

Should chlorine be banned from the Great Lakes?

In the modern Western societies, people have become accustomed to many life-style conditions. For example, people expect and demand clean air and water, security, jobs, a clean environment for recreation, etc. However, such demands often create many problems. During the 1960s, when environmental law was not as stringent as at the present time, human demand for products increased industrial pollution, resulting in high use of pesticides, herbicides, and some indiscriminate dumping of toxic wastes. As the next decade approached, a new consciousness began to develop and a number of significant events occurred in the Great Lakes region that would increase this concern. As dramatic examples, debris in the heavily polluted Cuyahoga River caught fire outside Cleveland, Ohio, and a toxic waste dump was discovered under the community of Love Canal, New York.

These incidents and many others nationwide gave impetus to the environmental movement and the legislation for which it called. This legislation included the Clean Air Act, the Clean Water Act, the Comprehensive Environmental Response, Compensation and Liability Act (also known as the CERCLA or "Superfund"), as well as many others. However, even though much of this legislation was enacted in the 1970s, it is continually amended as the result of new discoveries concerning chemicals and their impacts.

One such amendment to the Clean Water Act proposes a "chlorine sunset," eventually resulting in virtual elimination of chlorine related environmental issues. Such an amendment would ban all discharges of organochlorines formed as the result of chlorine-based bleaching in the pulp and paper manufacturing process. In addition it would require that the EPA make recommendations within 18 months to Congress for zero discharge of other organochlorine compounds. This would likely have an impact on the quality and safety of surface water as well as all chlorine dependent industries.

In this activity, the International Joint Commission (IJC) has determined that an international committee must be formed to examine the impact of such a decision on the Great Lakes region. Following the formation of the committee, a report has to be produced on the impact of this proposed action on the Great Lakes region.

Materials:

- Summary sheet of parties,
- Descriptions of individual roles,
- Map of Great Lakes Region.
- Conflict resolution fact sheet (included)

Optional: Information sheets from various interest groups, library resources.

Earth System Understandings

This activity focuses on ESUs #2 (stewardship), #3 (science process), #4 (interactions), and #7 (careers and hobbies).

Pulp and paper Treatment Plant

Teachers Note:

1. As you will note, the summary sheet contains a description of the ethnicity of the players. The sheet was produced with the view of having the students 'walk in someone else's shoes' and try to get to know the perspective of the player. Canada and the U.S. are countries of ethnic diversity, this diversity is utilized in this activity. If you are, or you think your students may be uncomfortable with this, then omit the ethnic characteristics of the players. The names may also be altered.
5. The negotiation process should be described briefly by the teacher. An informational sheet on conflict resolution is available with this activity. Various types of negotiations should be listed, with emphasis on consensus building.

OBJECTIVES

Following this activity, you will be able to:

1. visualize a complex issue from many different perspectives.
2. describe the legislative process, its functionaries (agencies, individuals involved in creating legislation), and the time involved in creating environmental legislation.
3. appreciate the difficulties in consensus-building in environmental disputes.

PROCEDURE

1. The class will be divided into seven groups. Each group will have a summary sheet of the potential committee members.
2. Each group will select committee members. There will be a total of seven committee members who will investigate the impact of the Zero Discharge Act on the Great Lakes region. Diplomacy requires that membership will include representatives of the U.S., Canada and the First Nation Tribes. Each group will have ten minutes to make the remaining four selections from the summary sheet.
3. Each group will write the candidates they selected on the chalkboard. If each group's list is the same, proceed to step 4. If the lists are different, discuss these differences and resolve them so that one complete list of seven names remains.
4. One member from each group should volunteer to play the role of a committee member. Each group of students will help one committee member assemble a presentation based on the information from the role-play sheet and additional sources. Charts, data, posters or other visuals should be used in each player's presentation. The following week, the presentations will be made during the meeting of the committee.
5. At the committee meeting, each of the committee members will put forward a different aspect and supporting data on the issue. Once the presentations are finished, negotiations should begin to determine the action to be recommended to the committee.
6. Finally, a report is to be completed, compiled from the enlarged scripts and reference materials used by the different groups. Each group is responsible for a section of the report, dealing with its representative. A consensus decision must be made on acceptance of the final report by the international committee on behalf of the IJC.

REVIEW QUESTIONS

1. What is the negotiation process used in this meeting? List the characteristics of this process. What difficulties do you see in this process? Do you think it can be used in all situations?
2. Trace the possible pathways of chlorine through all the subsystems of an ecosystem such as the Great Lakes. How does this chemical impact the hydrosphere, lithosphere, atmosphere, biosphere, and cryosphere? How can industries prevent chlorine from entering systems? How can you personally prevent chlorine entering the system?
3. List some of the benefits and the problems associated with chlorine dependent industries. Which list is longer? Which is more important?

The results of an EPA study (1995) on fish consumption advisories are available on PC-based disks which can generate statistics and maps for a specific fish species, state, or pollutant. Refer to document number EPA-823-C-95-001 and contact :

The Environmental Protection Agency,
National Center for Environmental
Publications and Information
11029 Kenwood Rd.
Cincinnati OH 45242
phone: (513)489-8190
e-mail: waterpubs@EPAMail.EPA.gov

EXTENSIONS

1. All the technology that we have created has an impact on the planet, some positive, some negative. Industrial polluters often say that environmental contamination should be prevented, but actually mean that it should only be limited or controlled at the end of a pipe. Elimination of the actual pollution is rarely considered. Also, because people constantly consume and demand more goods, more pollution is probable. Consumers must share some of the blame for this pollution.

Do you agree with this? How much are we to blame for the current situation of this planet? Can we save our species and others? Are they worth saving? Can we survive in an environment that is not so clean? Consider these questions. Give some examples of what you could personally do to alter the current situation.

Make a list of five behaviors that you want to or have changed over the few years as a result of increasing environmental knowledge.

2. Other chemicals, such as lead, PCBs, mercury, etc., are also toxic. How do they enter the food chain and what impact do they have on the Great Lakes ecosystem and human health?

SUMMARY SHEET OF PARTIES

The International Joint Commission (IJC) is to form a committee to examine the impact of the proposed ban of chlorine in the Great Lakes region (or proposed amendment to the Clean Water Act). The budget for this committee is approximately \$40,000, which means that the committee can only have seven people represented on it. Because the IJC is involved, three of the people on the committee have to be representatives of the U.S., Canada and First Nations. The committee will have one month to hold its preliminary selection meeting, its negotiation, and the production of its report.

The four other members of the committee may be selected from the following roles.

James Sinatra, a representative of the state of Wisconsin. A white middle-aged politician, he has served his constituency for a number of years. While he views the aspiration of a clean, healthy environment as being very noble, he wants to know who will pay for this if the ban is successful. Funding is necessary to have a clean environment. He is worried about the impact the ban will have on the industries in his state.

Bjorg Soulberg, a representative of the state (province) of (Minnesota, Ohio, New York, Pennsylvania, Illinois, Indiana, Michigan, (Quebec, Ontario)). A young white newly elected politician, he is impressed that a consensus approach is being used in this matter. While he understands both sides of this issue, at the moment he is undecided on what way to vote until he hears some more evidence.

Tung Won, a representative of the state (province) of (Minnesota, Ohio, New York, Pennsylvania, Illinois, Indiana, Michigan, (Quebec, Ontario)). A young politician of Asian origin. For this representative, the issue of health is of primary importance and she believes that this is the only issue to be contemplated.

Mr. B. Leach, a representative of the Chlorine industry. Concerned at the probability of the ban on all discharges of chlorine into water. A middle-aged white male, he deals mainly with public relations issues for the Chlorine Industry. He reminds people that they use chlorine-derived products on a daily basis, although people generally are unaware of this fact. His main objection to the proposal is that banning chlorine would have a major impact on the society and economy of the U.S. and Canada.

Mr. P. Abe Err, a representative of the pulp/paper industry. Concerned about the proposed ban on the discharge of chlorine and the implications for this industry. A middle-aged African American with a wife and two children, he works as a senior executive in a paper industry in the Great Lakes region. He believes that people should realize the consequences of this ban on the pulp/paper industry and the economy of the region.

Crystal Claire, a scientist and representative of a group of citizens who would like to see the ban on chlorine passed. She has worked with a number of other scientists on the possible effects on human and wildlife health. A career woman, she works for a non-profit organization that deals with environmental and non-environmental issues. She is a middle-aged Caucasian with a young daughter. Her main concern is with human health impacts, although her organization has also investigated wildlife health problems.

Di Oxin, a representative for citizens against the ban. As a long term resident of the region, she has sailed and fished in the Great Lakes. A white senior citizen, she is concerned with the impact on the local and regional economy, especially as her grandchildren will soon seek employment. She has been involved in previous campaigns on environmental issues and has been a vocal representative, often quoted in the media.

F. Waters, a member of the environmental group Greenpeace (or Pollution Probe). A recent college graduate, he has been employed by the group for 2 years. An Asian American, he has training in policy analysis and environmental issues. During his college years, he was involved in various protests concerning environmental polluters and has been working for a number of years on the chlorine ban project.

U.S. REPRESENTATIVE

My name is Janet Myers and I represent the United States governmental interests in this issue. The purpose of this committee meeting is to hear the ideas and concerns of various groups involved in this issue. As you know, the International Joint Commission (IJC) has announced that it wishes to reduce discharges of chlorine into the Great Lakes and efforts are continuing at the federal level to require industries to eliminate the use of chlorine under the Clean Water Act.

Once this meeting is completed, each of the government representatives will return to his/her own country and discuss the results of this town meeting with other officials. Recommendations for further action on the issue and its impact on the represented nations, the environment and the economic stability of the area will be made. I would like to thank the groups and organizations for selecting the representatives attending this meeting. Before we begin this meeting, I would like to remind the members that we are here to listen to your concerns; we want to produce a document that everyone will have contributed to and feel happy with the recommendations that will have been proposed. My Canadian colleague will outline the format and the agenda that will be followed and I trust that this meeting will be fruitful and add some new dimensions to the issue at hand.

Thank you for giving me the opportunity to speak.

CANADIAN REPRESENTATIVE

My name is Jacques Fontainbleu and I am a representative of the Canadian federal government. I would like to welcome you to this committee meeting. As Ms. Myers, my American counterpart said, our objective here is to listen to you as representatives of your groups and for us to leave with an idea of the best approach to the task before us. We have an important and difficult task to perform and would like to come to a consensus on the best and most equitable approach to use in achieving the result.

We need to treat the issue in a conscientious manner and weigh the impacts that the proposed ban will have on the various groups represented here and the general public. For this meeting to proceed efficiently and effectively, these rules need to be followed:

1. We all agree to follow the agenda as it is currently organized.
2. All the interests of the various parties need to be heard.
3. No name-calling, heckling, or interrupting will be permitted when another speaker is outlining his or her views/interests.
4. People may use whatever appropriate means and materials necessary for the presentation of their points/interests.
5. Each person has a definite role as a representative of one specific organization, and cannot represent any other group.
6. All groups must reach a decision or a consensus on the report.

Thank you for giving me the opportunity to speak.

FIRST NATIONS REPRESENTATIVE

My name is LittleEagle and I represent the various First Nations tribes that live and fish in the Great Lakes region. We have fished for many years in this area and were glad to see the 1970s ban on harmful chemicals that caused problems for the fish and eagles. However, we again have become concerned with the reappearance of problems with fish in the region. Tumors are once again beginning to affect the fish, and we are concerned for the health of our people and the environment.

As a nation and people, we hope that this meeting will consider not only the economic impact that a chlorine ban will have, but also the impact that continued use of this chemical will have on the health of the environment and human health. It is important to remember and to weigh into any proposal the health of wildlife and people. We need to be concerned for every person and every plant and animal. Quality of life is about a healthy environment and being able to enjoy it. So, let us consider these issues carefully.

When people hear about the contaminated fish in the Great Lakes, it makes them nervous about eating such fish. Of course, it needs to be recognized that not all the fish in the lakes are contaminated to the same degree. Fatty fish will accumulate more toxins in their fat tissue; fish near industrial and agricultural points will tend to be more contaminated than fish in deeper water.

"From a tribal perspective, zero discharge of harmful and toxic substances into the waters of the Great Lakes is a goal that must be vigorously pursued. While zero discharge may not be possible in the immediate future, elimination of additional discharge of toxic contaminants into the Great Lakes is imperative. Cooperation from federal, state and tribal agencies, industry, environmental groups, and the public sector is required to meet the goals of a healthy Great Lakes ecosystem.

Native Americans believe that man is one with his environment, not master of it. In this view, to discharge chemicals into the environment and cause it damage is to cause damage to oneself. Unfortunately, the truth of this philosophy is becoming painfully obvious as evidenced by the tremendous damage man has already inflicted upon his environment. As stewards of our environment, we must recognize the Great Lakes as a fragile, irreplaceable treasure that represents a system which we are all part of and dependent upon. The Great Lakes have sustained life for many generations of Native Americans and a commitment must be made to protect and preserve this resource for future generations."

Thank you for giving me the opportunity to speak.

[Quotations from a Zero Discharge/Virtual Elimination of Persistent Toxic Chemicals: A Tribal Fisheries Perspective. 1993. Amy L. Owen, Chippewa/Ottawa Treaty Fishery Management Authority, Sault St. Marie Michigan.]

STATE (PROVINCIAL) REPRESENTATIVE

My name is **James Sinatra** and I represent the state (province) of (Minnesota, Ohio, New York, Pennsylvania, Illinois, Indiana, Michigan, (Quebec, Ontario)). While I am pleased at the meeting and the goals and objectives of gathering all these people together, I must say that I am deeply concerned about the impact of this ban on the employment in my home (state, or province). While we all may aspire to a clean and healthy environment, we must also realize what is at stake here. Thousands of jobs in the production of chlorine and its use in the paper and pulp industry may vanish. Add to this the numerous other jobs in service industries and we could be looking at a total loss of over one million jobs, plus tax revenue. How is that to be recouped? How do we pay for schools, roads, infrastructure?

Yes, I would like a healthy, clean environment, but are we willing to pay the cost? Is the possible risk to a small number of individuals worth the economic and social havoc that will be caused by the loss of pulp/paper industry and other chlorine dependent industries to all of us? Just examine the costs and employment figures for chlorine dependent industries in the Great Lakes region, and the U.S. and Canada. What will replace these vast amounts of money should we ban chlorine? What will become of all the workers? How will we pay for a clean environment?

	Processing Plants	PVC Fabrication Plants	Total Number of Plants	Direct Employment	Total Attributable Employment	Direct Wages (\$ million)	Total Wages (\$ million)
Wisconsin	15	63	78	8,175	24,991	211	598
Minnesota	6	64	70	5,379	12,035	119	281
Illinois	31	130	161	10,887	39,116	314	970
Michigan	25	153	178	18,741	65,889	627	2,064
Ohio	30	219	249	26,076	78,592	631	2,239
New York	36	104	140	11,917	29,267	319	677
Indiana	12	143	155	13,106	38,181	326	1,006
Pennsylvania	31	132	163	13,037	42,783	336	1,001
U.S. Total	718	2,530	3,248	366,738	1,314,971	9,939	31,349
Ontario	29	61	90	9,902	32,614	268	881
Quebec	19	40	59	5,249	15,712	142	424
Canada Total	103	215	318	28,350	84,529	766	2,283
U.S. - Canada Total	821	2,745	3,556	395,088	1,395,088	10,706	33,632

Table illustrating the 1990 Value of Chlorine Chemistry (various industries) to the Great Lakes region, the U.S. and Canada. All costs are in U.S. Dollars. (Source: Charles Rivers Associates, 1993.)

If we tightened pollution laws and regulations, will that have the same impact? I think we need to examine such concerns as an integral part of any alteration in the law. Remember, once an amendment is passed, it will change our lives forever. I caution you all to remember that not only is the natural environment at issue here, but the human environment is at risk of collapse.

Thank you for giving me the opportunity to speak.

STATE (PROVINCIAL) REPRESENTATIVE

My name is **Bjorg Soulberg** and I represent the state (province) of (Minnesota, Ohio, New York, Pennsylvania, Illinois, Indiana, Michigan, (Quebec, Ontario)). This is a very important issue to the people whom I represent. Environmental issues can often become emotional because they deal with topics that people are extremely concerned about, even fearful for the damage to the environment or to their health or the health of their children. When people become emotional about an issue, it becomes more difficult to resolve because people fear that their very existence is threatened. However, by involving people from the beginning in this process, it is hoped that everyone will contribute to the knowledge concerning the issue. The resulting decision will be seen as fair, and worked toward by all the groups.

As you are all well aware, it is difficult to satisfy all of the people all of the time. However, if people are not involved in decisions that affect their lives deeply, then more severe problems can occur. It is hoped that in this consensus building process, the various groups' interests will be considered and the final decision will include elements that satisfy everyone's needs. Even though we think that we know where the final outcome of this process is heading, through consensus building we may be able to attain the goal of the committee in a more equitable manner. My position is unclear at the moment. I am uncertain of the recommendations I will make to my constituents. Before I make any final decisions, I would like to become more informed on the issue and am glad to be here at this meeting to do just that.

Thank you for giving me the opportunity to speak.

STATE (PROVINCIAL) REPRESENTATIVE

My name is **Tung Won** and I represent the state (province) of (Minnesota, Ohio, New York, Pennsylvania, Illinois, Indiana, Michigan, (Quebec, Ontario)). I am attending this meeting to voice the my concerns and the anxieties of my constituents on this issue of chlorine. I attended a local town meeting in my home state (province) concerning the chlorine ban. My question is: can we afford not to ban these chemicals? After hearing all the evidence I am surprised it took so long for this ban to be formulated.

Examining all the evidence I have heard and seen, I would like to say that chlorine chemicals with their potential and risks really frighten me. I am not alone in these feelings, according to my constituency. Yes, I realize that many jobs are in danger and lots of funds are in jeopardy, but what price do we put on a life, a single life? Is all the money in the world able to replace the life of a person? How do you tell people that you know these chemicals are dangerous but for the good of society they are necessary to use? How do you tell this to someone who has breast cancer, or the parent of a handicapped or deformed child? I don't want to tell people this, do you?

I think that the evidence is conclusive enough at this stage to ban organochlorine chemicals altogether. It is time to sunset, retire or ban these chemicals. Let's examine what happened to the amount of chemicals in the environment and human body fat content when they were sunsetted.

Many people at this meeting and in the chlorine industry will say that a total ban of chlorine is counterproductive to society. How can they say that will the current evidence? We cannot allow current impacts of this group of chemicals to continue on human health and wildlife. Neither can we wait to test all of these chemicals individually, we just do not have the time. This is an urgent problem. We must act and act now. But what frightens me even more is that even if we ban chlorine now, residues of dangerous chemicals that still persist in sediments will be transferred in the food chains. Once the ban is in place, the next logical step, in my mind, is to try to remove such dangerous chemicals from the existing polluted and contaminated area.

Pollutant	Time Period	Percent Change	Control Measure
Lead emissions	1975 - 1985	-86%	removed from gasoline
DDT (in body fat)	1970 - 1983	-79%	agricultural use banned
PCBs (in body fat)	1970 - 1980	-75%	production banned
Mercury (in sediments)	1970 - 1979	-80%	replaced with chlorine production

Table illustrating percentage change in human body fat and sediments after sunseting chemicals in certain practices. (Source: Mausberg and Muldoon, 1991.)

Finally, I would like to take this opportunity to say that I am pleased to be invited to this meeting. I am glad to see that various groups are involved in this and hopefully we will reach a consensus on the approach to be taken in this issue. I do hope that we can come to an arrangement on this most serious matter before us.

Thank you for giving me the opportunity to speak.

<p style="text-align: center;">CHLORINE INDUSTRY REPRESENTATIVE</p>
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My name is **Mr. B. Leach** and I represent the Chlorine industry. As you know we are all here to discuss the movement at hand to ban all discharges of Chlorine into water. However, we use chlorine-derived products on a daily basis, although people generally are unaware of this fact. Chlorine products include: polyvinyl chloride (PVC), other plastics, flame retardants, chlorinated solvents, hydrogen chloride (used in a variety of food processing and industrial applications), laundry bleaches and detergents, dry-cleaning fluids, water purification and crop protection chemicals (pesticides, herbicides and fungicides). Chlorine's use in the manufacture of certain products includes pigments in paints, paper, plastics, etc., nonstick cookware, and pharmaceuticals.

The proposed ban has resulted from the belief that "certain chlorine-containing compounds have been found to pose unacceptable health and environmental risks. These risks should not be ignored. Any situation where chlorine-dependent processes or chlorine or chlorine-containing compounds creates unacceptable health and environmental risks should be corrected. In April 1992, the International Joint Commission's Water Quality Advisory Board recommended that the United States and Canada consider phasing out the use of chlorine and chlorine-containing compounds as industrial feedstocks. However, any public policy debate that proposes the banning of all chlorine production and use should take into account not only any risks associated with chlorine's use but also the social and economic impacts of such a ban on the United States and Canada and the risks associated with the use of substitute products" (p. 1).

The economic benefits of the chlorine industry were outlined in a recent report conducted by the Charles River Associates (CRA). The figures represent the "benefits (or savings) that chlorine currently provides to the consumer and the contributions that chlorine-dependent industries provide to local, regional, and national economies" (p. 2).

What we are dealing with here, ladies and gentlemen, is a multi-billion dollar industry. Any ban or the use of substitutes will cost consumers and the industry millions of dollars in additional costs and could result in the closure of many industrial plants. The CRA report notes that the "use of substitutes for chlorine-based products and processes would cost an additional \$91 billion per year in the U.S. and \$11 billion per year in Canada" (p. 2). The investment required to construct facilities to produce substitutes would approach \$67 billion. This construction would probably take 10 to 20 years and it is likely that consumers would be forced to bear the burden of this cost through higher consumer prices.

Let's examine the figures in this table (next page).

Besides this cost, let's examine the number of people employed directly and indirectly in this industry. "In 1990, chlorine-dependent industries employed almost 400,000 workers. An additional 1.0 million workers are employed in related industries and services...Nearly 1.4 million jobs in 48 U.S. states and nine Canadian provinces depend on chlorine production. Total wages exceeded \$33 billion. If chlorine production were shut down, many of the workers would lose their jobs, and society would bear the cost" (p. 4).

Therefore, as you can see, banning chlorine will have a major impact on the social and economic fabric of the U.S. and Canada. I would ask this committee to seriously consider the consequences of this chlorine ban.

Thank you for giving me the opportunity to speak.

To Consumers	Units	Economic Value		
		United States	Canada	Total
Economic benefits				
In direct uses	\$Billion/Year	9.8	1.2	11.0
In products containing chlorine	\$Billion/Year	31.4	3.3	34.7
As a facilitator	\$Billion/Year	49.9	6.8	56.7
Total	\$Billion/Year	91.1	11.3	102.4
To local economics				
Economic contributors				
value of sales	\$Billion/Year	71.4	8.5	79.9
Employment, direct	Workers	366,700	28,400	395,100
Employment, indirect	Workers	948,300	55,600	1,003,900
Employment, total	Workers	1,315,000	84,000	1,399,000
Wages, direct	\$Billion/Year	9.9	0.8	10.7
Wages, indirect	\$Billion/Year	21.4	1.5	22.9
Wages, total	\$Billion/Year	31.3	2.3	33.6
Gross domestic investment	\$Billion	56.8	4.4	61.2
Balance of trade	\$Billion/Year	+2.9	+0.1	+3.0

*Table illustrating the 1990 Value of Chlorine Chemistry. All costs are in U.S. Dollars.
(Source: Charles Rivers Associates, 1993.)*

All the information used in this sheet is taken from a Final Report, Assessment of the Economic Benefits of Chlor-Alkali Chemicals to the United States and Canada, prepared for The Chlorine Institute, Inc., 2001 L Street NW, Washington, D.C. 20036, published in April 1993.

PULP/PAPER INDUSTRY REPRESENTATIVE

My name is P. Abe Err and I represent the pulp/paper industry. As you realize this ban on the discharge of chlorine could have serious implications for our industry. However, we are taking steps to help the present situation but are concerned about the impact that a total ban will have on the industry. One of the main uses of chlorine is in the pulp and paper industry. It is used directly to bleach wood pulps in the production of high-quality papers. While all pulps are not bleached, in 1990 almost 45 millions tons of bleached pulps were produced by 156 mills in the U.S. and Canada.

In the process of producing pulp, various treatment sequences can be used, depending on the wood used and the final product desired. Once the sequence (which entails extensive recycling and recovery of intermediate wash and byproducts, etc.) has been established within the overall design of the mill, then any alterations no matter how small, are extremely difficult and expensive. Considerable investments have been made by the industries involved. Just examine the figures in this chart.

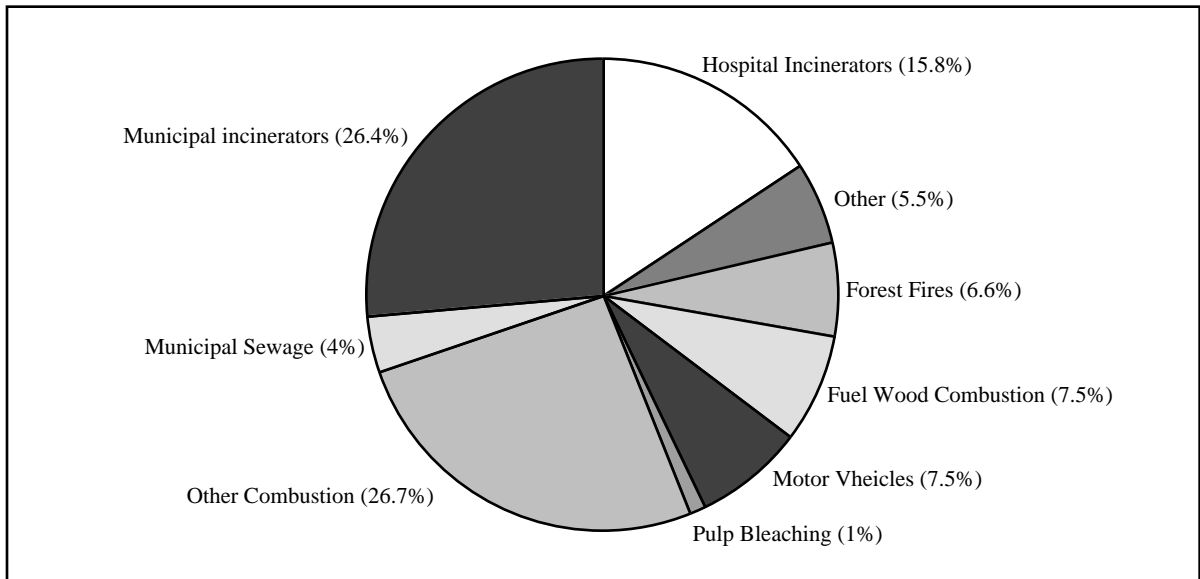
	Investment (U.S. \$Millions)
Wisconsin	1,583
Minnesota	339
Illinois	1,855
Michigan	4,742
Ohio	2,372
New York	2,216
Indiana	1,388
Pennsylvania	1,737
U.S. Total	56,837
Ontario	1,734
Quebec	818
Canada Total	4,437

Table illustrating the investments made by companies dependent on chlorine in the Great Lakes region, the U.S. and Canada. All costs are in U.S. Dollars. (Source: Charles River Associates, 1993.)

In addition, we in the pulp and paper industry believe that this industry is being used as a scapegoat by many of the politicians and environmental groups. Looking at the estimated releases of dioxin in the United States in 1991, it is clearly visible that incinerators pose a far greater health problem than pulp bleaching.

For some time, the pulp and paper industry has sought the development of cost-effective technologies that would decrease the discharges of chlorinated compounds in effluent. Generally, these technologies substitute chlorine dioxide for a portion of the chlorine formerly used in the bleaching cycles. Increased efficiency in the process has already reduced the discharge of toxic substances, such as TCDD. During 1988-89, 104 U.S. mills surveyed generated a total of 2.5 pounds of TCDD; in 1993 this was reduced to below 8 ounces per year. The amount of chlorine used in the bleaching process is projected to fall from 1.4 million tons in 1990 to 920,000 tons in 1995. Increased use of hydrogen peroxide and oxygen will also aid in the decline of chlorine.

However, while some companies have altered their system entirely to the production of paper without chlorine, the range of products we have come to expect may not be possible without some use of this bleaching agent. This alteration has been expensive: "the United States industry estimates that it has already spent over \$1 billion implementing these changes in the short time since dioxin was attributed to the pulping process."



Estimated Releases of Dioxin in the United States (1991). (Source: International Joint Commission, Volume 2, 1993.)

Ontario's 26 pulp and paper factories employ 16,000 people, providing one third of all the manufacturing jobs in northern Ontario. In Quebec, employment in this industry is also substantial. Between the U.S. and Canada, employment in this industry and the millions of dollars produced will be in jeopardy if this ban proceeds.

The pulp and paper industry has demonstrated that it is achieving virtual elimination — voluntarily, at great expense, and without having to eliminate all use of chlorine compounds. Thus, there is no rational basis for singling out the pulp and paper industry, or for banning the use of all forms of chlorine in the pulping process, when virtual elimination is being achieved through other process modifications.”

Thank you for giving me the opportunity to speak.

[All quotations are taken from 1993 Report of the Virtual Elimination Task Force to the International Joint Commission. A Strategy for Virtual Elimination of Persistent Toxic Substances. Volumes 1 & 2.]

SCIENTIST

My name is Crystal Claire and I represent a group of citizens who would like to see this ban on chlorine passed. As many of you know, what we are dealing with here is a health issue. What good are jobs to people if they are not healthy enough to work in them? What good is an environment if it is unhealthy and cannot be enjoyed? But many industry representatives will say that we are being overly emotional. Where is our proof, they ask. Well, here is our proof.

When it was discovered that some chlorinated insecticides, such as the pesticide DDT, were persistent, they were banned or regulated in the 1970s by the U.S. EPA. A chemical that is persistent accumulates in the body fat of animals and is passed along the food chain, up to the final consumer. In the case of DDT, the final consumers were often raptors — birds of prey, such as eagles, hawks, falcons, owls, etc. This chemical caused numerous problems for the birds, including:

- thin egg shells which broke prematurely, killing the young;
- birth defects, such as crooked beaks; and
- Reproductive defects, such as infertility.

However, people are also the final consumers for some of the food affected by DDT. Just examine this chart and the defects caused by exposure to organochlorines.

Species	Reproductive effects	Eggshell thinning	Generational effects	Deformities	Organ damage	Behavioral changes	Hormonal changes	Metabolic changes "wasting"	Immune suppression	Tumors
Bald eagle	•	•	•	•		•		•		
Beluga whale	•			•	•		•		•	•
Black-crowned night heron	•	•		•						
Caspian tern	•		•	•		•		•		
Chinook-coho salmon	•				•		•			•
Common tern	•				•	•		•	•	
Double-crested cormorant	•	•	•	•	•	•	•	•	•	
Forster's tern	•		•	•	•	•		•		
Herring gull	•	•	•	•	•	•	•	•	•	
Lake trout	•		•		•	•		•		
Mink	•		•		•			•		
Osprey	•	•								
Otter										
Ring-billed gull	•			•				•	•	
Snapping turtle	•	•	•	•	•			•		

Chart illustrating the variety of health effects observed in wildlife in the Great Lakes Basin. Blank cells do not necessarily mean that there is no effect on wildlife, only that research has not been performed on the species.

(Source: Hileman, 1993. Chemical and Engineering News.)

In addition, the targeted insects for this pesticide developed immunity to the chemical, thus making it ineffective. However, DDT was banned, not because of the adverse effects on wildlife, but because of the possible carcinogenicity (ability to cause cancer) in humans. Other chlorinated insecticides regulated or banned include aldrin, chlordane, dieldrin, kepone, lindane, mirex, and toxaphene. Some of these are still used, but under strict regulations. For example dieldrin is used as a moth repellent in carpets and rugs, and lindane is an ingredient in a preparation used to kill head lice in children. Fears have recently grown over the use of lindane to kill head lice as researchers fear it may increase the risk of brain cancers.

As stated earlier the reason that many of these chemicals were banned was based more on the possibility of carcinogenicity for people rather than their impact on wildlife. The main concern with the use of chlorinated chemicals has been the increase in human cancers over the last three decades. Researchers suggest that the new disturbing health trends are linked to exposure to organochlorines in the environment. Increases in most cancers, particularly brain, kidney and breast, have created a new interest in this possible link. In Sweden, people born in the 1950s have a greater chance (two to three times) of developing cancer than people born between 1873 and 1882. In the U.S., between 1973 and 1987, cancer deaths decreased in young people, but the overall trend of incidence showed an increase in all age groups.

These health trends are disturbing and need serious consideration. The increase of pollution in our daily lives has an important influence on our health and the health of our children. By banning chlorine and its byproducts we are coming closer to creating a safer and healthier environment for us, our children and future generations.

Thank you for giving me the opportunity to speak.

CITIZENS GROUP - AGAINST BAN

My name is Di Oxin and I represent a group of citizens who would like this proposed ban dropped. Before I go any further, I would like to say that I am an environmentalist. I have lived all my life in the Great Lakes region, have fished and sailed in the lakes and want to see them maintained as a good resource for everyone's use. However, in these tough economic times, people do not realize the devastating impact that this ban will have on the economy of our region. Around the Great Lakes, 122,000 jobs and \$3 billion in wages created by chlorine dependent industries would be at risk. Studies have shown that 40% of U.S. and Canadian jobs and income are some way dependent on chlorine and the products of the chlorine industry. Even scientists that realize the potential danger of these chlorine compounds think that a full chlorine ban is an extreme position and ridiculous. "Endocrinologist H. Leon Bradlow of Cornell University's Strang Cancer Prevention Center in New York City acknowledges that all toxic chemicals should be used judiciously and only when suitable nontoxic substitutes aren't available." However, and I quote Dr. Bradlow here, "I think methylene chloride [an animal carcinogen] is a dandy solvent and would hate not to be able to use it" (Quotes from Raloff, 1994. Science News.) If a scientist and cancer researcher of Dr. Bradlow's caliber thinks it is safe, then I think it is safe enough for me and you. Just look at all the uses we make of chlorine and the amount of resources it produces.

I would agree with people that it is imperative to maintain a clean environment, but there is a cost to pay for this. Are we all willing to pay this price, because we all will. Can people live on clean air? We need food, and jobs. In my area alone, over 6,000 people would be affected directly by this ban. Taking into account all the service industries that are connected to these primary jobs, over 10,000 jobs may be lost. Factoring in the loss in revenue to local, state and federal government, well, the figures goes into millions of dollars. And where do the funds to replace this come from? State or federal government? We all know how strapped for money these governments are already. There is no way that they can replace the lost money. Let's face it, a total ban would be disastrous for people and the environment. Where do you think existing money for environmental protection comes from?

A more sensible strategy is to phase out the use of chlorine, to use substitutes and to reduce the discharge to a level that is not as harmful as current levels. Such a proposal would benefit all the parties involved and reduce health risks, while maintaining the economic structure of the industry.

Thank you for giving me the opportunity to speak.

Use or Application	Estimated Net Benefits (\$Million/Year)	
	U. S.	Canada
Direct uses		
Pulp bleaching	2,100	260
Water treatment	5,430	570
Sodium hydroxide	2,110	400
Potassium hydroxide	120	10
In products		
PVC products	6,125	765
Chlorinated solvents	1,210	140
Hydrogen chloride	400	60
Bleaches, etc.	740	60
Flame retardants	160	20
Polychloroprene	360	20
Crop protection	22,140	2,160
Chlorinated polyolefins	110	10
Polyvinylidene chloride	160	20
As a facilitator		
Propylene oxide	170	20
Epichlorohydrin	435	45
Isocyanates	345	35
Titanium dioxide	470	10
Fluoropolymers	220	20
Polycarbonates	225	25
Pharmaceuticals	47,010	6,590
Refrigerants	500	50
Silicones	480	50
Total	91,020	11,340

Estimated benefits of Chlorine Chemistry to Consumers in the United States and Canada.
(Source: Charles River Associates, 1993.)

GREENPEACE/POLLUTION PROBE

My name is F. Waters and I represent the environmental group Greenpeace (or Pollution Probe). We would like to see the production of PVC, polyvinyl chloride, phased out as the process creates many harmful substances. In Germany and Austria, city and town planners have created new construction policies that favor non-use of plastics in their new buildings. The reason? Combustion of this plastic at low temperatures is similar to burning in inefficient waste incinerators, which produces toxic substances, such as dioxins and furans. The problem of melting plastic falling on people in fire situations in public buildings is also a safety consideration here.

Few useful products can be manufactured from pure PVC. Additives are mixed with it; the added substances are dependent on the final use of the product. Therefore, only a fraction of the total amount of PVC produced can be easily recycled. Any products that are recycled, usually are down-cycled — that is, manufactured into a product that is less valuable than the original commodity (i.e. rug backing). Currently, only 1% of all PVC is easily recycled. Imagine all that plastic used daily that will never be reused. While the Vinyl Institute in Akron, Ohio, is aiming at a recycling rate of 25%, even this is extremely low.

In addition to the problems caused for wildlife by these organochlorines, they also pose a major threat to people, in the form of an increased risk of cancer. Chlorinated insecticides already regulated or banned include aldrin, chlordane, dieldrin, kepone, lindane, mirex, and toxaphene. However, some of these are still used, but under strict regulations. For example dieldrin is used as a moth repellent in carpets and rugs, and lindane is an ingredient in a preparation used to kill head lice in children. Fears have recently grown over the use of lindane as researchers fear it may lead to an increase in brain cancers.

Even when chlorine insecticides are banned in the U.S., these dangerous chemicals can still enter into our lives by atmospheric transport, on imported foods and across borders through watersheds. For example, the waste effluent from all 26 pulp and paper facilities in Ontario is discharged directly into lakes and rivers which eventually drain into either the Lake Winnipeg and James Bay watershed or the Great Lakes.

The chlorine industry states that banning chlorine will be expensive, that it would “devastate the economies of the U.S. and Canada, with costs of a total phase-out estimated at \$102 billion annually. However, a more careful view of the information presented in the report actually supports the feasibility of eliminating chlorine.” Let’s examine the data.

Comparing Costs	
Project	Estimated costs
Cost to phase-out 100% of chlorine use, U.S. & Canada	\$102 billion/yr.
Cost to phase-out 95% of chlorine use, U.S & Canada	\$20 billion/yr.
Health care costs for effects of persistent toxic substances, U.S. & Canada\$	\$75-100 billion/yr
U.S. industry expenditures on end-of-pipe pollution control	\$90 billion/yr.
U.S. military budget	\$300 billion/yr.
U.S. Savings and Loan Bailout	\$500 billion/yr.
Clean-up of toxic and radioactive waste dumps in U.S.	\$500 billion - \$1 trillion (total)
Direct and tax subsidies for fossil fuels and nuclear power, U.S. government	\$53 billion/yr.

Table comparing costs of the feasibility of eliminating chlorine. (Source: Greenpeace, 1993.)

As stated earlier the reason that many of these chemicals were banned was based more on the possibility of carcinogenicity for people rather than their impact on wildlife. The main concern with the use of chlorinated chemicals has been the increase in human cancers over the last three decades. Researchers suggest that the new disturbing health trends are linked to exposure to organochlorines in the environment. Increases in most cancers, particularly brain, kidney and breast, have created a new interest in this possible link. In Sweden, people born in the 1950s have a greater risk (two to three times) of developing cancer compared to people born between 1873 and 1882. In the U.S., between 1973 and 1987 cancer deaths decreased in young people, but the overall trend of incidence showed an increase in all age groups.

It is crucial to the safety and health of the environment and people as inhabitants of that environment to prevent the further discharge of chlorine and its byproducts into our surroundings. It is important for us and for our children that we accept this challenge and do the right thing.

Thank you for giving me the opportunity to speak.

[Quotation and chart from “Industry Study Backfires: Chlorine Phase-out is Feasible and Affordable” in the Greenpeace publication, Chlorine Free, 1993.]

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Greenpeace Publications.

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