

PCBs and their Effects on Rodents, Humans, and Wildlife

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EPA-Mandated Dredgings of Some of Our Rivers with
PCB-Containing Sediments

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A Tutorial Seminar
presented on
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to the

Students of Western Michigan University's
College of Engineering and Applied Sciences

by

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Good evening!

I'm sorry, but tonight you will have to be patient because this seminar will take about two hours. Complex subjects cannot be discussed in short sound bites. Who promised you a rose garden? However, there will be an intermission during which you can examine the more than twenty pieces of evidence which represent the core and the rationale for my observations and conclusions and which are laid out in front of me. Please do not change the order in which they are presented and do not mix them up. At the end of this session you will get a copy of the full text of my speech which you may want to share with relatives and friends.

I gave a very similar presentation on 3-11-2011 and 3-14-2011 to graduate and undergraduate engineering students, respectively. But you are lucky! This is a new and improved version with some new and interesting information added.

As an aside, please bear with me because my voice is somewhat hoarse: earlier this year I had surgery, and the breathing tube they put down my throat did not agree with my vocal cords.

You may ask "who is today's lecturer? Can we trust him, can we believe him?"

Well, since you don't know me, you should learn who the person is giving this presentation.

My name is Claus Globig: C, L, A, U, S, G, L, O, B, I, G.

The family name is a German name, although it's not a typical one because it is of Polish origin, meaning "dwelling" or "house", as I learned from a Polish emergency physician at Bronson Hospital some time ago. My first name is spelled with "C" and not a "K." This tells you that I am really the son of Santa Claus, so be careful at Christmas time!

Here is a warning: Look at my hair in these two photos. It shows what might happen to you if you study the PCB issue for 16 years. Your hair might turn grey first and then white!

I was born and raised in Germany and studied there. I received an undergraduate degree in mechanical engineering at the Technical University of Dresden, at that time in East Germany. I did not like the Soviet-Russian domination of the country and fled East Germany under the threat of imprisonment, and so did my fiancee, my parents, and my brother and his wife. I continued my studies at the University of Darmstadt, not far from Frankfurt, in West Germany, where I obtained the equivalent of a master's degree in mechanical engineering. By the way, of all the elements on the periodic table, this is one of the very few named after a city: Darmastadtium, Ds, atomic number 110. However, since it is an unstable element, this does not mean much to us as engineers.

After a few years of working on research projects, and after writing and defending a dissertation, the university conferred upon me a doctor of engineering degree in pulp and paper technology. One more year as what is called an assistant professor in this country followed, but then I accepted one of two good offers to join a large U.S. pulp and paper producer and came to this country with a wife and three little kids.

My intent was to learn how pulp and paper companies are managed here and to return to Germany after three years. Well, I am still here. My mother had often asked me when the three years will be over! I have worked in this country for 37 years for two companies of the pulp and paper industry, 35 of them for one company.

I found the right company, privately-owned, named Simpson-Lee Paper Co. It started in Vicksburg, Michigan, but grew to a company with 12 plants in 8 different states in this country and one large pulp mill in Chile. Three of these mills were state-of-the-art, new greenfield mills. We produced more than 1 million tons of bleached long-fiber chemical wood pulp and more than 1 million tons of paper. The paper grades involved ranged from white linerboard to high-quality writing and printing papers, both coated and uncoated, to many technical specialty paper grades, including release base papers for postage stamps and other end uses, archival papers for documents and for artists' prints, and high-quality ink-jet printing papers and photographic base papers. We sold paper world-wide. I directed all research and development activities from day one to my retirement at the end of 1995 with one R&D Center and three satellite R&D laboratories at our most important paper mills. Simpson Paper Co. never recycled any post-consumer carbonless copy paper. Although Simpson Paper Co. owned the Plainwell

paper mill for ten years, starting in December of 1987, this was long after PCBs had been banned so that no PCBs were discharged into the Kalamazoo river from its operations. After my retirement, at the age of 69, I worked as an International Consultant.

Our associated Simpson Timber Company on the West Coast, really the owner of Simpson Paper Company, has been in the business of re-forestation for more than 100 years.

My professional activities led me to Canada, Germany, Finland, Sweden, Denmark, The Netherlands, Belgium, France, Italy, Japan, South Korea, Australia, and Brazil. It was an interesting and challenging professional life. I have a pretty good perspective on many things and have learned a great deal about our world and people and customers and, especially, human freedom.

I am proud to be an engineer and am glad that you want to be engineers. We need you! More power to you!

If you want to be a civil engineer, here comes your challenge: Bridges! These photos are not very good photos, but they give you a very good impression about the length and the size of these massive structures.

My brother, a civil engineer, also educated in Germany and now retired, was the chief engineer of a bridge design company in Manhattan that initially designed bridges for our interstate highway system. Later this group designed the President Costa de Silva bridge, better known as the Rio-Niteroi bridge, which is 8.25 miles long and connects Rio de Janeiro with Niteroi, where Rio's airport is located. My brother stayed in Rio for four years supervising the bridge's construction. Another project of his was the Penang bridge, the Jambatan Pulau Pinang in Malay, which connects the Penang Island across the Malucca Straights with the mainland of Malaysia on the Malay peninsula. Now my grandson, Gregory Neff, is studying engineering here at WMU although his home is in Manchester-by-the-Sea in Massachusetts. He is now doing what grandchildren are supposed to do: help their old grandparents.! He is handling the overhead projections tonight. Based on the advances in molecular biology, I think that one of these days an engineering gene will be discovered in the human genome!

The two main topics of today's tutorial seminar are "PCBs and their Effects on Rodents, Humans and Wildlife" and "EPA-Mandated Dredgings of some of our Rivers with PCB-Containing Sediments." Fasten your seatbelts, because this will be a rough ride. As a preamble, I should mention that what follows is a brutally honest report that might be uncomfortable reading for some of the people cited. However, the truth is the truth, and people should feel responsible for what they said or did or did not say or did not do.

Before we go into detail, I have to talk about the confusion that exists about words and their meaning. I have published papers in technical journals in Germany and in this country and have presented papers at national and international conferences in Germany, Canada, and in the USA. To prepare for such occasions, dictionaries, unabridged and abridged, even medical dictionaries, were close at hand to make sure that I knew the exact definition of every word I was using.

When Dale Harrison, the president of the Kalamazoo River Protection Association, characterized PCBs as "cancer causing toxins" and "toxic poisons" in print in 2001 and again in 2003, I became nervous. When I learned that in 2005 Bob Beck, at that time vice-president of the Kalamazoo River Watershed Council, publicly stated in front of a TV camera in Grand Rapids that "the Kalamazoo River is the Chernobyl of West Michigan," I became alarmed because this statement was patently false. I sent him information about what had actually happened in Europe, as far as the disastrous effects on humans were concerned, and asked him then, during a meeting, whether he still believed what he had said. The answer was "yes." No further comment!

The Kalamazoo River Protection Association, the Kalamazoo River Watershed Council, and the more recent Kalamazoo River Protection Association are all tax-exempt non-profit organizations under the IRS rules' heading of Educational Organizations. Their instruction of the public must be useful to individuals and beneficial to the community. The rules clearly state that "the mere presentation of unsupported facts is not educational." If these rules are not followed, the non-profit status may be revoked.

Quite a number of years ago, I don't remember the exact year, I joined the Kalamazoo River Watershed Council, supported it with a yearly donation (and still do) and attended most of the Board of Directors' meetings, which

are open to the public. In the early days a supporting member who contributed more than \$ 100 per year was named a Steward of the River, an honor I still claim today.

The reason for joining the council was partially based on its Position Paper as Revised of 11-25-2003 which states with regard to the cleanup of the Kalamazoo River:

“We will work to ensure that unbiased decisions are made based on solid scientific evidence and that appropriate monitoring is conducted as the cleanup proceeds. We will do our best to convey information and issues to the public in a balanced manner...”

This agreed well with my thinking as I have expressed it in at least one public meeting:

“Any action to be taken along the Kalamazoo River must be based on the most up-to-date, most extensive, and most reliable science and technology and not on emotion. Moreover, it must be assured that any remedial action to be taken will actually improve the ecology of the river and not make it worse.”

I have lived in Kalamazoo for 50 years and am as much interested in a clean and healthy Kalamazoo River as other people in this area.

When I learned in 2000 that PCBs were still flowing into the Kalamazoo river, I was flabbergasted: The reason was the erosion of PCB-containing material from what used to be the submerged sediments in the three impoundments behind the Plainwell, Otsego, and Trowbridge dams owned by the Michigan Department of Natural Resources (MDNR). These sediments had been submerged until the 1970s when the MDNR drew down the impoundments to present levels. Today these former sediments are exposed above the waterline and have become a source of PCBs as they slowly erode into the river with rain water.

During a board meeting on 6-28-2005 I told the board members that I admired them for actually helping to clean up the river physically and motivate and organize others to do the same because the physical

contamination of the river had been the most obvious problem in the past. However, I also stated that the chemical contamination was another matter and that the PCB problem had been greatly exaggerated and that a great deal of misinformation was out there in the public which had not been dispelled.

I also suggested to pay more attention to mercury, lead, cadmium, arsenic, phosphates, nitrates, bacterial pathogens from fecal matter of humans, livestock, and wildlife, and especially invasive species, for example the Asian carp, and fine-particle diesel engine emissions (which are known carcinogens) instead of concentrating on PCBs in the river sediments.

The words "toxic" and "toxins" are in vogue now, but often used incorrectly and often also interchangeably. One professor at Western Michigan University and another professor, at Michigan State University, the Kalamazoo Gazette, and the Wall Street Journal have all made these mistakes. Very recently an announcer at the PBS-TV NewsHour also used the word "toxin" instead of "toxic substance." The producers of the show should google the words they want to use before airing the program. Words do matter, words do count!

Interestingly enough, in the past not even the EPA has termed PCBs as toxic: EPA personnel from Region 5 in Chicago have not done so during presentations or in print for a long time. Only in August of 2011 did they do so. However, when Dr. Hannah McKinney, a professor of Economics at Kalamazoo College, was mayor of Kalamazoo, she referred to PCBs as "highly toxic" in a letter dated 4-2-2007 to the EPA Region 5 Director, I asked her, during a 4-minute presentation to the Kalamazoo City Commission, on 4-5-2010, who gave her that information, she did not respond. I wanted to talk to that person. She told me, however, that I had only half a minute left. When I inquired whether the importance of the subject would justify a little more time, her answer was "no." You only have 4 minutes to address the City Commission but you don't get an answer. Is this democracy in action? PCBs are certainly not highly toxic, they are not even toxic, as you will find out later during my presentation. PCBs can, however, be considered rather persistent organic industrial pollutants.

If the EPA or any other agency elects to include substances that can be considered hazardous materials or persistent organic pollutants or

contaminants under the term toxic, this is not correct scientifically. We cannot redefine existing definitions of medical and scientific words depending upon a personal point of view or agenda, political or otherwise.

In every dictionary toxic is defined as poisonous. It is based on the Latin word toxicum, which was the poison on the tip of an arrow in the Roman empire. The scientific definition of a poison is that of a substance which, when introduced into an organism in relatively small amounts, acts chemically upon the tissues to produce serious injury or death! While the prevailing view is that PCBs are toxic, they certainly do not fit this description. Toxic substances can be either man-made or natural. Toxins are natural toxic substances, they are not man-made. A toxin is a toxic matter generated in living or dead organisms. It is a poisonous substance, having a protein structure, secreted by certain organisms and capable of causing toxicosis when introduced into body tissues but also capable of inducing a counteragent or antitoxin. Examples of toxins are aflatoxin, ricin, and botulinum.

Based on the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the so-called Superfund Law, a few of our rivers, including the Kalamazoo River in 1990, the Fox River, and the Hudson River, have been declared so-called Superfund Sites because of PCBs in their sediment. The EPA then has mandated to dredge the rivers to remove the PCBs. This decision was based on the listing of PCBs as "probable human carcinogens," an assumption based mainly on the fact that Sherman-strain female rats developed liver cancer when fed in 1975 by Dr. Renate Kimbrough and co-workers very large amounts (100mg or ppm or 100,000 ppb) of PCBs in their daily diet until they were killed after 23 months and then dissected. This designation of "probable human carcinogens" was done in absence of any information on the effects of PCBs on humans. It was a projection from rats to humans.

Assuming the weight of a rat to be 2 lb, the equivalent for a human with the weight of 160 lb would be 8,000 ppm or mg or 8 million ppb or 8 grams. Imagine! This would be absurd.

As far as I know, the Superfund Law was originally developed for the cleanup of polluted sites left behind by oil companies. I don't know why it was extended to cover PCBs in river sediments.

After I retired at the end of 1995, I had time to assume the role of an investigative reporter and follow the PCB trail from their first mention in 1881 in the German scientific journal, Annalen der Chemie, to the present day. I wanted to know whether PCBs posed any real risk for humans and wildlife, as assumed by many people. I was a reporter, not a PCB scientist. However, I paid special attention to the newer scientific evidence which I could not find in the EPA database. As Dr. Preuss, the Director of the U.S. EPA Integrated Risk Information System (IRIS) in his letter to me of 4-9-2007 had indicated, the last PCB risk assessment was done in June of 1997, 14 years ago!

In a summarizing way I am presenting to you the evidence I found during the last 16 years. Then think about it and draw your conclusions. You are invited to be the jurors. I trust that you will listen with an open mind. Unfortunately, I found out in a number of public meetings that most people in the audience did not have an open mind but had their mind already made up. "Don't confuse me with the facts." In one of these meetings, on May 2, 2001 in Plainwell, organized by the Michigan Department of Environmental Quality and full of emotions, fear, and some hysteria, I had compared the human mind with an umbrella: they both will work only if they are open! With a closed mind no evidence will convince.

Don't worry, this will not be a chemistry lecture, but we have to know what PCBs are and their important properties. Polychlorinated biphenyls were considered at their industrial introduction as wonder chemicals, as were penicillin and prednisone described as wonder drugs when they were invented.

PCBs are a class of non-polar, chlorinated hydrocarbons with a biphenyl nucleus on which one to ten of the hydrogen atoms have been replaced by chlorine atoms. Commercial PCBs were manufactured and sold as complex mixtures containing multiple isomers at different degrees of chlorination. The commercial mixtures were clear viscous liquids with increasing viscosity with higher chlorination, up to being sticky like a resin. PCBs have low water solubility and low water pressure. They are soluble in most organic solvents, oils, and fats. PCBs are very stable compounds chemically and do not degrade easily, although they may be destroyed by chemical, thermal (high -temperature incineration), and biochemical processes. Many cities had ordinances that required the use of PCBs in electrical transformers and insurance companies insisted on their use because the old, petroleum-

based dielectric coolants often caught fire and the transformers exploded. PCBs reduced the risk of fires in office buildings, hospitals, factories, and schools.

Industrial PCBs are man-made. It was thought that PCBs do not occur naturally. However, I learned recently that papers published by 1) Isasaari et al. in 2002 and by 2) Green et al. in 2004 showed that PCBs have been identified 1) at low levels in all pre-industrial sediment subsamples from a remote lake in Finland with concentrations from 50-2,540 ng/kg dry weight and 2) in archival soil samples from different locations around the world in the early 1880s between 240 and 650 ng/kg dry weight. Note: the unit of measure is nanograms!

This might be a good time to review the units of measure used in this area of PCBs and what the amounts cited actually mean:

1 ppm is 1 mg/l or kg mg is milligram
1 ppb is 1 mcg/l or kg mcg is microgram
1 ppt is 1 ng/l or kg ng is nanogram

Whenever a number looks too small, a switch is made to the next unit of measure, such as from ppm to ppb or from ppb to ppt. Be careful, this may confuse you!

- 1 ppm is equivalent to 1 drop of water diluted into the 50 liters of a fuel tank of a compact car or 1 penny in \$10,000
- 1 ppb is equivalent to 1 drop of water diluted into 250 50-cubic meter chemical drums or 1 penny in \$10 million
- 1 ppt is equivalent to 1 drop of water diluted into 20 Olympic-size swimming pools of 50,000 cubic meters each
- 1 ppm is equivalent to 32 seconds out of 1 year
- 1 ppb is equivalent to 3 seconds out of 100 years
- 1 ppt is equivalent to 3 seconds out of 100,000 years

It is amazing that analytical chemistry is so advanced that such very minute

amounts of chemicals can be detected. Chemicals have to be very, very potent to be effective at such low levels.

PCBs were produced commercially beginning in 1929 through the mid-1970s and used world-wide in a wide variety of applications ranging from dielectric fluids that are not flammable in electric capacitors and transformers to heat transfer fluids, fire retardants, hydraulic fluids, lubricating and cutting oils, additives in pesticides, paints, copying paper, carbonless (NCR) copy paper, adhesives, sealants, and plastics. By far the most PCBs were used in electrical capacitors and transformers, about 1 billion lb. sold in the U.S. vs. about 45 million lb. for copy paper from 1930-1975.

PCBs have entered the environment through volatilization and through disposals. 99% of the environmental PCB mass is in the soil. However, atmospheric transport is the primary mode of global distribution of PCBs. Even if PCBs in river sediments were to be removed completely, pollution from the air will still occur, especially, for example, from India and China. PCBs may be considered ubiquitous pollutants, i.e., they are everywhere.

Faced with environmental concerns, Monsanto voluntarily curtailed the PCB manufacture in 1971 and stopped it completely in 1977. Later, in 1979, PCBs were banned for most uses by the Toxic Substances Control Act of 1976. Then the EPA classified PCBs as "probable human carcinogens." I was astounded. Where did the term "probable" come from? One either has or has not enough evidence for such a statement. The National Academy of Sciences had concluded in 1999 that scientific evidence was inadequate to suggest low doses of chemicals typically found in the environment, including PCBs, pose any health threat. Already in 1982 the International Agency for Research in Cancer (IARC) of the World Health Organization had stated that there is inadequate evidence for the carcinogenicity of PCBs in humans. I thought that PCBs were rather improbable carcinogens for humans based on their properties described earlier. I had to find out why this dramatic classification statement had been made.

Renate Kimbrough, who obtained her doctor of medicine degree from the old and renowned University of Goettingen in Germany, came to this country and devoted her career to public safety. In 1972, when she worked for the EPA in their Toxicology Laboratory as a pathologist in Chamblee, Georgia, she published, together with Ralph Linder and Thomas Gaines, a

paper and described that male and female Sherman-strain rats (specifically bred for lab experiments) had been fed 0, 20, 100, 500, and 1,000 ppm of two forms of PCBs (Aroclor 1254 and 1260) in their diet for eight months: enlarged livers were detected. In 1975, when she worked for the Center for Disease Control of the U.S. Department of Health, Education and Welfare in Atlanta, Georgia, Dr. Kimbrough published, together with Robert Squire, Ralph Linder, John Strandberg, and Richard Montali, a follow-up study which proved to be the seminal paper based on which PCBs were classified as probable human carcinogens. Female Sherman-strain rats were fed 100 ppm or 100,000 ppb or 100,000,000 ppt (this is equivalent to 5,000 mcg/kg/day or about 5,000 times the tolerable daily intake of PCBs set by the FDA for humans in 1973) of one form of PCBs, the highly chlorinated Aroclor 1260, in their daily diet for 23 months when they were killed. The result was that these rats developed an increased number of liver tumors compared with untreated control rats.

However, the liver tumors did not spread to other tissues nor shorten the lifespan of the treated rats. The treated rats actually had fewer reproductive-systems cancers, making their overall cancer rate no higher than that of the untreated rats. Could PCB-exposure actually prevent some types of cancer? Obviously, the people who classified PCBs as probable human carcinogens had not read the whole scientific paper involved. Interestingly enough, in 1984 three German researchers, Ekkehard Schaeffer, Helmut Greim, and Wolfgang Goessner published a paper that confirmed Kimbrough's finding: rats fed 100 ppm of commercial PCBs over most of their lives had more liver tumors and observable liver damage at the time of death than control rats, but again, they had significantly fewer tumors of other tissues. In fact, rats fed two different types of commercial mixtures had significantly lower overall cancer rates and better survival rates than the control rats on a diet without PCBs. The authors theorized that the reduced mortality and cancer rates might have been caused by "PCB-induced alterations in the immune system," presumably one stimulating cancer-preventing or cancer-fighting capabilities. I wish the EPA scientists would have read this paper! Or did they just ignore it? I read another reference that stated that elevated levels of PCBs or DDT in a woman's body slightly reduced the breast cancer risk. I wish I had this reference handy.

Later, Dr. Kimbrough also worked for the Food and Drug Administration (FDA) and the EPA in various other positions and became the Director for Health and Risk Capabilities in the Office of the Administrator of the U.S.

EPA in Washington, D.C., from 1987-1989. This is the highest position for a scientist in the EPA.

My impression that PCBs are improbable human carcinogens is supported by the fact that the so-called Ames test for the likelihood of whether a substance causes mutations of genes (often the reason for cancer) is negative for PCBs. Prof. Dr. Bruce Ames is a world-renowned molecular biologist and the recipient of the U.S. National Medal of Science. Dr. Ames is also the co-author of a book published in 2002 by the Fraser Institute of Canada ("Misconception about Cancer" by Lois Swirsky Gold, Thomas Slone, Neela Manley, and Bruce Ames), which describes the Human Exposure/Rodent Potency Index (HERP in %), which predicts the likelihood in % of whether a rodent carcinogen will also be a human carcinogen based on average daily human exposure. The HERP index for PCBs is only 0.00008%, far below the values for naturally-occurring carcinogens in wine, coffee, lettuce, orange juice, tomatoes, bacon, celery, mustard, beer, mushrooms, and hamburgers. For example, ethyl alcohol in various alcoholic beverages 1.8-3.6%; caffeic acid in coffee 0.1%, in apples 0.02%, in lettuce 0.04%, and in potatoes 0.004%; a mixture of hydrazines in mushrooms 0.02%; d-limonene in orange juice 0.03%; furfural in bread 0.004%. The lower these values are, the less likely it is that a rodent carcinogen will be a human carcinogen. PCBs get a pass!

In many public meetings and during a presentation by Prof. Dr. Charles Ide, the Director of WMU's Environmental Institute, great concern was mentioned for the health of sport anglers and especially so-called subsistence anglers, who ate fish contaminated with PCBs. Two local studies by US and Michigan State agencies did not establish a correlation between PCB levels in the blood of the anglers and negative self-reported health effects:

- a) Mid-1900s: Kalamazoo County Human Services and Allegan County Health Department.
- b) 1998 and 2000: Kalamazoo River Angler Survey and Biological Testing Study (Environmental Epidemiology Division, Community Public Health Agency, State of Michigan, U.S. Department of Human Health and Human Services Agency, Agency for Toxic Substances and Disease Registry, Atlanta, Georgia).

The final report, issued in May 2000, stated that no associations were observed between contaminant levels of PCBs, DDE (dichlorodiphenylethylene), and mercury in blood and self-reported medical problems. One ironic conclusion of this study was that anglers smoke more than the general public and should be encouraged to quit smoking!

When Bruce Merchant, at that time the president of the Kalamazoo River Watershed Council and now Public Services Managing Director of the City of Kalamazoo, had requested in 1999 further, extended angler surveys, the U.S. Department of Health and Human Services declined in a letter dated May 3, 1999. Obviously there was no evidence to justify this.

I have lived in Kalamazoo for 50 years, and during this period I have not seen anyone, sport angler or subsistence angler, come forward and claim that he or she got cancer or any other serious illness because of eating fish from the Kalamazoo River. No fish has ever been killed by PCBs either, based on my studies of the literature.

Dr. Kimbrough reported in 2003 about a 1989 publication in The Netherlands, which she edited (Henry A. Anderson in Elsevier Scientific Publishers B.V. – Biomedical Division) that an angler, who in the 1970s ate an average of 40kg of fish from Lake Michigan per year, had a PCB serum concentration of 360 ppb or 0.36 ppm without any adverse health effects. The same was true for the other anglers in this study. Many of these anglers were studied again later, and their serum PCB concentrations were lower because levels in fish had declined. Regular fish eaters in this area had PCB levels in their blood serum of about 20 ppb or 0.02 ppm.

Companies involved with the manufacture or use of PCBs in some form wanted to know whether their employees had suffered any ill health effects. Studies between 1987 and 1990 on employees of Appleton Papers, Inc., the producer of carbonless copy paper, which contained some PCBs in one of the coating layers, were carried out by the Harvard Medical School: there were no excess mortality rates for any disease, including cancer.

Another large Harvard Medical School study in 1989 on the use of carbonless copy paper worldwide showed no causal relationship with health hazards.

Since we cannot perform PCB feeding studies with humans, we must rely on epidemiological studies with as many participants as possible.

Jack Welch, at that time CEO of General Electric Corporation (GE) was very concerned about negative health effects workers in two GE capacitor plants, in Hudson Falls and Fort Edward in New York on the Hudson River, might have suffered due to occupational exposure to PCBs between 1946 and 1977 and wanted a large study done. However, previous studies on GE capacitor workers had been done already and shown no negative effects:

1. 1981 Brown & Jones (National Institute of Occupational Safety, NIOSH): there were no statistically significant excesses of deaths due to any individual cancer types.
2. 1987 Brower (NIOSH): in this follow-up study there were no significant excesses of any individual cancer types.
3. 1987 Nicholson, Selikoff, et. al., (Mt. Sinai Hospital School of Medicine): neither the overall results of the full study nor of the subgroup indicate any cancer risks.
4. 1988 Taylor (NIOSH, New York State Department of Health, Harvard School of Public Health): overall mortality was significantly less than expected (510 vs. 615) and cancer mortality was less than expected (136 vs. 145). None of these estimates of PCB exposure was associated with a risk of cancer.

Nevertheless, Jack Welch wanted a new study and was looking for a recognized scientist with unassailable integrity and credentials. He asked Dr. Kimbrough to take on this assignment (she had left the EPA), and she accepted. This was the physician who had published the seminal 1975 rat-feeding study! Dr. Kimbrough studied virtually everyone who ever worked at those two GE plants in Hudson Falls and Fort Edward between 1946 and 1977. Some 7,075 current and former employees were involved in the research.

As the culmination of all of these epidemiological studies, Renate Kimbrough, a pathologist, Martha Doemland, an epidemiologist, and Maurice LeVois, an epidemiologist and statistician, in 1999 published their striking report: "Mortality in Male and Female Capacitor Workers Exposed

to Polychlorinated Biphenyls." The conclusion was that the death rates due to all types of cancer for the GE employees at these two GE plants was at or significantly below the general and regional population rates. This study, the largest, the most reliable, the longest-running and statistically most powerful ever showed that "... even long-term human exposure to PCBs at higher levels than are found in the environment is not related to any increase in deaths from cancer or any other diseases." PCB blood levels of up to 2,600 ppb or 2.6 ppm were involved. A 5-year update published in 2003 by Renate Kimbrough, Martha Doemland, and Jack Mandel confirmed the earlier findings. If these two studies would have shown opposite, i.e. negative, effects, every newspaper and every TV station would have publicized the findings. Since the findings were good findings, they were not publicized wildly. Good news means no news!

Dr. Kimbrough's studies were praised by renowned scientists, such as Dr. Arthur Upton, former director of the National Cancer Institute, Dr. John Moore, former assistant administrator and acting deputy administrator of the EPA and former deputy director of the National Toxicology Research and Testing Program (NIEHS), National Institute of Health, and Dr. Jonathan Borak, Associate Clinical Professor of Medicine at Yale University.

The average PCB levels found in the blood of people in the general population who have been tested range from 4 to 8 ppb according to the Agency for Toxic Substances and Disease Registry. Heavy fish eaters in the Great Lakes Region in the mid-1990s had PCB blood levels of about 20 ppb. They must be lower now. Remember the angler who ate 40kg of fish from Lake Michigan for a year and had a PCB blood serum level of 360 ppb and was healthy?

If high-level workplace exposures do not cause cancer in humans, then it is nearly certain that such adverse effects will not result from the much lower levels that might result from environmental exposure. Let us also realize that 1 ppb is 1 inch in 16,000 miles or 1 drop of ink in the largest tanker truck!

During the turbulent public meeting of the Michigan Department of Environmental Quality on May 2, 2001 in Plainwell which I mentioned earlier and which was full of fear, emotions, and some hysteria, I explained to the participants the results of Dr. Kimbrough's 1999 publication, but to no avail. Even the Kalamazoo Gazette did not mention the good news in a printed report. The meeting was nothing but a paper mill bashing. In reality,

the paper mills involved were innocent victims. Weyerhaeuser at the Plainwell Paper mill, Allied Paper Co. in Kalamazoo, later owned by Millenium Holdings, and Kalamazoo Paper Co., later owned by Georgia-Pacific Corp., were involved. They were encouraged again and again to recycle, recycle! It was the right thing to do. Without their knowledge, mixed post-consumer waste paper coming into the mills contained used carbonless copy paper. Had they been told, they might not have known what PCBs were and that they might pose a health risk. Without intent to harm, there is no crime. There should be no liability.

When I started to explain the good news I had collected over the last few years, especially referring to Dr. Kimbrough's study, Dale Harrison, the president of the Kalamazoo River protection Association tried to cut me off and wanted to interfere with my presentation, violating my right of free speech. I continued with my presentation. Dr. Fonken, a researcher of the Upjohn pharmaceutical company and who knew me, asked pointedly in front of the audience "haven't you worked for the paper industry?" You can surmise what he meant by that question: that I was biased. I considered this a form of character assassination. My answer was that I grew up in the paper industry and worked in it all my life and that I felt better qualified than many other people to discuss the PCB issue at hand. There was certainly an intimidating atmosphere present during this meeting.

Here is a lesson to be learned here: never question the integrity of anyone, especially in public, without having specific evidence! I wrote letters to both Mr. Harrison and Dr. Fonken and asked them to apologize for their uncouth behavior in a forthcoming public meeting on August 15. As you can imagine, I received no response to my letters and no apologies. Such is life...

Remember, as mentioned earlier, Simpson Paper Company, for which I had worked, had owned the Plainwell paper mill for 10 years, starting in December of 1987. This was long after the manufacture of PCBs had been discontinued in 1971 and banned by the EPA in 1978. Therefore, Simpson Paper Company has never released any PCBs into the Kalamazoo River from its Plainwell operations.

In 2004 the Kalamazoo River Watershed Council (KRWC) had asked Prof. Dr. Charles Ide, the Director of WMU's Environmental Institute, to prepare a primer on PCBs. He received \$15,000 for this work from the KRWC from

a Technical Assistance Grant from the EPA with taxpayer money. This primer was first presented to the KRWC's Board of Directors. I was present and have a copy of the text. Later, Dr. Ide presented some or all of this information a few times to the public at various occasions. However, this presentation did not mention any of the fifteen medical scientific papers, including Dr. Kimbrough's 1999 and 2003 papers on the health of GE workers ,which had been published between 1981 and 2003 and which presented a completely different perspective and showed that PCBs are not causing cancer or any other serious illness in humans. He was either not aware of these papers, which would not speak well for his diligence in literature searches, or he just dismissed them, which would be very unusual for an unbiased professor teaching at a university.

By the middle of 2005 I had found enough information on PCBs to write it down. Then, on 6-28-2005, I presented my findings to the Board of Directors of the Kalamazoo Watershed Council and later gave them the printed text. It was all good news. I had also invited to this presentation Bill Krasean, at that time the science reporter for the Kalamazoo Gazette, who, a little later, published a summarizing report. The term "Board of Directors" is somewhat of a euphemism. The board is practically the council. The board members are not elected by the members. There are not many financially supporting individual members. I was one of them for years, and I still am. In 2006 I wrote a summarizing VIEWPOINT article for the Kalamazoo Gazette. Unfortunately, only a part of it was published because of space restraints. I distributed my two summaries widely during the following years. This will be mentioned in more detail later when we talk about the politics of PCBs.

Later, Dr. Kimbrough, together with one or two co-authors, published between 2001 and 2003 a total of four papers covering the world medical literature concerning PCBs: three of them dealt with PCBs and the birth weight, immune function, thyroid function ,and the neurobehavioral development of children; the fourth publication (2003) was a comprehensive, critical review of the world medical literature on the "Human Exposure to PCBs and Health Effects," ranging from animal data, human exposure, clinical studies, occupational mortality studies, case studies, studies on children, to memory and learning in adults. I am quoting some of the conclusions of these four publications:

"None of the publications reviewed provides clinical evidence that PCBs and related chemicals adversely affect weight, immune, or thyroid function in infants or children born to healthy mothers."

"In the aggregate, the studies reviewed here do not provide solid, conclusive evidence that environmental exposure to PCBs and related chemicals affect the neurobehavioral development of infants and children."

"None of the observed differences reported in the children represent clinical disease."

"In the past, most people in the U.S. had detectable levels of PCBs in their tissues. Now, however, despite lower limits of detection, PCBs can no longer be universally detected. In older people, levels may still be higher because of past exposure."

"There is no convincing evidence that PCBs cause cancer or other chronic health effects in humans at the various levels of exposure humans have received over the years."

More recently, I obtained a copy of a 2006 editorial publication by Dr. Peter Shields of the Lombardi Comprehensive Cancer Center of the Georgetown University Medical Center in Washington, D.C. The conclusions of this extensive study support Dr. Kimbrough's conclusions: "Overwhelming evidence shows that PCBs are not mutagenic... the epidemiological evidence fails to establish PCBs as human carcinogens... there has been extensive investigation of a PCB-related breast cancer risk and the literature is consistently null."

This confirmed what I had found in an article in the Journal of the National Cancer Institute of 5-16-2001 in which it was reported about the review of five studies which concluded that there was no association between the occurrences of breast cancer and blood levels of DDT (dichlorodiphenyltrichloroethane), DDE (dichlorodiphenylethylene), or PCBs.

Another extremely pertinent scientific paper I found later was published by Robert Golden and Renate Kimbrough in 2009: "Weight of Evidence Evaluation of Potential Human Cancer Risk from Exposure to

Polychlorinated Biphenyls: An Update Based on Studies Published Since 2003."

This very important paper cannot be ignored by the EPA because it confirms the conclusions of a similar paper published already in 2003 by Robert Golden, John Doull, William Waddell, and Jack Mandel. The main conclusion is that "the weight of evidence does not support a causal association for PCBs and human cancer." This goes back and confirms a 1999 statement of the Agency for Toxic Substances and Disease Registry (ATSDR) in a draft toxicological profile for PBS: "The weight of evidence does not support a causal association for PCBs and human cancer at this time." The dramatic differences between rodents and humans in sensitivity to PCB-mediated induction of CYP1A1 (a gene) suggests that even occupational exposures to PCBs have never resulted in PCB body burdens approaching the levels required to initiate the sequence of events involved in the promotion of liver tumors in rodents". This should end any further discussions. I cannot over-emphasize the importance of these findings.

It is ironic that just before I started to write down my notes in 2005 I went to the Kalamazoo Public Library and looked up PCBs in the 2004 edition of the Encyclopaedia Britannica (mine is from 1960!). One comment confirmed my conclusions in a nutshell: "It appears that humans are more resistant to the toxicity of these compounds (such as PCBs, PBBs, and TCDD) than are some species of laboratory animals, and the main toxic effect observed in humans is chloracne, similar to juvenile acne."

My two summaries (from 2005 and 2006) were widely distributed over time, mainly to the following people, sometimes with other pertinent information added: three successive presidents of the Kalamazoo River Watershed Council, Robert Beck, Rich Koster, and Prof. Dr. Stephen Hamilton; Prof. Dr. Charles Ide, Director of WMU's Environmental Institute; Dr. Jay Means, Chemistry Professor at WMU; Bill Krasean, Kalamazoo Gazette's science reporter; Rebecca Pierce, Editor, and James Stephanak, Publisher of the Kalamazoo Gazette; a few other Kalamazoo Gazette reporters; Dale Harrison, president of the Kalamazoo River Protection Association; Gary Wager, Executive Director of the Kalamazoo River Cleanup Coalition (three times); all Kalamazoo City Commissioners, which includes the mayor and the vice-mayor; the City Manager and the City Legal Council (twice, in 2007 and 2010); and Dr. Susan Hedman, EPA's new Region 5 Administrator.

The printed invitation I had received from the Kalamazoo Environmental Council, an umbrella organization for local environmental groups, to attend the Legislative Breakfast Meeting on 4-23-2007 looked very interesting and promising: " Lively Discussion of Issues Affecting the Environment" . I was prepared to tell the U.S. and State of Michigan legislators or their representatives the good news I had told the Kalamazoo City Commissioners on 4-16-2007 in four minutes! Not so! The rather large audience could not ask any questions or make any comments. Lively? Only previously-prepared questions were put to the legislators who then answered them. Not much of a discussion! I gave all the persons on the podium, either elected official or representative , a folder with my summary information : representatives of U.S. Senators Stabenow and Levine, Michigan State Senator Birkholz, and U.S. House Representative Upton; Michigan State Senator Dr. George, Michigan State House Representatives Lorence Wenke, Jack Hoogendyk, and Robert Jones. This information was also mailed to the home of Michigan State Senator Birkholz twice and given to her personally later in Lansing by a friend of mine a third time.

After an election debate at the Kalamazoo Valley Community College in 2010 I gave my summaries to U.S. House Representative Fred Upton personally. In 2009 and 2010 I tried to arrange a meeting with Kalamazoo Mayor Bobby Hopewell and Vice-Mayor Dr. Hannah McKinney to discuss the PCB issue, but without success. Extended information was submitted to the Executive Producer of "60 Minutes" twice, to John Stossel at Fox News, and the Editor-in-Chief of the Wall Street Journal, Robert Thomson. To no avail! The silence was deafening! So much for freedom of speech! It seems to be a one-way street from the news organizations to the public!

The only individuals who acknowledged my submissions were Lorence Wenke and Jack Hoogendyk.

When, in 2009, I contacted Dr. Ide by telephone and asked him why he never mentioned the information I had given him after his various public speeches on PCBs (for example, in Battle Creek; at a forum at WMU; in a meeting in Kalamazoo organized by the Kalamazoo River Cleanup Coalition), his reply was that I relied too much on Dr. Kimbrough's work. My reply was "why not?" She is the best, most knowledgeable person in the country on this subject, was the main author of the seminal rat-feeding study, and had been the EPA Director for Risk Assessments in the EPA

Administrator's office in Washington, D.C. His reply was: "Well, she worked for industry!" That ended the conversation. A medical issue had become a political issue. Had she done a bad thing? Certainly not. I worked for industry for 37 years and am one of the good guys. Without a manufacturing industry, and you will be part of it, this country would not be what it is. And its future would be very dismal without it. Besides, without it, Dr. Ide would not have a job.

During a number of public meetings, especially in an EPA meeting at the Kalamazoo Public Library on 8-3-2005, people living close to the Kalamazoo River came forward to express their fear of cancer for themselves and their pets through contact with PCBs, despite the following being said with regard to contact with contaminated water and sediment in a 2000 publication of the Kalamazoo River Watershed Council entitled "The Kalamazoo River: Beauty and the Beast:"

"There are several ways (exposure pathways) humans can be exposed to PCBs in water and sediment. Evaluation of the resultant human health risks in the Kalamazoo River and Portage Creek has been undertaken by the Michigan Department of Community Health (formerly the Michigan Department of Public Health).

PCBs in the river are almost entirely bound to sediment particles, and are not often found up in the water unless contaminated sediments have been disturbed and suspended in the water. Therefore, PCB concentrations in surface waters in the Area of Concern generally do not exceed levels at which increased health risks would be incurred. Skin contact with water in the Kalamazoo River is not expected to result in a notable increased health risk to humans. Even occasionally swallowing water from the River, as when falling out of a boat, should not put anyone at increased risk from PCBs.

Since most contaminated sediment remains too wet to become airborne, inhalation of airborne particles would not result in a significant amount of exposure to PCBs. Health risks attributable to this pathway are highly unlikely."

Neither the EPA nor any of our local environmental organizations allayed the deep-seated fears of some of the attendees.

Now let's have an intermission! Please take a good look at the extensive evidence on the first row.

The information mentioned earlier concerning some not-man-made PCBs found at low, minute levels in pre-industrial soil samples is contained in a paper published in 2010 by Kimbrough, Krouskas, Carson, Long, Bevan and Tardiff entitled "Human Uptake of Persistent Chemicals from Contaminated Soil: PCDD/Fs and PCB." One overall conclusion is that PCBs found in soil do not pose an added health risk for humans. I am quoting: "We find that their presence in soils is unlikely to increase human body burdens" and: "PCBs are highly lipid soluble compounds; and because of their extremely low water solubility, PCBs are present in drinking water at very low concentrations (less than 1 microgram per liter), if at all, and are usually associated with point sources that may have contaminated water from wells, rivers, and lakes. At such low concentrations, PCBs in drinking water are expected to provide little or no contribution to the human body burden."

" In soil, PCBs are strongly absorbed and very persistent, with half-lives ranging from months to years, depending upon the position of the chlorine and the degree of chlorination of different congeners. However, highly chlorinated biphenyls are de-chlorinated in aquatic sediment by microbial organisms."

"No correlation between PCB levels in soil and human blood could be demonstrated in the many studies evaluated in this paper."

"In conclusion, the contribution of soil contaminated with PCDD/Fs or PCBs to overall exposure of humans to these chemicals appears to be negligible (less than 1%)."

As far as the cause of cancer is concerned, the recent medical research in molecular biology indicates that cancers are caused by the mutation of genes. Oncogenes and tumor-suppressing genes play a role. I recommend that you google Dr. Harold Varmus, now Director of the National Cancer Institute, and Dr. Michael Bishop, both Nobel Prize winners, and read their 1989 Nobel Prize lectures. I also recommend Dr. Siddhartha Mukherjee's 2010 book entitled "The Emperor of all Maladies," which details the history of cancer. To put it simply, genes mutate or get switched on or off. Cancers result when the genes responsible for the coding the proteins that control cell division mutate. If an oncogene is switched off and tumor-suppressing gene

is switched on, a smoker who starts to smoke as a teenager, smoked all his or her life heavily and dies at the age of 92, but not of lung cancer, is the lucky one. We have such a case in our extended family. On the other hand, if the oncogene is switched on and the tumor-suppressing gene is switched off, a person who never smoked and was never exposed to second-hand smoke may die of lung cancer. While I am not a biologist, it is interesting to note that the gene CYP1A1 mentioned before can encode enzymes. And genes can catalyze aromatic hydrocarbons to become carcinogenic. And chemicals can mediate enzymes to activate potential carcinogens. Cancer therapies researched today relate directly to the role of gene activation in the cell cycle.

So, the conclusion is: select your parents and grandparents carefully! You got 50% of your genes from your mother and 50% from your father. Exactly which ones is a matter of genetic roulette. You will discover this during your lifetimes, based on your traits, characteristics, idiosyncrasies, and illnesses.

Now let's turn our attention to the subject of health risk assessments. The most commonly used target risk for carcinogens in water bodies is an excess lifetime incidence of 10 to the negative 6th. "One in a million!" As professor Dr. Roy Albert stated in 1994, this figure was established in a casual hallway conversation because it "might be appropriate because this is about the level that seems to be ignored by the general public in relation to the risks of getting killed in a mass transportation accident." When I checked the cancer death statistics for the U.S., I found that 1 out of 500 dies of cancer every year. Cancer strikes 1 in 2 men and 1 in 3 women in their lifetime.

How can risk assessment specialists then try to establish regulations and spend other people's money or taxpayer money based on rodent data to save 1 person out of 100,000 or 1 out of 1,000,000? It does not make sense. Risk assessment seems to be a risky business.

EPA's risk assessment for the dredging of the Hudson River was based on the following assumption, as Jack Welch pointed out in his 2001 book "Straight from the Gut":

"If a person eats half a pound of fish every week for 40 years, the EPA contends that the person's risk of cancer may increase by 1 in 1,000. In other words, you've got to eat 52 meals a year for four decades before the increase might go up by one in a thousand. Why doesn't a rational mind come to the

conclusion that the risk is practically lower than breathing?" I am not making this up. This is a quotation by the book from Jack Welch who was GE's CEO.

On 6-12-2001 I had written a letter to the EPA Administrator in Washington, D.C., the Honorable Christie Whitman, asking to take PCBs off the list of probable human carcinogens based on the results of Dr. Kimbrough's 1999 publication on the evaluation of the GE capacitor workers. I received a very courteous reply from Dr. James Cogliano, the Chief of the Quantitative Risk Methods Group. While he did not say that he still believed that PCBs are probable human carcinogens, he pointed out that the EPA is greatly concerned about susceptible populations, especially children. With his logic he places PCBs in the same category as over-the-counter and prescription drugs that all carry warnings directed at these susceptible populations, such as children, pregnant women, and people with compromised and suppressed immune systems.

On 3-21-2007 I wrote my second letter to the EPA Administrator, this time the Honorable Dr. Stephen Johnson, and then, on 3-26-2009, my third letter, to the Honorable Lisa Jackson, repeating my request. I was told in 2007 that I would have to wait for EPA's "call for nominations" for risk assessment or re-assessment of chemicals. This call for nominations was delayed for years until it was finally issued on 10-18-2010. I mailed my nominations for re-assessment of PCBs and DDT (dichlorodiphenyltrichloroethane) on 12-7-2010 by Express Mail of the U.S. postal mail system. The last assessment had been done in 1997.

The EPA can accept my nomination or decline to accept it. If they accept, procedures will be followed that will yield a decision between 1,415 days (3.9 years) and 2,155 days (5.9 years), based on the old procedures and 735 days (2 years) based on the new procedures recommended by Lisa Jackson on 5-21-2009. The old procedures certainly were made by an agency out of control.

In addition to my formal nomination I had mailed an open letter to the EPA giving the rationale for my nominations as well as 27 "pieces of evidence," including 14 copies of the complete texts of medical-scientific papers published in the past and in the more recent past in renowned journals. The U.S ;EPA has an Integrated Risk Information System (IRIS) with an IRIS-Hotline which can be reached by calling (202) 566-1676 and connects with a

Records Information Manager at the EPA Docket Center. I called and inquired whether my submissions had actually been incorporated in their database. Since the answer was positive, I went on my iMac with its Google search engine and tried to reach and read my submissions by using key words such as “recent submissions for EPA risk assessment of chemicals; Dr. F. Claus Globig; PCB risk reassessment,” but to no avail. You may want to try this with other search engines. If you are successful, please give me a call at (269) 381-9235. My search yielded nothing. Further communications by e-mail first and then by telephone with the IRIS personnel gave me some hints as to how to access this part of the EPA database: go to regulation.gov; then to Regulations null; then Read comments; then View results by docket folder; enter keyword or ID: ORD-2010-0744-0011 and -0012. This is quite complicated and time consuming, but after a few tries I succeeded. Please try yourself and let me know your experience.

What I found out is quite disturbing. The 14 papers published in scientific journals which represent the heart and main evidence of my rationale and my conclusions cannot be viewed because they are copyrighted. One is invited to come to Washington D..C., visit the EPA Reading Room and read them there! Really?!

I immediately called the IRS- Hotline, spoke with a few of their contractors whom the EPA has hired for this work and stated that this is not acceptable. This situation subverts the idea of a database being accessible to the public in a transparent way. I suggested to make these papers viewable but not downloadable or present at least only the first page of each article which normally shows a summary. The contractor said that they could not do either of these two things and that they are doing what the EPA told them to do. Now I have to write letter to Dr. Preuss, Director of the National Center for Environmental Assessment, Office of Research and Development, to resolve this untenable situation.

In 2007 the EPA decided to take PCP-containing dredgings from the Plainwell dam area and re-deposit them in the Allied Paper Co. landfill which is in the middle of the city of Kalamazoo. This decision was, in my opinion, unwise and certainly unexpected. It was wrong not to consider the opinions , wishes, and emotions of the people living in that area, although from a technical point of view, the EPA’s rationale seemed to have been valid because PCBs have been in that landfill immobilized for about 40 years without any negative effects on the city’s drinking water and without

any public outrage. I said so before the Kalamazoo City Commission on 4-16-2007 after a huge public outcry organized by what was to become the Kalamazoo Cleanup Coalition . I stated that no river dredgings should be re-deposited in any area within city limits, especially not in residential neighborhoods. If the EPA would have told me that they intended to deposit river dredgings ,with or without PCBs or any other contaminant, adjacent to my half-acre homestead , I would have objected strenuously. Another deposit site outside city limits would have to be found.

When the Kalamazoo River Cleanup Coalition organized a meeting at the Radisson Hotel in Kalamazoo and various presentations were made dealing with PCBs in the presence of EPA officials, I got up and made the point that, unfortunately, a medical issue had become a political issue and that, if the PCBs in the Allied Paper Co. landfill antagonized everybody, the EPA should take \$250 million out of their \$10 billion budget and donate these funds to the City of Kalamazoo so that all of the sediments in this landfill could be removed within a few years to satisfy public opinion. Chris Killian, reporting for the Kalamazoo Gazette, did not mention this suggestion. More recently the Kalamazoo City Commission has declared that only the complete removal of the old PCB-laden sediments would be acceptable and that they have found a company that would do this for less than 100 million dollars instead of the 238 million dollars the EPA had estimated.

When representatives of the U.S. Justice Department came to Kalamazoo on 4-15-2010 for a public meeting at the Radisson Hotel concerning the settlement of the Lyondell Basell Chemical Company's Chapter 11 Protection from Bankruptcy filing, attorney Pierre Armand mentioned that PCBs present an "imminent threat to human health and the environment," I had to speak up for the record:

"My name is Claus Globig. I have lived in Kalamazoo for fifty years. I heard three times tonight that PCBs in river sediment present an imminent threat to human health and the environment. This statement is not correct, based on the more recent literature. This is a complex issue and cannot be covered in five minutes. Therefore, I submit in writing pertinent information supporting my conclusions. To really understand the situation, one would have to read about eight scientific papers."

I gave a manila folder containing the evidence for my conclusions to the Justice Department representatives. The Kalamazoo Gazette did not report this comment either in Chris Killian's contribution.

Since Prof. Dr. Ide has emphasized PCBs in fish in a number of public meetings and in print and stated that people "should not eat fish from the Kalamazoo River" due to PCB contamination based on fish advisories issued by the Michigan Department of Community Health, I studied the last few advisories and came to the following conclusions: these advisories are lengthy and complicated, but they do not say "do not eat fish from the Kalamazoo River." Whether one should eat no fish at all or only a certain, variable amount of fish per week or month, or whether one can eat the fish unrestrictedly, depends upon the type and size of the fish and where it was caught as well as on the gender and age of the fish eater. As far as I know, all the recommended limits for consumption are based on rodent data.

In an article published in 1994 by M.E. Zabik, M.J. Zabik, A.M. Booren, S. Daubenmire, M.A. Pascall, R. Welde, and H. Humphrey, representing the Department of Food Science and Human Nutrition and Pesticide Research Center, Michigan State University and the Michigan Department of Public Health, found that when PCB-containing fish is properly prepared and the fillets then cooked, baked, pan-fried, or char-broiled, its PCB content will be reduced between 17% and 53%. Only after proper preparation and cooking should fish fillets be tested for their PCB content since most of us are not sushi eaters.

A very interesting study was published in 2005 by the Kalamazoo River Study Group, representing the three paper companies involved. By using high -resolution gas-chromatography it was demonstrated that most of the PCBs, about 80%, in the sediment of the Kalamazoo River are the result of the recycling of carbonless copy paper, most of the PCBs (more than half) in fish, however, came from PCBs in electrical equipment. Not all the blame should go to paper companies that recycled paper. This could be shown because only Aroclor 1242, with a low 42% chlorine content by weight, was used in carbonless copy paper. Aroclors 1242, 1254, and 1260 were used in electric capacitors and transformers. In Dr. Kimbrough's rat-feeding studies, Aroclors 1254 and 1260 had been used with their higher chlorine content (Aroclors 1254 and 1260 in 1972 and Aroclor 1260 in 1975).

After the EPA had mandated the dredgings of the Kalamazoo and Hudson rivers, I looked into the history of river dredgings. I found a voluminous report issued in 2000 by GE and Blasland, Bouk and Lee, an applied environmental management company. This report covered the results of nine EPA-mandated dredgings. While 1 ppm or less of PCBs in the river surface sediment was considered acceptable, this was not accomplished in one case. Six were at about 10 ppm or above. There were three deteriorations and six small "improvements." Of the six small improvements none was below or at 1 ppm. During an early meeting at Plainwell, Mary Powers, an earlier president of the Kalamazoo River Watershed Council and later Drain Commissioner, not being a chemist or engineer, declared 0.1 ppm as the goal for the dredging of the Kalamazoo River. I had to tell her that this was daydreaming. Technically this could never be accomplished. The interim surface sediment goal was then set by the EPA to 2.47 ppm. I have heard that at the Fox River dredging, where the PCBs came from the paper mill producing, not recycling as on the Kalamazoo River, the carbonless copy paper, they had problems reaching even this number. The big dredging report included the following statements:

"Indeed, our review shows no evidence that sediment cleanups performed to date have effectively reduced risks to human health or the environment. Nevertheless, environmental dredging has become the default remedy for contaminated sediments. Most of the decisions appear to be based on the simple, yet largely incorrect, assumption that removing a percentage of the contaminant mass from the sediment will result in a roughly equivalent reduction in risks. This approach is referred to as "mass removal." Our review shows, however, that this approach is substantially flawed. Environmental dredging and the national program that increasingly promotes it have not produced the risk reduction that is their central goal. It is important to remember that most of the contaminants in sediments are the result of waste disposal practices that began 50 to 60 years ago and largely ceased 20 to 25 years ago (as is the case with our Allied Paper landfill, my addition). The fact that the chemical mass remains buried 25 to 50 years after it entered the sediment is strong evidence that it is associated with stable sediments and is unlikely to migrate to the surficial bioavailable layer in any significant way. This explains why, at many sites, dredging has not been effective in reducing risks. Dredging is effective in removing sediment mass to, for example, clear a clogged navigational channel. However, removing chemicals

that are not available to the food chain or the water column does not reduce risks. A large-scale dredging project can have devastating impacts on sensitive ecological habitats and, like any large construction project, carries with it both significant risks to workers and disruption to local communities."

As far as the Hudson River is concerned, where the PCBs came from two GE capacitor plants, the EPA had decided in 1984 not to dredge the upper part of the river because it would be environmentally devastating! Then, in 2001, Christie Whitman, the EPA Administrator at that time, decided to have a 38-mile stretch to be dredged against the wishes of the people living there. I obtained a 2001 GE videotape explaining 1) the excellent work GE specialists have been doing to reduce the amount of PCBs going into the river water, 2) showing what dredging would mean for the people and the environment, and 3) how people felt about this project. The decision to mandate dredging is difficult to understand. It must have been a political decision because no scientific information was developed between 1984 and 2001 that would have justified this change of mind. This bad decision is even more difficult to understand because the Hudson River had been declared safe for swimming, boating, wading, and use as a source of drinking water for municipalities; bald eagles and other wildlife were flourishing in the Hudson Valley; PCB levels in fish and water had fallen by 90% since 1977. Levels in fish were down to between 3 to 8 ppm. Two is the level the FDA says it is safe for the sale of fish at the fish market.

By the way, in my presentation to the Kalamazoo River Watershed Council in 2005, I had stated that the mandated dredging of the Hudson River would be an exercise in futility.

I think that Jack Welch, at that time the CEO of GE, was inclined to go to court to fight the EPA mandate. However, Jack Welch and the new GE CEO, Jeffrey Immelt, did not do that. They wanted to demonstrate that their company, one of the best technology companies on earth, was very ecology-friendly and would not fight the EPA in court and be a very good corporate citizen. GE felt that they had no choice. Had they not acquiesced, EPA would have developed the plans, hired contractors, paid for all the work and then charged the total cost to GE with treble damages. These costs would very likely be higher than the cost GE would incur. Jack Welch put it succinctly:

"When the EPA issues a Superfund order, you really have only one choice under the law: do what the agency tells you or else. Otherwise you face treble damages and daily fines. The law gives the EPA power to issue orders of unlimited scope. You get no hearing before being ordered to do the work. You get no hearing until many years later, and then only when the EPA chooses to tell you the work is done."

GE went to work, developed plans and implemented them, including building the necessary facilities to process the dredgings, under the supervision of the EPA. Every step recommended by GE was either accepted by the EPA or modified or changed by them. Every step was, in the end, approved by the EPA. This project turned out to be the largest and most complex dredging project on earth. The dredgings of Phase 1 began on 5-15-2009 and were completed on 10-26-2009. The results were devastating: the dredgings had caused a five-fold increase of PCBs in fish, a one hundred and fife-fold increase in the air, and a ten-fold increase in the water compared with the project's standards. The water severely violated the federal drinking water standard, and certain municipalities could not use the Hudson River water any more for their drinking water supply.

By the way, the dredgings from the Hudson River were sent by rail to Texas!

In my opinion, the EPA should admit its mistakes and stop dredging. My guess is that they will do no such thing.

GE has spent \$830 million on Hudson River-related research and cleanup projects since 1990, \$561 million of that total was spent on the Phase 1 dredging activities. More than \$90 million represent the reimbursement to the EPA for the past and future dredging oversight costs! Now, a few years ago, I gave some GE stock to my two grandchildren because GE is a great technology company. What I resent is that my grandchildren are now helping to pay for the cost of dredging the Hudson River and for the EPA's oversight!

Since there is no clinical medical evidence that PCBs encountered with human exposure produce adverse health effects, are there negative health effects on wildlife? Not based on a "2002 Michigan State University Studies on the Kalamazoo River." I have obtained a copy of the voluminous report

to which 24 people contributed under the leadership of Dr. Gisey, an authority in this field. This information was presented in November of 2002 in Salt Lake City at a meeting of the Society of Environmental Toxicology and Chemistry. The conclusion is that no ill health effects were found on the wildlife on the Kalamazoo River, not even for mink, which is reportedly the species most sensitive to PCBs.

In conclusion, the Kalamazoo River today does not present a problem for humans or wildlife. Before the dredgings in 2008 and 2009 the PCB level in the water was about 0.01 ppb and after the dredgings about 0.05 ppb. While the PCB level in the surface water of the Kalamazoo River is well within the federal limit for the drinking water standard of 0.5 ppb or mcg/l, and below the lower State of Michigan limit of 0.2 ppb or mcg/l, I would not drink its water under normal circumstances because it may contain pathogens from wildlife, agriculture, or sewage from municipalities.

If people are afraid of cancer, they should realize that in 2005 the National Toxicology Program has added to the list of known carcinogens, published in the 11th Edition of the Report on Carcinogens by the Department of Health and Human Services, 17 agents, one of which is heterocyclic amine. This substance is formed when meat or eggs are cooked or grilled at high temperatures. Avoid the black material on a grilled steak!

In 2001, in that eventful meeting in Plainwell, I had asked Dr. Means, Dr. Ide, and representatives of the Michigan Department of Environmental Quality: what would be more detrimental to my health, eating once a week a cooked fillet of fish from the Kalamazoo River or a flame-broiled hamburger? There was no clear answer. Now we know what the answer might be.

Instead of dwelling on PCBs, the EPA should concentrate on the real threats to our health and the environment. Some of these I had already mentioned in my 2005 and 2006 summaries, but they were expanded and emphasized during a conference on 9-14/15-2006 called “Shared Waters: A Symposium of the Great Lakes” presented by the Canadian Studies Department of WMU. The most urgent problems are connected with invasive species and diseases:

Four, but mainly, two types of Asian carp, the Silver carp and the Bighead carp; Quaggae mussels; Zebra mussels; Sea Lampreys; Round Goby; Microcystic algae blooms that give off toxins; Red Mysid; Viral hemorrhagic septicemia.

As touched upon earlier, other problems are caused by the very- fine- particle- size diesel engine particulate emissions of our trucks, which are known carcinogens, mercury (methyl mercury), lead, cadmium, arsenic, phosphates (algae growth), nitrates, and bacterial pathogens from fecal matter of humans, livestock, and wildlife on our beaches and in our rivers.

Who are the last men standing in the Kalamazoo area who had actually some experience with PCBs? I know two. I am one of them, and the second one is Edward Gladysz, age 87, who first worked as an electrical engineer at the KVP/Sutherland/Brown paper company in Kalamazoo and later as the plant engineer at the White Pigeon paper mill. I interviewed Ed recently during a luncheon. He had extensive experience with PCBs in capacitors and transformers and extensive direct exposure to and contact with PCBS during accidents and maintenance operations. Neither he nor his co-workers ever suffered any ill effects. Today he is telling me he wonders what the fuss is all about!

I discovered during my research activities that a liquid Aroclor made paper completely transparent when the raw paper was saturated with the Aroclor liquid. We could have applied the Aroclor on the paper machine with a so-called size press. Transparent paper was made at that time by one of our customers with organic solvents. We decided not to use our approach in order not to compete with our customer. I saved our company a lot of grief this way!

In 1953 Life magazine had published on its cover a photo of large amounts of fish in a tributary of the Kalamazoo River. The fish had died of oxygen depletion, not of PCBs, because various industries, including paper companies, agriculture, and municipalities used the river as a convenient sewer. This was clearly irresponsible. However, PCBs never killed one fish.

Now let us review the legal perspective. The three paper mills that put PCBs into the Kalamazoo River with their waste water from their operations but stopped doing that 40 years ago were: 1) the Weyerhaeuser Plainwell mill,

2) Allied Paper Company, and 3) Kalamazoo Paper Company. None of these mills is producing any more. The Plainwell mill was practically, if not literally, razed; the Allied paper mill was razed; and the Kalamazoo paper mill still exists only as property. Allied Paper Company, later Performance Paper Co., was then purchased by Millenium Holdings, and the Kalamazoo Paper mill was purchased by Georgia Pacific Corp. Weyerhaeuser, Millenium, and Georgia-Pacific were identified by the EPA as "potentially responsible parties" for paying for cleanups. "Potentially" is a euphemism. The EPA means it. While Weyerhaeuser did pollute, Millenium and Georgia-Pacific did not. They were unfortunate enough to purchase mills with problematic environmental legacies.

Everybody seems to believe that polluters should pay. There is only one small catch: our Constitution. Under Article 1, sections 9 and 10, it clearly states: "No Bill of Attainder or ex post facto Law (from what is done afterward, my addition) shall be passed." In today's English this means that no retroactive law can be made. The 1980 CERCLA Superfund law, however, has been enacted retroactively and made responsible parties liable even though their actions were legal before the law was enacted and there was no knowledge of or intent to harm! To me this is violation of the constitution and of natural law. As to GE, another potentially responsible party, the State of New York had approved their discharges and issued permits for it. Our legislators should read our Constitution.

The mandate of the EPA is the protection of the environment, and humans are part of the environment, which is defined as the aggregate of all external and internal conditions affecting the existence, growth and welfare and of organisms.

The EPA is a huge and expensive federal organization with dictatorial powers and not known for admitting mistakes. DDT comes to mind, which saved many thousands of people including Allied soldiers, during and following World War 2, from typhus carried by lice, and could have saved millions of people in Africa (mostly children) from dying of malaria carried by mosquitoes, but it was banned. The EPA did not own up to their ineffective river dredgings either. We should modify EPA's zeal and come up with realistic, reasonable, and cost-effective solutions to our problems. We engineers are used to that.

Now let's have a few laughs !

The first cartoon shows two men (congressmen, senators, or lobbyists ?) walking by the Capitol. One says to the other: "You can't simply throw money at a problem; it has to be someone else's money." He may have had GE in mind.

The second cartoon shows two native Indians looking from behind a tree at the Mayflower approaching the shore. One says to the other: "Let's offer them a guest worker program with a path to citizenship."

Remember, most of us, but not all of us, are in the end immigrants. There were people here before we came.

After you got your test results back, you can relax, go home, forget about the PCB nightmare, and enjoy the evening!

Thank you for your attention!