailed information and persons at the top of an organization who have a need for detailed information on a selective basis."

My observations have basically been that the lower level people would like to see the environmental and public health problems addressed to. This is the people at a professional lower level and I know the Natural Resources Board from my conversations with them. They want to see it dealt with. So the reason I think that there hasn't been more action forthcoming on this is somewhere in between I question whether—as is often brought out, whether it's necessarily at the Secretary's level, and I think what will have to be done on this is that people will have to take less cognizance of how much taxes an industry pays, how many people it employs and this kind of thing. And instead, the industries also have to sit down and be willing to employ technology which, as I say, I think does exist. There's biological treatment of chlorophenolic wastes, which is a relative, a related compound. They've had luck with mildly acid reduction techniques for degradation of polychlorinated biphenyls. This can be done on a current basis, a restriction of the use of PCB's will cause—will be—cause the level of PCB's in wastepaper to drop over a period of time and then the sediments problem can be addressed.

And I think that rather than industry saying that they really can't do it, but rather instead working to see what they can do. There's a lot of chemists; there's a lot of biologists, which are unemployed and there's sort of almost a need to spend money, I think, to get the economy going again and I think these are resources which should be applied. I don't think problems should really be covered up. I think they should be dealt with and I think the people in the organization—I would specifically like to mention two people. I think Stan Kleinert, here and Maurice Van Susteren I think are very dedicated professionals. And I think in some way they should be singled out for some special commendation, may a Governor's commendation or something, for the extent to which they've pushed this, I think. I think with it, not necessarily being a thing which is endeared them with the administration of DNR.

So anyway, I guess on that I'll close.

EXAMINER: Okay. Thank you very much, Mr. Tilson. I appreciate your appearance. Please provide us with copies of your slides and a memorandum of what's referred to in the slides, identifying the slides and referencing material you used. It would be good for typing up the transcript. Thank you.

Is there any other party who wished to make an oral comment at this time?

(No response)

EXAMINER: Okay. With that I will be here for a short time this afternoon to see

if anyone wishes to appear for comments in that we did issue news releases stating that we would be here. Otherwise, I have no information as to other parties who wish to appear. All of our presentations are completed. If those of you who are here do wish to leave at this time, then we will adjourn for a noon lunch. But if you aren't going to be with us after lunch, again, there'll be no further hearings.

The comment period is extended to 30 days after availability of transcript or November 1, whichever is sooner, and you'll be—all those filling out appearance slips will be informed.

On behalf of the Natural Resources Board, Secretary Voigt and the Department, I wish to thank you for your assistance and participation. We will now have a noon recess and readjourn at 1:00. Thank you.

(Noon recess)

EXAMINER: On the record.

The hearing into the proposed Administrative Code rules limiting the effluent discharge and pertaining to polychlorinated biphenyls which was recessed for the noon lunch period, is reconvened.

It is presently 1:30. No new persons who wish to give oral statements have appeared in the hearing room. Therefore, at this time, the record is—excuse me. The hearing is closed with the record to be held upon for receipt of comments pursuant to time limits stated in the before lunch recess address.

Thank you. The hearing is closed.

(Hearing closed)

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