Working to balance...

ENVIRONMENT

SOCIAL RESPONSIBILITY

ECONOMY

WORLD CHLORINE COUNCIL

The World Chlorine Council and Sustainable Development

CONTENTS

April 2002

WORLD CHLORINE COUNCIL

www.worldchlorine.com

The World Chlorine Council® (WCC) was formed in 1992 in order to respond more effectively to global concerns and issues surrounding chlorine chemistry. The WCC brings together the national and regional chlorine trade associations, along with their member companies. It co-ordinates activities, shares information — particularly environment, health and safety best practices — and serves as the global voice for the chlorine industry.

The WCC is guided by a Governing Council, composed of senior industry executives, which oversees five global teams working in the fields of Safety, Science, Advocacy, Sustainability and Communications. Each team consists of experts from member companies and staff of regional chlorine associations. These teams promote continuous performance improvement in their areas of expertise through, for example, Global Stewardship Workshops, joint initiatives with the United Nations Environment Programme (UNEP), the World Health Organization and the Pan American Health Organization, along with Organization for Economic Cooperation and Development activities. The Governing Council is working to further expand WCC membership to all countries where chlorine producers are located, in order to achieve the maximum level of performance on a global basis.

WCC MEMBERS:

Producer Associations:
Asociacion Nacional de la Industria Quimica (Mexico)
Canadian Chlorine Coordinating Committee – www.cfour.org
Chlorine Chemistry Council – www.c3.org
Chlorine Institute – www.cl2.com
Clorosur – www.clorosur.org
Euro Chlor – www.eurochlor.org
Indian Chemical Manufacturers Association
Japan Soda Industry Association – www.jsia.gr.jp
Korea Soda Industry Association
Plastics & Chemicals Industry Association of Australia – www.pacia.com.au/
Russian Centre for Chlorine Safety

Product Sector Associations:
European Council of Vinyl Manufacturers – www.ecvm.org
Halogenated Solvents Industry Alliance – www.hsia.org
Vinyl Council of Australia – http://www.vinyl.org.au/
Vinyl Council of Canada – www.plastics.ca/vinyl
Vinyl Environmental Council (Japan) – www.vec.gr.ip/
Vinyl Institute – www.vinylinfo.org

Corresponding Associations:
China Chlor-Alkali Association
Taiwan Soda Association

OVERVIEW

The 2002 World Summit for Sustainable Development made communicating progress on sustainability a priority. As a result, the World Chlorine Council, consisting of national and regional chlorine chemistry associations, felt it was important to publicly communicate our industry's views, challenges, commitments and progress on sustainability.

Today, chlorine chemistry meets many of society's critical needs and provides numerous benefits. The products of chlorine chemistry touch people's lives in many positive ways, through medicines, water purification, pollution control, basic disinfectants, and affordable, durable building materials. In fact, chlorine chemistry serves society's needs in ways so numerous that we've illustrated its varied role in separate booklets that supplement this report. (*Chlorine Chemistry's Role in Our Daily Lives* and *Chlorine's Important Co-product: Caustic Soda*)

However, our industry does face challenges, both with some past practices and with specific products. The 12 persistent organic pollutants slated for action under the Stockholm Convention are chlorinated. There may be others identified in the future. The global chlorine industry is committed to addressing these challenges, to working with concerned stakeholders and to following a sustainable development model.

We know we must protect health, safety and the environment and be socially responsible, in addition to contributing to the economic well-being of nations. We view our industry's participation in Responsible Care, a voluntary environment, health and safety (EH&S) continuous improvement program, as a strong element of sustainable development.

Key to sustainable development is acting from a global perspective – viewing our issues through the lens of global impacts and managing our operations around the world at a high level of performance, regardless of size or geographic location. However, this presents a significant challenge, as the Responsible Care program is not in every country,

CHLORINE CHEMISTRY MEETS SOCIETY'S CRITICAL NEEDS

- Chlorine plays a vital, life-saving role in controlling bacteria and viruses in drinking water that can cause devastating illness, such as typhoid and cholera.
- About 85 percent of all pharmaceuticals contain or are manufactured using chlorine, including medicines that treat heart disease, cancer, AIDS and malaria.
- Chlorine is involved in over 50 percent of all commercial chemistry, even if it is not present in the final molecule. The result is a multitude of products, including various plastics, such as polyurethanes, polycarbonates and epoxy resins.
- Chlorine chemistry is involved in the production of over 95 percent of crop protection chemicals.
- Caustic soda, chlorine's co-product, is valued for its neutralizing power, protecting the environment by removing acid contaminants from industrial gases.
- Caustic soda plays a significant role in the production of soaps and detergents, aluminium, and pulp and paper.
- Chlorine and caustic soda production generates annual gross sales revenue of U.S. $16 billion worldwide.

About 1.1 billion people lack access to safe drinking water. Contaminated drinking water and an inadequate supply of water account for 10 percent of all diseases in developing countries.

– Johannesburg Summit 2002, World Summit on Sustainable Development, United Nations Department of Public Information, October, 2001.

and not all chlorine producers are involved in chlorine or chemical industry associations. The World Chlorine Council (WCC) is working to change this. It is the forum that brings together current regional and national chlorine associations to co-ordinate activities and share information, particularly EH&S best practices.

The WCC Global Safety, Science, Advocacy, Sustainability and Communications Teams promote continuous performance improvement in their areas of expertise through, for example, Global Stewardship Workshops, joint initiatives with the United Nations Environment Programme (UNEP) and participation in Organization for Economic Cooperation and Development (OECD) activities. The Governing Council of the WCC is working to further expand WCC membership to all countries where chlorine producers are located, in order to achieve the maximum level of performance on a global basis.

This report describes the WCC's commitment to follow the sustainable development pathway. In it, we review industry's commitment to continuously improve environment, health and safety performance; present examples of social responsibility; and show how we contribute to the global economy.

Most important, we address the challenges we face and commit to future actions. We discuss health concerns, efforts to reduce mercury use and emissions, and efforts to reduce dioxins and furans emissions, as well as efforts to improve resource conservation and eco-efficiency.

Sustainability is about everyone succeeding. We are determined to play a part, by contributing to a high quality of life for people in all parts of the world, while excelling in all three elements of sustainable development: environmental integrity *and* social responsibility *and* economic viability. Through each of our member associations around the world, we will strive to make sustainability a way of doing business.

We invite you to use this report as a baseline to judge the industry's future progress and to share your own thoughts, comments and concerns with us either through our website or by contacting us at the addresses contained in the report's back pocket.

THE WCC COMMITS TO:

- Expanding the reach of the WCC to include all chlorine producers.
- Promoting the ethic of sustainability and Responsible Care principles, which focus on continuous environment, health and safety (EH&S) performance improvement.
- Sharing, globally, EH&S best practices and research to promote safe application of our chemistries.
- Improving chlorine safety performance, at fixed facilities and in transportation, on a global basis by continuous improvement.
- Helping to facilitate implementation of the Stockholm Convention globally.
- Addressing public health policy issues that relate to our chemistries.
- Promoting resource conservation, especially of water and energy.
- Improving dialogue and involvement with external stakeholders.
- Including environment, economic and corporate social responsibility – "triple bottom line thinking" – in all strategic decision making.

INTRODUCTION

SUSTAINABLE DEVELOPMENT & THE WORLD CHLORINE COUNCIL

Sustainable development is a framework for long-term leadership and commitment about how to improve the standard of living for all, while protecting human health and the health of the planet that we all share.

Sustainable development, as defined by the World Commission on Environment and Development in 1987, offers a new way of thinking about future development, a way that attempts to balance three key aspects – the environment, society and the economy. These aspects are often referred to as the "triple bottom line". True development requires not just productive economies but also strong and healthy societies and ecosystems.

Chlorine chemistry plays a large role in meeting many of society's needs by helping to maintain and improve the standard of living around the world. Yet the industry recognizes there are concerns about unintended effects from some chlorine chemistry products and by-products and about some areas of industry's performance.

We are committed to continually improving our performance and to understanding and addressing concerns in order to continue to serve society's needs as we progress along the sustainable development pathway. We view reaching out to a broad range of stakeholders as an essential element of successfully meeting this challenge and see this report as one way to expand that dialogue.

Many in the chlorine industry, through participation in the voluntary Responsible Care program, are already on the sustainable development journey. We believe Responsible Care addresses many of the elements of sustainable development and provides a strong foundation for future progress.

Responsible Care goes beyond what is legally required in any specific country. It is industry's commitment to continual improvement in all aspects of health, safety and environmental performance and to openness in communication about its activities. Responsible Care is about action, performance and dialogue.

United Nations Definition of Sustainable Development:

"… development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Our Common Future, World Commission on Environment and Development, 1987.

This report establishes a baseline that we hope you will use to judge our future progress. Variations in regional priorities, needs and conditions limit us in this global report to a somewhat general discussion of many issues. Some regional and national associations have produced detailed reports specifically for their areas of operation that should be considered adjuncts to this report.

ELEMENTS OF SUSTAINABILITY

The WCC believes that some of the essential elements on the pathway to sustainability include:

- Engaging external stakeholders and entering in a dialogue with the sustainable development community.
- Helping society meet its critical needs, while continuously improving health, safety and environmental performance through Responsible Care principles.
- Practising openness and honesty in communication, and reporting meaningful measures of progress.

COMMITTED TO ENVIRONMENTAL SUSTAINABILITY

• REDUCING OUR FOOTPRINT

Responsible Care provides a strong foundation for implementing sustainable development. It is the stewardship ethic the chlorine industry employs to continuously improve environment, health and safety (EH&S) performance and address any public concerns about this performance. While specific codes of management practice and public outreach efforts may vary from country to country because of different cultures and priorities, the ethic remains the same. This ethic also encompasses application of the United Nations Conference on Environment and Development (UNCED) definition of the Precautionary Principle.[1]

Responsible Care also means we must be able to measure the impact our operations have on the environment, commit to improvement and publicly report this information. Below is a sampling of some of the improvements and reporting initiatives that have come about through implementation of Responsible Care.

- The Canadian Chemical Producers' Association has issued a *Reducing Emissions* report for the past eight years, listing emissions and projected reductions for 599 substances, including chlorinated compounds. The data show that total emissions of chlorinated compounds have essentially been cut in half in Canada – from approximately 4,100 metric tonnes in 1992 to 2,000 metric tonnes by 1998. The Canadian Chlorine Coordinating Committee reports this information to Environment Canada for publication in the Chlorinated Substances Action Plan Progress Report.

For more information, please see www.ccpa.ca.

For more information, please see www.ec.gc.ca/csap.

- The European chlorine industry association, Euro Chlor, co-ordinated a voluntary program for its member companies to measure emissions of a series of chlorinated substances. During the period 1985–1997, even while production levels were increasing, emissions to air of several chlorinated substances were reduced by more than 70 percent and emissions to water by 85 percent. Further improvements have since been achieved.

For more information, please see Chlorine Review 2000–01, www.eurochlor.org.

- In the United States, emissions of chlorine-related compounds fell by more than 65 percent, even while chlorine production grew by 20 percent.

- The Japan Soda Industry Association (JSIA) established a Japan Chlorinated Chemicals Conference in November 1999 to exchange information and jointly address environmental issues, particularly the High Production Volume program. JSIA is also compiling Life Cycle Inventory data of chlor-alkali products, such as chlorine, caustic soda, hydrogen and hydrochloric acid. This activity is being performed in co-operation with approximately 40 products/raw materials-related trade associations/federations under the guidance of the Japanese Ministry of Economy, Trade and Industry (METI). The findings are to be incorporated into the five-year Life Cycle Assessment (LCA) project that the METI started in 1998. The LCA project includes the development of a methodology and construction of a database.

Responsible Care has now spread to chemical industry associations in more than 45 countries. Because we feel Responsible Care must be actively

[1] ***"When there are threats of serious or irreversible damage, a lack of full scientific certainty shall not be used as a reason for postponing cost effective measures to prevent environmental degradation."*** … United Nations Conference on Environment and Development (UNCED), Earth Summit, Rio Declaration on Environment and Development, Rio de Janerio, Brazil, Publ. No. E73.II.A.14, Stockholm: United Nations, 1992.

practised for the chlorine industry to be successful in achieving sustainability, the WCC is committed to promoting and sharing the Responsible Care ethic and EH&S best practices with chlorine producers around the world. Ways in which the WCC is pursuing this goal include Global Stewardship Workshops, dissemination of technical resources and industry outreach.

GLOBAL STEWARDSHIP WORKSHOPS

One way the WCC promotes the Responsible Care ethic and EH&S best practices is through its Global Stewardship Workshops. The WCC created standardized workshops on environmental, health and safety issues and EH&S best practices that can be taken anywhere around the world. Special emphasis is being given to offering these seminars in developing countries, in order to share state-of-the-art practices and resources on a global level. The WCC first Global Stewardship Workshop took place in São Paolo, Brazil, in February 2002.

- **ENERGY EFFICIENCY: THE CHALLENGE OF DOING MORE WITH LESS**

The raw material of the chlor-alkali industry is abundant, inexpensive sodium chloride/salt. However, processing the salt into chlorine and caustic requires energy. Since energy costs contribute significantly to product costs, it is obviously in the industry's best interests to reduce its energy use per unit of production.

Thus it is for both economic and environmental stewardship reasons that the industry has devoted a great deal of attention to minimizing energy consumption and optimizing energy efficiency.

The chlorine chemistry industry has long employed co-generation, an energy efficiency attained through the co-production of electricity and process heat (also called combined heat and power or CHP) from a plant that is located at the chemical manufacturing facility. By closely locating the power-consuming and -generating sites, energy transmission losses are virtually eliminated. Energy efficiency more than doubles to as high as 70 percent, compared with 32 percent efficiency for energy transmitted from a utility.

In addition, hydrogen gas produced as a by-product of chlorine production is captured and used as a fuel in these on-site power stations. Hydrogen is a "clean fuel," meaning it does not emit carbon dioxide, one of the "greenhouse gases." Recovering and burning the hydrogen also preserves existing fossil fuel reserves such as coal, oil and natural gas. Considering the vital and growing role of energy in global economic and environmental issues, the chlorine industry is likely to increase its use of co-generation.

PRACTISING SOCIAL RESPONSIBILITY

• CONTRIBUTING TO PUBLIC HEALTH

Perhaps the most critical way the chlorine industry makes a significant social contribution is through its products, in particular the use of chlorine to disinfect drinking water. According to the World Health Organization (WHO), chlorine's use in water treatment has been one of the most significant public health advances ever, controlling pathogens that can cause human illness.

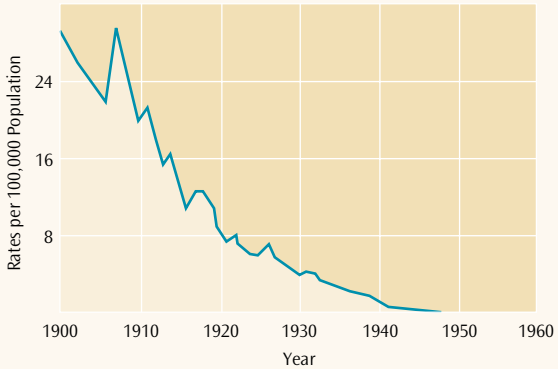
> ***"Of all chemicals, chlorine has saved the most lives worldwide."***
>
> Mauricio Pardón Ojeda, Health and Environment Director, Pan-American Health Organization/World Health Organization.

Chlorination of drinking water began in the early 20th century in Great Britain, where its applications sharply reduced typhoid deaths. Shortly after this dramatic success, the rest of the developed world also began chlorinating its drinking water, virtually eliminating waterborne diseases. Chlorine-based chemicals have remained the disinfectant of choice for treating drinking water for nearly a century. Some 98 percent of public water treatment systems in Europe and North America use chorine-based disinfection. Chlorination is also widely used in wastewater treatment.

Since the 1970s, scientists have known that chlorine used to disinfect drinking water can react with certain organic material in the water to create disinfection by-products (DBPs) such as trihalomethanes (THMs). Concerns about potential human cancer risks from THMs have led regulatory bodies in Europe and North America to establish acceptable levels of THMs in treated drinking water. One of the best methods to control the formation of THMs is to filter out organic material prior to disinfection. While these potential health risks continue to be researched, the WHO notes: "the risks to health from DBPs are extremely small in comparison with inadequate disinfection."

Figure 1

Death Rates for Typhoid Fever in the USA



Women in developing countries can spend up to eight hours a day fetching water, creating an obstacle to their education and their ability to participate in the economy.

– U.S. Agency for International Development

Yet untreated or inadequately treated drinking water supplies remain the greatest threat to public health in developing countries. Over one-fifth of the world's population does not have access to clean water, and more than one-third lacks adequate sanitation. In these countries, diseases such as cholera, typhoid and chronic dysentery are endemic, killing thousands of people every day. When chlorination was halted in 1991 in Peru, the result was a five-year epidemic of cholera.

> ***"Annually, the world's population suffers about 4 billion episodes of water-related diarrhea, causing widespread debilitation and reduced productivity throughout the developing world. An estimated 2.5 million people die from such diseases each year, primarily children under five."***
>
> Integrated Water Resources Management, Ushering in a Blue Revolution, U.S. Agency for International Development.

In June 1996, the U.S. Chlorine Chemistry Council joined with the American Red Cross to launch the Water Relief Network® – a humanitarian effort to help restore public health in the wake of disasters. Access to safe drinking water is one of the most urgent and universal of human needs in the aftermath of disasters such as earthquakes, hurricanes or floods. Chlorine disinfection is currently the most effective and affordable method of preventing diseases caused by unsanitary water.

During its first year, the network's more than 50 company members donated chlorine-based chemicals for water disinfection, surface disinfectants, plastic water bottles and vinyl pipe to help communities struck by natural disaster in Cuba, Haiti, India, Antigua, Tajikistan and the United States. The Water Relief Network is now a World Chlorine Council program.

The chlorine industry has also spawned initiatives to help guarantee the ongoing safety of municipal water systems. For example, in 1999, the Chlorine Chemistry Council signed an agreement with the Pan American Health Organization (PAHO) to help improve drinking water safety in 19 nations in Latin America. Clorosur, the chlorine association in South America, along with Abiclor, the Brazilian Chlor-Alkali and Derivatives Industry Association, regularly donates large amounts of products to poor communites.

Chlorosur and Abiclor have also been working with the PAHO/WHO on water quality projects. They publish educational materials, such as literature on the prevention of cholera, and hold conferences to help increase access to safe water supply systems in urban and rural communities. Known as Acquasur, the South American Conference on Water Quality annually brings together specialists from several parts of the world to discuss the problem of water shortages, proper management of water resources and the importance of environmental education for ensuring quality of life for future generations.

Helping the sick

Chlorine chemistry also contributes to public health through its contribution to the production of medicines. Approximately 85 percent of all pharmaceutical products contain or are manufactured using chlorine. These include medicines to treat AIDS, allergies, arthritis, cancer, depression, diabetes, heart disease, high blood pressure, infections, malaria, pneumonia, psychiatric illnesses and gastro-intestinal ulcers. Often the presence of chlorine in the substance is essential for its efficacy, with 40 percent of recent drugs containing chlorine in the active molecule.

In addition, vinyl plastic (the major market for chlorine) is used in over 25 percent of all medical plastics and over 70 percent of all disposable medical applications. Its unique combination of performance characteristics – transparency, flexibility, durability and sterilizability – make it the plastic of choice for such essential products as blood bags and tubing, catheters, dialysis equipment and tubing, inflatable splints, masks, gloves and myriad other products.

When Disaster Strikes

The Water Relief Network is a World Chlorine Council program. Over the past four years, the program has provided life-saving materials when desperately needed. It has reached more than 15 nations, including Nicaragua and Honduras following Hurricane Mitch and Colombia following earthquake damage. More recently, the industry supported American Red Cross relief efforts in the earthquake-ravaged state of Gujarat in Western India. The donation provided plastic sheeting to construct temporary housing for 120,000 people. Additional resources were used to help provide safe drinking water to regions in which water infrastructure had been damaged or destroyed.

• PROMOTING SAFETY

Another aspect of industry's social responsibility focuses on the safety of workers, communities and the public. The chlorine industry is acutely aware of how dangerous releases of chlorine can be. Chlorine is a poisonous gas, irritating to the respiratory system, mucous membranes, eyes and skin. It is neither explosive nor flammable, but under certain circumstances will support combustion. As a liquid, chlorine causes skin and eye burns on contact. Chlorine gas reacts with moisture to form hydrochloric acid and hypochlorous acid; both are very corrosive and can be dangerous.

Therefore, numerous controls and layers of protection are in place during the manufacturing process to prevent releases, including use of chlorine in closed systems constructed of corrosion-resistant materials, storage and use with proper ventilation, and storage away from flammable materials.

TRACKING AND IMPROVING SAFETY

The WCC Global Safety Team (GST) was established to promote safe practices and to help the producers, packagers, distributors and users of chlorine continuously improve their safety practices. The GST is establishing systems that will further enhance our ability to measure manufacturing and transportation safety performance and to share lessons learned.

The incident tracking system will enable the team to share experiences on chlorine incidents globally, thus potentially preventing similar incidents. The performance tracking system will keep track of chlorine safety incidents globally and allow industry to measure whether or not its performance is improving globally.

EMERGENCY PLANNING

WCC associations have been instrumental in creating emergency plans. For example, the Chlorine Institute's North American Chlorine Emergency Plan provides trained emergency teams from chlorine producing, packaging and consuming plants on alert 24 hours a day to handle potential or actual chlorine emergencies outside of these facilities.

Similar mutual aid plans have been established in numerous other countries, such as Germany's Transport Accident Information System and France's TRANSAID, a network for potential interventions in case of transportation emergencies. French chlorine producers have developed a tool, named *Protocole 70,* to provide their expertise and presence when necessary through the permanent 24-hour availability of teams. Similar systems are in place in all Western European producer countries.

Safety in transportation is a top priority. Bulk quantities of chlorine are shipped by pipeline, road and rail tankers, and tank barges. Small quantities are shipped in cylinders. Modes and volumes vary greatly by region.

In Europe and North America, shipment of chlorine over long distances is minimized when vinyl chloride monomer and polyvinyl chloride plants – the largest users of chlorine – are located either on the same plant sites or nearby. The chlorine is then transported through pipelines as a liquid or gas. In South America, chlorine is primarily transported by truck.

Sharing expertise

Sharing safety expertise is one of the most effective ways to prevent accidents. Organizations such as

the Chlorine Institute, Japan Soda Industry Association, Euro Chlor and Clorosur have independently produced and then shared:

- specifications for chlorine cylinders and rail tank cars to ensure the highest integrity containers;
- technical information, including drawings and videotapes for the safe handling of chlorine, and chlorine emergency kits;
- the U.S. Chlorine Institute's Chlorine Manual, now in its 6th edition and an American National Standard;
- Euro Chlor's more than 150 technical publications covering subjects such as environmental protection, health, safety, transport, valves; and
- training materials for firefighters and hazardous materials emergency responders.

Promoting safe use

Chlorine producers are also concerned about the safe use of their products. For example, in France nine consumer associations, with the support of the National Safety Consumers Commission and with participation of French chlorine producers (members of Syndicat des Halogènes), created nine fact sheets to address concerns about incidents connected to the inappropriate use of some chlorinated household products. These sheets on safe use have been distributed through various consumer associations and are also available on a website: www.conso.org. Similar fact sheets are also available on www.c3.org.

Definition of Corporate Social Responsibility:

"The commitment of business to contribute to sustainable development, working with employees, their families, the local community and society at large to improve their quality of life"

World Business Council for Sustainable Development

• CORPORATE SOCIAL RESPONSIBILITY

One aspect of sustainability that has gained prominence and acceptance around the world is the concept of corporate social responsibility. However, the focus of corporate social responsibility may be different in different parts of the world. In some nations the emphasis may be on actions against child labour or to promote training of local workers, while in others it may be on community involvement.

Whatever the focus, an important part of the sustainability process is engaging in dialogue with stakeholders outside of the corporation. This dialogue helps all parties identify and understand societal concerns. It also provides the company with a valuable forum for mapping its future course, especially when confronting difficult trade-offs.

In some parts of the world, many WCC companies have Community Advisory Panels to help encourage dialogue and openness with their plant communities. These panels, composed of local citizens and community officials, help companies become partners in addressing issues of importance to the community as a whole.

WCC member companies also invest time, money and other resources to improve the quality of life in the workplace and in their local communities, striving to be socially responsible corporate citizens. Many support educational programs to help motivate students to study science; some even build schools and hospitals. In addition, employees are personally involved in many ways within their communities.

While business is certainly familiar with measuring its financial as well as environmental performance, measuring its social contribution is still somewhat undefined. Therefore, we offer the following member company activities as examples of what we believe are socially responsible actions.

HELPING ENVIRONMENTAL EDUCATION

"Chemistry and Nature" is an environmental education program created in 1997 by Solvay Indupa Brazil. The goal of the program is to help students understand the relationship between communities and a healthy environment. It also addresses the role and responsibilities of industry and environmental performance initiatives such as Responsible Care.

The program focuses on the geographic areas around Ribeirão Pires, Rio Grande da Serra and Santo André (São Paulo – Brazil). It employs a variety of communication tools, including cartoons, leaflets and games oriented to children 7–14 years of age. Students participate interactively and can earn awards for certain achievements, such as the best drawing for "How can I protect the environment?"

In 2001, the project reached 68 public schools and 18,000 students, including 450 children of Solvay employees.

"In Santo André city, Solvay has been our partner in many social actions, helping us to go ahead in the direction of social responsibility and sustainable development. They are consistently working in local and regional discussions and supporting cultural and environmental initiatives, especially here in an environmentally protected area. In environmental terms, Solvay has implemented many actions to better control its production processes and to identify and treat their environmental programs."

Mr. Maurício M. Mindrisz – General Director of SEMASA (Santo André Environmental Secretariat)

PROVIDING SAFE WATER

Employees of Norsk Hydro (a member of Euro Chlor), along with trade unions, the environmental organization Bellona and the Norwegian church built a waterworks in Mensura, Eritrea. Employees donated 2,000 hours of pay to the project. The waterworks provides safe water to the 4,000 inhabitants of Mensura's two villages and a refugee camp built with aid from the Norwegian church.

The project started as a wish to help people in rural Eritrea, but also to demonstrate that vinyl products can be useful to society by improving living conditions. About 5,000 metres of vinyl tubes supplies pure water to various water posts in the villages. The local school and hospital have received their own water supply. Before the waterworks was built, people had to walk two to three kilometres to get water of poor quality, and carrying water was the women's responsibility. The work was very time-consuming, and deprived young girls of an opportunity to go to school. Thanks to easy water access, girls now have more time for school and other activities.

Only local workers have been employed on the project, and regional building traditions have been followed. The villagers have participated in planning and execution and are now responsible for maintenance and following up. Everyone has to pay a small fee upon collecting water. The money is used to maintain water pumps and other equipment. The chief administrative officer of Mensura has recommended the project as a model waterworks.

SUPPORTING COMMUNITY HEALTH

The Formosa Plastics Group of Taiwan has founded several non-profit organizations to help improve quality of life in its local community. In particular, it has been involved for many years in ensuring quality medical care. In 1976 when Taiwan had a serious shortage of medical facilities – with only 17 medical beds for every 10,000 people – Formosa founded Chang Gung Memorial Hospital. It also built four branches throughout the island. At present, Chang Gung treats 25,000 out-patients daily and has 6,500 beds available for in-patients. It is considered one of the largest and best equipped general hospitals in Asia.

To eliminate a serious shortage of nurses, Formosa also founded the Chang Gung Institute of Nursing. In addition, in 1987, it established Chang Gung Medical College, now known as Chang Gung University. Presently, the university has schools in medicine, engineering and management with a total of fifteen departments and nine graduate study programs.

Today, apart from its educational mission, Chang Gung University is dedicated to the most advanced basic medical research. So far, significant progress has been made in genetics, B-type hepatitis and organ transplants, as well as Parkinson's and cardiovascular diseases.

IMPROVING QUALITY OF LIFE

The Dow Chemical Company's commitment to Responsible Care meant going beyond government requirements when it purchased a plant site in former East Germany in 1995. Since that time, the site, which includes chlor-alkali, ethylene dichloride and vinyl chloride monomer plants, has achieved the following reductions:

- Chemical emissions into the air and water reduced by 90 percent.
- Solid waste reduced by 75 percent.
- Wastewater reduced by 80 percent.
- Work-related injuries and illnesses down from 250 to 58 per year.
- Annual spills down from 39 to one.

The bottom line – a vastly improved environmental performance that has created a better, healthier workplace and a better, healthier community for employees and neighbours.

BEING A GOOD NEIGHBOUR

In 1999, the Pioneer Tacoma Plant was awarded the Neighbourhoods USA (NUSA) Notable Award in recognition of the company's active support of the City of Tacoma in the All-American City competition. NUSA is the nation's largest grassroots neighbourhood organization with over 1,100 active members. The organization brings together neighbourhood activists, elected officials and individuals to advocate for community improvements. The NUSA mission statement is "Neighbourhoods USA provides opportunities for diverse people and organizations to share their ideas, values and experiences to build stronger communities."

The NUSA Notable Award recognizes private corporations, foundations or individuals that provide significant contributions to their community. The Northeast Tacoma Neighbourhood Council nominated Pioneer's Tacoma Plant for the award, citing the plant's support of the All-American City Committee, their volunteer activity in over 50 organizations, and their participation in Neighbourhood Council Conferences.

IMPROVING HEALTH AND SAFETY PERFORMANCE

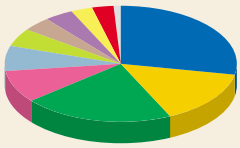
Occidental Chemical Corporation is a leader in safety, health and environmental excellence. This is due to high levels of employee involvement and management leadership in an evolutionary process and cultural change that was started in the late 1980s.

The process entails implementing the Responsible Care Codes of Management Practices and partnering with the Occupational Safety and Health Administration (OSHA). The voluntary partnership program (VPP) with OSHA has been an outstanding success. OxyChem's first VPP STAR (the highest level of safety achievement) worksite was approved in 1986. They currently have 18 worksites qualified for STAR status, and on July 30, 1998, the corporate headquarters in Dallas, Texas, became the first office building in the nation to receive STAR approval.

As part of the VPP model, OxyChem employees play an active role in identifying and assessing potential hazards, evaluating safety and health programs, and training other employees. OxyChem employees have served on VPP advisory panels, made workshop presentations and mentored other worksites. A result of participating in the Responsible Care initiative and the OSHA VPP program has been a dramatic and measurable difference in the injury incidence rate. Improving worker safety is a core focus and plays a significant part in sustainable development.

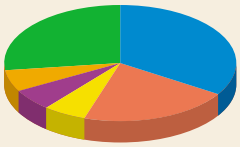
CONTRIBUTING TO THE GLOBAL ECONOMY

1999 Global Chlorine Capacity



North America	28%
Western Europe	21%
NE Asia	15%
Japan	9%
Russia	7%
India	5%
South America	4%
Eastern Europe	4%
Middle East	3%
SE Asia	3%
Africa	1%

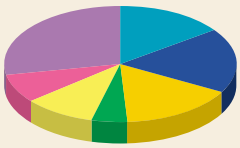
Chlorine Chemistry's End Uses



Vinyl	34%
Organics	21%
Chlorinated solvents	6%
Pulp & paper	6%
Water	6%
Other	27%

*such as propylene oxide, epichlorohydrin, polycarbonate

Caustic Soda End Uses



Organics	18%
Pulp & paper	16%
Inorganics	15%
Soap & detergents, textiles	10%
Alumina	8%
Water treatment	5%
Other	28%

Around the world, chlorine and its essential co-product, caustic soda, are fundamental building blocks of the chemical industry. Direct production of these chemicals provides jobs for tens of thousands of people at over 500 companies at 650 plant sites worldwide. Plants in Western Europe alone provide jobs for some 40,000 people.

A total of 14 companies produce about 45 percent of the world's total capacity of 46.7 million metric tonnes. Based on 1999 global demand of 88 million metric tonnes, it is estimated that the production of chlorine and caustic soda alone generated gross sales revenue of U.S. $16 billion worldwide.

But that's just the beginning of the story. Chlorine chemistry is used in over 50 percent of all industrial chemical processes, including 85 percent of pharmaceuticals and 96 percent of crop protection chemicals. It is a basic manufacturing chemical and thus affects numerous other industries, making it truly difficult to capture the breadth of its total economic contribution in terms of job and wealth creation.

In addition, chlorine's co-product, caustic soda, is also fully integrated into the economy through a wide variety of industrial applications. It is valued for its neutralizing power and as an absorbent. It is used directly in the production of pulp and paper, aluminium, petroleum and natural gas refining and processing. It is used for pollution control to remove acid contaminants from gases prior to discharge to the atmosphere. And like chlorine, it is also used as an intermediate to produce other products, such as sodium phenolate used in antiseptics and in producing aspirin and amyl alcohol used in the production of pharmaceuticals. It also plays a significant role in the textile industry and in the manufacture of powder soaps, bar soaps and detergents. Developing countries in particular have a high demand for caustic soda. (Please see insert, *Chlorine's Important Co-product: Caustic Soda*.)

Chlorine chemistry not only is important for today's economy, but also plays a key role in enabling future innovations, thus contributing to economic growth. Innovative uses of chlorine chemistry include producing:

- ultra-pure silicon, the basic material of the photovoltaic cell, used to trap solar energy;
- super-strength polyaramide fibres, used to replace asbestos in brake linings and to reinforce fibre optic cables, the infrastructure of high-speed Internet communications;
- silicon chips, essential to microprocessors that drive computers, personal digital assistants, mobile telephones and many "smart" appliances;
- titanium metal and aluminium for lightweight aircraft fuselages, jet engines and spacecraft; and
- epoxy resins used in satellites, cars and planes.

PRESENT & FUTURE CHALLENGES

• ADDRESSING HEALTH CONCERNS

Nothing can be more important than ensuring the products of chlorine chemistry are properly characterized and managed with respect to potential hazards. In order to be sustainable, the chlorine industry must be at the forefront in supporting and conducting research on the potential effects of its products.

GLOBAL SCIENCE FORUMS

The WCC Science Team has sponsored two Global Science Forums for regulators, legislators, scientists, academics and industry representatives involved in environmental, health and safety aspects of chlorine chemistry. The first one was held in the United States in September 1998, with the second one in Portugal in May 2000. Over 80 industry and government scientists from Europe, North America, South America and Japan attended the May 2000 Forum on Assessing the Risks of Chlorinated Substances for Health and the Environment.

In addition to the research that chlorine producers do on their own products, WCC associations also fund research and share the results through the WCC Science Team. Science benefits enormously from global co-ordination. The WCC Science Team works to foster global understanding of key health issues affecting chlorine chemistry. It shares scientific knowledge and provides scientific support to help identify gaps and address areas of concern.

One identified research gap focuses on the theory that even minute amounts of certain chemicals may have adverse effects on the endocrine system of wildlife and possibly humans, particularly on fetuses. Currently, the global chemical industry is helping to find the answer by providing $100 million over the next four years to research this gap. The industry has also partnered with the OECD to develop endocrine disrupter screening and testing methodologies.

Summaries of the latest scientific research can be found at:

www.cfour.org/science/science.html

www.americanchemistry.com

www.cefic.org/lri

www.nikkakyo.org/english/lri/lri_parent.htlm

The HPV initiative

The Global Science Team also strives to maximize the benefit from collective scientific knowledge, improve science management and improve confidence in science-based risk assessment of chlorinated chemicals. Currently, the team is helping to facilitate the compilation of test data on more than 125 chlorinated substances identified under the International Council of Chemical Associations High Production Volume (HPV) Programme.

The HPV Programme is a commitment by the global chemical industry to provide, by 2004, publicly available, harmonized, internally agreed upon data on the hazards of 1,000 commonly used chemicals with production volumes of more than 1,000 metric tonnes per year. This initiative is in response to increasing public concerns about the risks posed by HPV compounds and is part of the OECD voluntary testing program.

For more information, please see www.iccahpv.com.

This is the first time producers of a chemical around the world will share an internationally agreed initial hazard assessment. There have been, however, several similar initiatives on a national and regional level. One of the first was in 1995 when Euro Chlor initiated a groundbreaking commitment. It made a voluntary environmental agreement to carry out marine risk assessments, following European Union guidelines, on 25 chlorine-based compounds. This was in part a response to concerns expressed by ministers of countries bordering the North Sea, and in part an experiment to further develop appropriate risk assessment tools.

VOLUNTARY RISK ASSESSMENTS

Euro Chlor has conducted voluntary risk assessments on 25 chlorine-based compounds. The results have proven to be a most useful research application, not only for Euro Chlor but also for the European Union, the Commission for the Protection of the Marine Environment of the North East Atlantic and for interested non-government organizations.

• PERSISTENT ORGANIC POLLUTANTS

One of the challenges of hazardous materials is that the very properties that make a chemical beneficial and useful can also make it hazardous when not properly managed. Of the many thousands of chlorinated compounds in existence, a limited subset combines three characteristics that can make them a particular health and environmental concern. Persistent, bioaccumulative and toxic substances (PBTs) are chemicals that do not degrade readily, may be transported over large distances, bioaccumulate in living organisms and are toxic. Organic chemicals that are PBTs are also known as persistent organic pollutants (POPs).

The WCC is fully committed to reducing the risks posed by these compounds. It actively participated in the United Nations Environment Programme (UNEP) negotiations to develop an International Convention to manage and reduce the risks associated with POPs. In addition, the treaty calls for the continuing minimization of releases of dioxins and furans – by-products of combustion and some industrial production – and where feasible, their ultimate elimination. Adopted in May 2001 and known as the Stockholm Convention, this treaty is an important achievement. It balances responsible environmental stewardship with sound public health policies and economic growth.

Reaching a global agreement on such a complex and important issue was not easy, especially given the fact that some of the POP compounds offer significant, even life-saving benefits. For instance, negotiators recognized that the judicious use of DDT, while appropriately banned in North America and Europe because of effects on wildlife, was absolutely essential to preventing malaria in certain tropical areas.

Malaria, according to the WHO, "…is by far the world's most important tropical parasitic disease, and kills more people than any other communicable disease except tuberculosis." The WHO estimates that more than 90 percent of all malaria cases occur in sub-Saharan Africa, and that the disease kills more than one million people per year, with the greatest number of deaths among young African children. Recognizing this, the treaty allows about 25 countries to use DDT selectively in public health applications.

STOCKHOLM CONVENTION POPs LIST:

PESTICIDES:
Aldrin, Chlordane, Dieldrin, DDT, Endrin, Heptachlor, Mirex, Toxaphene

INDUSTRIAL CHEMICALS:
Polychlorinated biphenyls (PCBs)

BY-PRODUCTS:
Hexachlorobenzene, Dioxins and Furans

WORKING TO MANAGE POPs

To further promote the proper management of POPs, the World Chlorine Council has also been very active in the UNEP's Regional Awareness Workshops on the Management and Destruction of PCBs. At the invitation of UNEP, the WCC, through member associations such as Euro Chlor, has provided several industry experts to speak at different workshops in Mali, United Arab Emirates, Slovenia, Zambia, Russia, Croatia and Iran. These experts share information on the handling and environmentally sound destruction of PCBs and PCB-contaminated equipment, and minimisation of dioxin and furans.

• REDUCING MERCURY USE AND EMISSIONS

Chlorine is produced by applying a direct electric current to brine (water and salt solution) to produce chlorine, hydrogen gas and sodium hydroxide (caustic soda). (For more details, see insert *Chlor-Alkali Manufacturing Processes*.)

There are three main electrolytic production processes in the industry – the diaphragm cell, mercury cell and membrane cell.

Plants using the mercury cell process are primarily located in Europe and South America. While this use contributes only a small fraction of the total emissions of mercury to the environment (less than 0.1 percent of all natural and industrial sources), the toxicity of mercury to humans and wildlife makes it imperative that any emissions be minimized.

In Europe, about half of the chlorine capacity uses mercury cell technology. During the past decade, producers have progressively reduced annual mercury emissions by more than 85 percent. The industry is committed to further reductions. All European producers using the mercury cell process have entered into a voluntary agreement that includes limits and targets for future emissions, no new mercury capacity and the closure or conversion of the existing mercury cell plants at the end of their economic life, anticipated by 2020. Western European mercury process plants have reduced total mercury emissions to air, water and products from 26.60 grams per metric tonne in 1977 to 1.25 grams per metric tonne in 2000. In the United States, 10 percent of chlorine production capacity uses mercury cell technology and these plants have committed to a 50 percent use reduction by 2005.

SHARING EXPERTISE

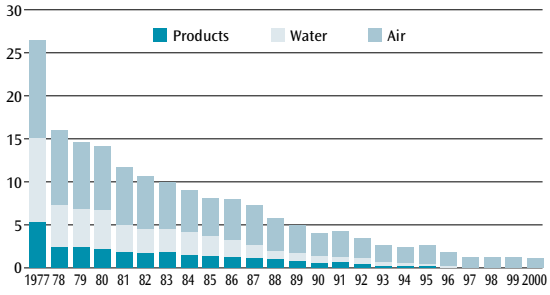
Euro Chlor is actively sharing its extensive knowledge and expertise in reducing mercury emissions. In 1999, the WCC and Euro Chlor collaborated with the Indian Chemicals Manufacturers Association (ICMA) to organize an India Chlorine Conference to help upgrade internal standards of Indian industry and share best available technology for manufacturing chlorine and vinyl. In 2000, Euro Chlor was invited by ICMA to speak about mercury emissions abatement at a two-day seminar with the Alkali Manufacturers Association of India.

The WCC is also involved with the Working Group for the Global Mercury Assessment initiated by the UNEP Governing Council in February 2001. As a result of global concerns about mercury as a toxic heavy metal subject to long-range environmental transport, the UNEP working group will prepare a study that aims to identify man-made sources of mercury and share EH&S best practices for minimizing such emissions.

Figure 2

European Chlor-Alkali Mercury Emissions to Air, Water and Products

g Hg/t chlorine capacity



There have also been dramatic reductions in mercury emissions in Brazil, which accounts for almost 80 percent of South American chlorine production. In fact, the reductions achieved at one plant rank it amongst the foremost of its kind in the world, reducing mercury use over 97 percent from 1975 to 1991.

In Japan, all plants using the mercury cell process were completely phased out by the end of 1986.

The industry also has rigorous controls in place to protect the health of employees from any potential exposure to mercury. For instance, Euro Chlor and the U.S. Chlorine Institute have

DRAMATIC MERCURY REDUCTIONS

Carbocloro's plant, a joint venture with Oxy Chem, in Cubatão, Brazil, is considered a model company by Cetesb (São Paulo State environmental protection agency) and has won numerous awards. Operating since April 1964, the plant produces about 253,000 metric tonnes of chlorine and 284,000 metric tonnes of caustic soda annually, along with hydrochloric acid, sodium hypochlorite and hydrogen, using the mercury cell and diaphragm cell processes. Carbocloro has been able to reduce mercury emissions to levels that are considered some of the world's lowest.

Efforts to achieve these reductions began in 1973 when the company's technical staff went to Europe and the United States to learn about the most advanced environmental protection technology. In 1978, they installed a mercury treatment and effluents neutralization station that resulted in mercury levels dropping to 20 percent of the level legally permitted in industrial waste. In addition, mercury use at Carbocloro was reduced from 0.380 kg/tonne chlorine in 1975 to 0.010 kg/tonne chlorine in 1991. As a result of these efforts, the presence of mercury in the nearby Cubatão River is undetectable before and after passing the plant.

In 1985 Carbocloro declared itself an Open Plant. Since then, it has welcomed more than 43,000 visitors, day and night, all year round, to tour the plant and to learn about a responsible chlorine manufacturer.

established rules and guidelines pertaining to worker exposure, and employees must undergo regular health examinations.

All new plants use the membrane cell technology.

• REDUCING EMISSIONS OF DIOXINS

"Dioxins" is the general term used to describe a group of 75 different types of chlorinated dioxin and 135 related furans. Seventeen of these compounds are of concern, but they vary greatly in their degree of toxicity. These compounds are not produced intentionally, generally occurring as by-products of combustion.

Dioxins can occur as a result of natural processes (forest fires, volcanoes) and from human activities, such as incineration of wastes, backyard burning, the production of iron and steel, coal burning, and some industrial processes involving chlorine. The chlorine industry is recognized in the Stockholm Convention (see page 16) as a minor source of air emissions of dioxins.

Air emissions, the priority

The improper incineration of various types of wastes is thought to be the leading source of air emissions of dioxins in some countries. Studies indicate that improved combustion practices can have the biggest effect on further reducing environmental levels of dioxins. While the presence of chloride (either as naturally occurring salt or in products) is necessary to form dioxins, studies have also shown that the amount of chloride-containing waste is not a determining factor in the formation of these compounds.

Design and operating temperature of incinerators are by far the most important variables in preventing the formation of these combustion by-products. For

instance, in Japan, where incinerators for municipal waste were identified as the major source of dioxins, technological improvements and the shutdown of several old incinerators reduced total emissions of dioxins dramatically—to 64 percent of 1997 levels by 1999.

Determining sources of dioxins

Many industry sectors and/or governments have created inventories of dioxins emissions to track quantities and trends of releases by various industry sectors. Examples include:

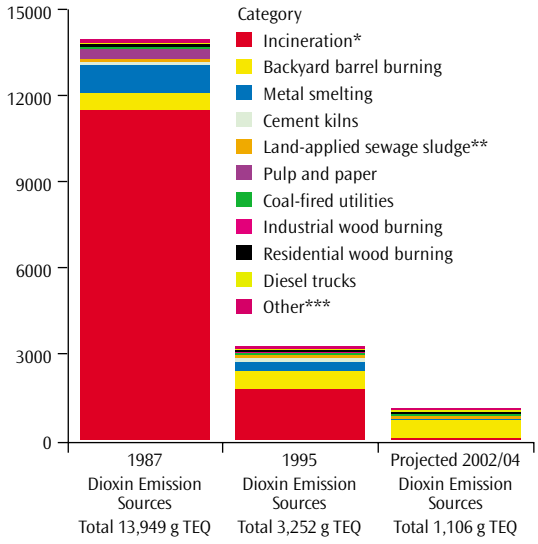
- The Stockholm Convention requires all parties to develop a National Action Plan for reducing dioxin and other listed substances. This includes a requirement to develop and maintain source inventories and release estimates.
- U.S. Environmental Protection Agency inventory of air emissions of dioxins for the years 1987 and 1995, and projected emissions for 2002–2004. Emissions are expected to decline 92 percent from 1987 levels.
- A voluntary review by the Vinyl Institute (U.S.) of emissions of dioxins from its production processes. The results shows that emissions from the vinyl sector totalled about 13 grams TEQ*, versus 3,000 grams TEQ nationwide.
- A new 2000 requirement in the United States (Toxic Release Inventory) and Canada (National Pollutant Release Inventory) for reporting of releases of dioxins to air, water and land.
- Japanese dioxin emission inventories for the years 1997 and 1998, and promulgation of the Basic Guidelines of Japan for Promotion of Measures against Dioxins, which call for a nationwide reduction of dioxins emissions of 90 percent against 1997 levels.

Figure 3

Quantified U.S. Dioxins Sourced Over Time[1]

Grams TEQ

Source: U.S. EPA, 2000[2]



* Includes incineration of municipal solid waste, sewage sludge and hazardous waste

** The U.S. EPA will be issuing a new projection for dioxin emission from land-applied sewage sludge for 2002/2004 based on surveys to begin in spring 2001. The U.S. EPA expects that the new projection will be lower than the value previously projected and here graphically displayed.

*** Other category includes leaded and unleaded gasoline, land-applied 2,4-D, iron ore sintering, oil-fired utilities, EDC/vinyl chloride, lightweight aggregate kilns that combust hazardous waste, petroleum refinery catalyst regeneration, cigarette smoke, boilers/industrial furnaces, crematoria and drum reclamation.

[1] Dioxin here is defined at the totality of 7 dioxins and 10 furans. TEQ denotes toxic equivalent, a quantitative measure of the combined toxicity of a mixture of dioxin-like chemicals.

[2] U.S. Environmental Protection Agency (May, 2000; updated October 19, 2000). Inventory of Sources of Dioxin in the United States.

HELPING TO IDENTIFY SOURCES

One effort to identify sources of dioxins took place in Thailand, where UNEP worked with Thai and German authorities on a dioxins sampling assessment pilot project. At UNEP's request, the WCC/Euro Chlor participated in this project, which was completed in June 2001. This pilot project will be used as the basis to establish similar assessment programs for dioxins in other countries to help develop a national dioxins release inventory.

• PRODUCTS

One of the major products of chlorine chemistry is polyvinyl chloride, known as PVC or vinyl. Invented in the United States in the early 1920s, it was first used for insulated wire, raincoats and shower curtains. Today, vinyl is the second largest selling plastic in the world, with numerous uses ranging from blood bags to siding to piping. (Please see insert, *Chlorine Chemistry's Role in Our Daily Lives,* for additional product information.)

*TEQ denotes toxic equivalent, a quantitative measure of the combined toxicity of a mixture of dioxin-like chemicals.

Most vinyl (about 65–70 percent) is used in building and construction because of its durability and longevity. While these traits have their own environmental advantages in terms of reduced need for replacement materials (conservation of resources), they also create questions about end-of-life management and obligations on future generations.

The global vinyl industry has taken many steps to address these concerns. In one of the broadest and most recent examples, the European Council of Vinyl Manufacturers, along with the European Council for Plasticisers and Intermediates, the European Stabilisers Producers Association and the European Plastics Converters, is engaged in a Voluntary Commitment announced in June 2000.

This Voluntary Commitment builds on principles of the chemical industry's Responsible Care program and addresses key issues across the vinyl life cycle. It contains quantifiable targets, with interim deadlines, that will allow the industry and the public to track its progress toward achieving four key overall objectives:

1. Continuous environmental improvement and resource efficiency during manufacture;
2. Sustainable use of additives within PVC applications;
3. Responsible management of PVC products at the end of their useful life; and
4. Managing delivery of these projects and provisions of appropriate financial resources.

The industry published its first annual progress report in March 2001. The report presents actions taken on manufacturing, additives and waste management, including eight future recycling projects.

The Vinyl Council of Canada's (VCC) voluntary Environmental Management Program (EMP) is another example of industry's responsiveness. Developed in 1998–1999, the EMP is modelled in part after Responsible Care and ISO 14001 and is one of the first of its kind for manufacturers of vinyl products. The EMP contains a series of commitment areas and action steps designed to ensure vinyl products are manufactured and distributed in a safe and environmentally responsible manner, with the promotion of recycling wherever possible, thus minimizing vinyl's environmental footprint. The VCC issued its First Progress Report on the EMP, which also contains an assessment by its Public Advisory Panel, in September 2000.

A copy of the report is available at www.plastics.ca/vinyl.

The Vinyl Institute (U.S.), as a Responsible Care partner, has committed to continuous improvement in environmental and safety performance. This commitment is demonstrated through the industry's Responsible Care Progress Report. Now in its second edition, the report provides trend data on declining emissions as well as improvements in safety performance of Vinyl Institute member manufacturing sites. In the 1987–1999 period, the industry reduced releases of vinyl chloride monomer by 72 percent and of ethylene dichloride by 94 percent. U.S. vinyl industry facilities have also reduced work-related illnesses and injuries from a 3.95 incident rate in 1994 to a 1.47 incidence rate in 2000.

The recently developed Environmental Charter for U.K. PVC Manufacturers and Eco-efficiency Code of Practice for the Manufacture of PVC being adopted by the U.K. PVC manufacturing industry marks an important incremental step on the road toward sustainability through the progressive reduction of environmental impacts.

The Japanese PVC resin industry established the Vinyl Environmental Council (VEC) to respond to environmental issues and provide accurate information on PVC. Based on Responsible Care principles, VEC is preparing a voluntary "vinyl charter" to demonstrate how the industry is taking responsibility for addressing environmental issues.

The vinyl industry has also pioneered research that has expanded the ability to recycle mixed wastes. This research led to the commercialization of automatic sortation equipment that is used today in modern materials recovery facilities.

Most recently, the European and U.S. vinyl industry organizations have jointly funded a pilot facility to convert PVC waste materials back to chemical feedstocks. This start-up phase pilot operation is in Tavaux, France.

COMMITTED TO THE SUSTAINABLE DEVELOPMENT JOURNEY

Throughout this report we have tried to present a picture of the global chlorine industry's status regarding the three facets of sustainable development – environment, society and the economy. We view this report as a step along the way in our sustainable development journey.

We conclude this first report by restating that we strongly believe chlorine chemistry plays a vital role in meeting many of society's present needs and will continue to play a vital role by helping to maintain and improve the standard of living around the world. We recognize that we face challenges and that there are concerns about unintended effects from some chlorine chemistry products and by-products, and about some areas of industry's performance. We are committed to improving our performance and to understanding and addressing concerns in order to continue to serve society's needs while advancing the goal of sustainable development.

We intend to increase our dialogue with a broad range of stakeholders as an essential element of successfully meeting these challenges, and we view this report as one way of starting that dialogue. We look forward to your views on our report, our industry and its sustainability.

THE WCC COMMITS TO:

- Expanding the reach of the WCC to include all chlorine producers.
- Promoting the ethic of sustainability and Responsible Care principles, which focus on continuous environment, health and safety (EH&S) performance improvement.
- Sharing, globally, EH&S best practices and research to promote safe application of our chemistries.
- Improving chlorine safety performance, at fixed facilities and in transportation, on a global basis by continuous improvement.
- Helping to facilitate implementation of the Stockholm Convention globally.
- Addressing public health policy issues that relate to our chemistries.
- Promoting resource conservation, especially of water and energy.
- Improving dialogue and involvement with external stakeholders.
- Including environment, economic and corporate social responsibility – "triple bottom line thinking" – in all strategic decision making.

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INSIDE BACK POCKET...

Turning Salt into...

CLEAN DRINKING WATER

Chlorine Chemistry's Role in our Daily Lives

BLOOD BAGS IV BAGS/TUBING

Turning Salt into...

SOAPS AND DETERGENTS

Chlorine's Important Co-product: Caustic Soda

COTTON FABRICS

Turning Salt into...

Chlorine and Caustic Soda

Chlor-Alkali Manufacturing Processes

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