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PROCEEDINGS OF THE OECD WORKSHOP ON NON-REGULATORY INITIATIVES FOR CHEMICAL RISK MANAGEMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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Previous Environmental Health and Safety publications related to risk management include:

Risk Reduction Monograph No. 1 Lead.
Background and National Experience with Reducing Risk (1993)

Risk Reduction Monograph No. 2 Methylene Chloride.
Background and National Experience with Reducing Risk (1994)

Risk Reduction Monograph No. 3: Selected Brominated Flame Retardants.
Background and National Experience with Reducing Risk (1994)

Risk Reduction Monograph No. 4: Mercury.
Background and National Experience with Reducing Risk (1994)

Risk Reduction Monograph No. 5: Cadmium.
Background and National Experience with Reducing Risk (1994)

Methylene Chloride Information Exchange Programme: Survey Results (1996)

About the OECD

The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental organization in which representatives of 29 industrialized countries in North America, Europe and the Pacific, as well as the European Commission, meet to co-ordinate and harmonize policies, discuss issues of mutual concern, and work together to respond to international problems. Most of the OECD's work is carried out by more than 200 specialized Committees and subsidiary groups composed of Member country delegates. Observers from several countries with special status at the OECD, and from interested international organizations, attend many of the OECD's Workshops and other meetings. Committees and subsidiary groups are served by the OECD Secretariat, located in Paris, France, which is organized into Directorates and Divisions.

The work of the OECD related to risk management is carried out by the Advisory Group on Risk Management, with Secretariat support from the Environmental Health and Safety Division of the Environment Directorate. As part of its work on risk management, the OECD has issued "status report" monographs on five substances which were, or continue to be, the subject of review*: Lead, Cadmium, Mercury, Selected Brominated Flame Retardants, and Methylene Chloride*. The OECD has also published a *Survey Report on Methylene Chloride* which supplements the information in the monograph on methylene chloride. Finally, in 1996, OECD Environment Ministers endorsed a *Declaration on Risk Reduction for Lead* to advance national and co-operative efforts to reduce risks from exposure to lead.

The Environmental Health and Safety Division publishes documents in six different series: **Testing and Assessment**; **Good Laboratory Practice and Compliance Monitoring**; **Pesticides**; **Risk Management**; **Harmonization of Regulatory Oversight in Biotechnology**; and **Chemical Accidents.** More information about the Environmental Health and Safety Programme and EHS publications is available on the OECD's World Wide Web site (see next page).

This publication was produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC).

This publication is available electronically, at no charge.

For the complete text of this and many other Environmental Health and Safety publications, consult the OECD's World Wide Web site (http://www.oecd.org/ehs/)

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The Inter-Organization Programme for the Sound Management of Chemicals (IOMC) was established in 1995 by UNEP, ILO, FAO, WHO, UNIDO and the OECD (the Participating Organizations), following recommendations made by the 1992 UN Conference on Environment and Development to strengthen co-operation and increase international co-ordination in the field of chemical safety. The purpose of the IOMC is to promote co-ordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

Foreword

This publication contains the papers presented by representatives of governments and industry at the **OECD Workshop on Non-Regulatory Initiatives for Chemical Risk Management** held in the United States at Crystal City, Virginia, on 10-12 September 1996. The Workshop was co-sponsored by the US Environmental Protection Agency, Environment Canada, the Chemical Manufacturers Association (United States) and the Canadian Chemical Producers Association. Joe Carra (US EPA) and Michele Taylor (Environment Canada) jointly chaired the Workshop[1].

The primary objectives of the Workshop were to: (1) provide a forum for governments, industry and non-governmental organisations to share experiences with non-regulatory initiatives, and (2) provide guidance to the OECD Risk Management Programme on the value and promise of non-regulatory measures.

The Workshop consisted of one day of plenary discussion, followed by one day of "breakout sessions" and a concluding half-day plenary. The four main types of non-regulatory approaches considered by the participants, and presented by expert panels during the opening plenary, included: (1) industry initiatives; (2) challenge programmes; (3) bilateral/multilateral agreements; and (4) other approaches.

Breakout sessions were held to discuss the panel presentations and to characterise the elements that are typically found in successful programmes. Each of these sessions developed a separate report. The reports were then consolidated into one report which was discussed during the closing plenary.

The papers given during the opening plenary are included here, along with luncheon remarks made by Dr Lynn Goldman (US EPA), the final consolidated report, and short summaries of presentations made available during the poster session held the evening of the first day of the Workshop.

More than 75 officials and experts attended the Workshop, representing governments of OECD countries, the OECD's Business and Industry Advisory Committee (BIAC) and Trade Union Advisory Committee (TUAC), academia, and non-governmental organisations.

Background

In 1990, the Council of the OECD adopted a Decision-Recommendation on the Co-operative Investigation and Risk Reduction of Existing Chemicals [C(90)163/Final]. This OECD Council Act is aimed at the reduction of risks from chemicals to the environment, and/or to the health of the general public or workers. It is based on the premise that international co-operation in risk reduction activities can enhance the technical and institutional aspects of risk management in Member

[1] An OECD Workshop on "Use Clusters" co-sponsored by the US Environmental Protection Agency, the Chemical Manufacturers Association (US) and the Canadian Chemical Producers Association was held immediately following the Workshop on Non-Regulatory Initiatives for Chemical Risk Management and concluded on 13th September 1996.

countries through burden-sharing and a reduction of duplicative efforts. Furthermore, such activities can lead to more effective use of the knowledge of risks being generated through, for example, national chemical reviews and assessments; the OECD co-operative investigation of existing chemicals; and the work of other international organisations conducting hazard and risk evaluations.

The initial work of OECD's Risk Management Programme focused on five chemicals (or groups of chemicals): lead, mercury, cadmium, brominated flame retardants, and methylene chloride. For each, a "Risk Reduction Monograph"[2] was published which described the commercial and environmental life cycle of the substance(s), international and national positions concerning risk to man and the environment, and measures taken by OECD countries to reduce such risks. Based on this material, various actions were initiated within the OECD, ranging from the collection of additional information on some chemicals, to overseeing voluntary industry initiatives to reduce certain risks, to a declaration by Member governments that they would advance national and co-operative efforts to reduce other risks.

In 1995, the Joint Meeting of the OECD's Chemicals Group and Management Committee agreed to review the Risk Management Programme in the light of technological advances and lessons learned since the Programme was launched in 1990. It was decided that the Programme should focus on two areas: (1) developing methods and technical tools that can be used by OECD and Member countries to enhance their current risk management programmes; and (2) identifying chemical exposures of concern in Member countries and evaluating possible risk management opportunities. The OECD Workshop on Non-Regulatory Initiatives for Chemical Risk Management was held in response to the call for work in the first of these areas. The results of this Workshop have been incorporated into the current Programme of Work of the Risk Management Programme, and the use of non-regulatory initiatives will be a principle consideration in all future work of the Programme.

[2] The Risk Reduction Monograph on lead was published in 1993. The other four were published in 1994. and

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Presentations by Invited Panel Speakers

PANEL 1: INDUSTRY INITIATIVES

Responsible Care®

Dan Roczniak

US Chemical Manufacturers Association

Background

Responsible Care® is an initiative developed and adopted by chemical companies to improve the already very good health, safety and environmental performance of their operations and products in a manner responsive to the concerns of the public. Responsible Care® was first adopted as a new model for the management of chemicals by the Canadian Chemical Producers Association (CCPA) in 1985 and has since been adopted by chemical associations and their members in an additional 41 nations. Responsible Care® is the basis of significant cultural change within the chemical industry, which is leading to improved performance and new levels of openness with the public.

The global chemical industry plays an important role in modern society by contributing to the solution of human problems ranging from hunger, sickness and sanitation to housing, transportation and leisure. The processes and products that deliver these benefits often have properties with the potential for harm to health and the environment if they are not managed properly. As a result, the public has concerns about the products and operations of the industry. Through the implementation of Responsible Care®, the chemical industry, led by the chairmen and CEOs of companies, has delivered improved environment, health and safety (EHS) performance and new levels of responsiveness to the public's concerns about chemical risk reduction.

Why Responsible Care®?

Collective action

The global chemical industry, as represented by the International Council of Chemical Associations (ICCA), views Responsible Care® as a practical and visible tool for meeting its obligation to safely manage the risks associated with the ever-widening range of chemical production and products. Managing risk has been a role traditionally addressed by individual companies working alone or with their customers and suppliers to comply with regulatory requirements. Individual companies have made progress in reducing chemical risk. However, in some cases a company's actions were limited to localized improvements or failed to meet standards required by regulators or the expectations of the public. Additionally, company and industry innovation and flexibility in addressing chemical risk management has often been hampered by government command-and-control regulatory pressures. In the developed world, purpose-designed and well-enforced laws and regulations focusing on single-media, end-of-the-pipe solutions can cause industry to devote scarce resources to meeting only minimum requirements in order to avoid penalties and legal actions. In developing countries, enforcement of laws and regulations is often hampered by a lack of resources and uncertainty about what is expected of individual companies.

Implementation of Responsible Care® by a national chemical association transforms the traditional view of risk management from an individual company activity to the responsibility of a group of like-minded companies representing significant segments of a nation's chemical production. These companies seek broad-based performance improvement and the establishment of best management practices. Factors which drive this new cultural mindset include:

1. agreement among participating companies that successful risk management and reduction practices are to be shared to promote collective performance improvement;
2. peer pressure among companies driven by an understanding that the failure of one company to deliver on its commitment threatens the entire group's ability to operate;
3. input from interested parties or groups both within and outside the industry, which continually emphasizes their expectations and raises industry performance;
4. belief that, given the opportunity to innovate and introduce flexibility into their response to regulation, companies can meet and exceed regulatory requirements and public expectations;
5. awareness that the Responsible Care® message and its benefits must be shared throughout the chemical supply and customer chain to foster product stewardship and improved chemical risk management; and
6. a public commitment by a national chemical trade association's members to Responsible Care® and its underlying philosophy and expectations.

The global chemical industry has embraced Responsible Care® because it is viewed as both "good citizenship" and a positive impact on companies' economic bottom line. For the individual company, implementation of Responsible Care® leads to improved efficiency, lower EHS costs, and improved relations with stakeholders. For the global chemical industry, successful implementation of Responsible Care® demonstrates an appropriate public policy which protects its ability to operate and its flexibility to innovate and meet society's demands for its products. For the public, successful implementation of Responsible Care® ensures that the chemical industry will continue to provide beneficial products to society and continually reduce its negative impacts on human health and the environment.

External recognition

The chemical industry's success with Responsible Care® has led to its recognition at the 1992 UNCED meeting in Rio, by the Intergovernmental Forum on Chemical Safety (IFCS) at numerous forums, and by President Clinton's Council on Sustainable Development. Japan's Ministry of International Trade and Industry's Council for Chemical Safety recognized Responsible Care® as an example of an effective, voluntary initiative which in combination with regulations can promote chemical safety. In addition, individual chemical companies have received recognition at the national and local level for their efforts under Responsible Care® to reduce risk and promote product stewardship.

In recent years, Responsible Care® has also become a model for other industries or institutions which seek voluntary approaches to performance improvement and openness with stakeholders. In New Zealand, Responsible Care®'s value is demonstrated by the adoption of the initiative by significant segments of the nation's public and private sectors, including the armed forces. In the United States, the Department of Energy has recognized Responsible Care® as an effective means of reducing chemical risks and is encouraging adoption of the initiative by its facility contractors.

What Is Responsible Care®?

Since 1985, Responsible Care® has been adopted by chemical associations in 42 countries in both the developed and developing worlds: this accounts for approximately 88 per cent of the world's chemical production. In each case the initiative is sponsored by a nation's primary chemical trade association, representing both domestic and multinational companies. Participating chemical companies in each country commit themselves to adhere to the Responsible Care® Guiding Principles which state that a company will manage its activities so that they represent an acceptably high level of protection for the health and safety of employees, customers and the public and for the environment. Furthermore, the companies will reflect these commitments in their policies and practices.

The growth and integrity of Responsible Care® is guided by the International Council of Chemical Associations (ICCA) and its Responsible Care® Leadership Group. Through the Leadership Group, the ICCA has identified certain fundamental features of Responsible Care® which must be present in each national association's initiative. These fundamental features include:

1. A formal commitment to a set of Guiding Principles by each participating company.

2. Adoption of a title and logo which clearly identifies national programs as being consistent with and part of the concept of Responsible Care®.

3. A series of Codes, Guidance Notes or Checklists to assist companies to implement the Responsible Care® commitment.

4. The progressive development of indicators against which improvements and performance can be measured.

5. An ongoing chemical association and member company process of communications on environmental health and safety matters with interested parties outside the industry.

6. Provision of forums in which company CEOs and Responsible Care® co-ordinators can share views and exchange experiences on implementation of the commitment.

7. Systematic procedures to externally verify the implementation of the various elements of Responsible Care® by the member companies.

8. Consideration of how best to encourage all association member companies to commit and participate in Responsible Care®.

9. The Responsible Care® fundamental features are intended to insure global consistency of the initiative for the chemical industry and for its stakeholders. It is the view of the ICCA that effective implementation of the fundamental features by an association and its members will lead to improved EHS performance, risk reduction, increased influence of interested parties' views within the industry, and the spread of the Responsible Care® ethic both within and outside the chemical industry.

Accountability

One of the key tenets of Responsible Care® is openness and responsiveness to public and other stakeholder concerns about the management of chemicals. Underlying this tenet is an understanding that the public (local, national and international) has ultimate authority over the

industry's ability to operate. If the public's expectations of improved performance are not realized, the chemical industry will face greater regulation, sanctions, protests, or even closure. Therefore, the chemical industry has a keen appreciation of the need to seek out input from the public and other interested groups, include this input in its development of policy, and report on its progress in meeting these expectations.

National audiences

Following an example pioneered by the Canadian Chemical Producers Association, a number of national chemical associations have created National Advisory Panels to provide public input into the development and implementation of Responsible Care®. These panels ensure that the expectations of interested groups are a part of industry planning processes. Formal national Responsible Care® panels are now also sponsored by the U.S. Chemical Manufacturers Association (CMA) and the Australian Plastics and Chemicals Industries Association (PACIA).

The Japan Chemical Industries Council (JCIA) sponsors a panel of experts to provide input to its members on EHS issues, while the Netherlands' Vereniging van de Nederlandse Chemicsche Industrie (VNCI) has created a Board Advisory Panel to provide similar information to its leadership. A number of other associations are now in the process of forming national advisory panels as part of their Responsible Care® programs. Many other countries seek out public and other stakeholders' views through discussions with "opinion formers", such as in the case of the Chemical Industries Association in the United Kingdom. Through this process, the associations receive independent national advice on health, safety and environmental issues.

Local audiences

In addition to these national advisory processes, individual chemical companies have realized the essential need for local community dialogue concerning their production and distribution facilities. A growing number of formal and informal mechanisms are being established by chemical companies around the world to foster dialogue with local communities. One successful example of company-community dialogue is the local Community Advisory Panel. This local version of the National Advisory Panel provides input to chemical facility management and reinforces the local facility's accountability to the community in which it operates. In cases where panels do not exist at this stage, facility managers seek outside parties' input through other forums such as meetings with local leaders, open houses, or progress reports to the media. One example of this willingness to dialogue with communities occurred in Italy, where more than 70 chemical plant managers participated in an "Open Factories Week" in October 1995. Australia's biennial "Open Door Weekends" have hosted more than 30,000 visitors at 50 member company manufacturing sites.

Reporting performance

As part of their Responsible Care® commitment, participating companies and their trade associations report performance data to the public. This voluntary reporting provides the public with specific, meaningful data on the industry's EHS performance and demonstrates the industry's commitment to exceeding public expectations. Examples of these voluntary reports include: "Indicators of Performance" by the U.K. Chemical Industries Association (CIA), which includes information on worker safety, emissions, waste releases, environment-related spending, and community complaint processes; CCPA's annual "Emissions Inventory and Five Year Projections", which has been identified by Environment Canada as a "model for other industries to follow;" and the Australian Plastics and Chemical Industries Association (PACIA), which is moving towards a series of performance indicators developed by a team of industry and public participants, including a "Survey of Local Community Advisory Panel Satisfaction". PACIA reports that local panels have increased by 50 per cent in two years, and most panelists are "moderately to well satisfied with the

industry's progress." The number and scope of association reports and individual company reports continues to expand to meet public expectations.

Verification

The chemical industry is further demonstrating its accountability by including the public in programs to verify companies' implementation of Responsible Care®. In several countries members of the public, working with industry experts, are reviewing companies' implementation of Responsible Care® in an effort to promote continuous EHS improvement and build credibility among key audiences. ICCA has recognized the importance of Responsible Care® verification by recently adding it to its list of Fundamental Features.

Results

Responding to Agenda 21

Since the early 1990s, many of the national chemical associations implementing Responsible Care® have begun to collect EHS data from their members to measure the positive impact on performance. While the amount of EHS performance data varies between countries, positive trends are beginning to emerge wherever Responsible Care® is being implemented.

In addition to the positive trend in process- and product-related performance results, the chemical industry has made a concerted effort to respond to the challenges outlined in Agenda 21's Chapter 19. These efforts include risk reduction efforts – many of which were underway prior to Agenda 21 – at the company, association and international level. In many cases these risk reduction efforts have been conducted with the participation of customers, suppliers and other stakeholders within the chemical distribution chain.

Specific performance results and product stewardship efforts (which include industry efforts to promote risk reduction throughout the chemical distribution chain) reported by national chemical associations as part of their Responsible Care® programs are listed below. The information is divided into two categories, process-related results and product-stewardship activities.

Process-related results

- As a result of voluntary reduction efforts sponsored by the Japan Chemical Industry Association, the level of vinyl chloride monomer (VCM) emissions at VCM/PVC production facilities in Japan decreased by almost 50 per cent between 1990 and 1993.

- In the United States, chemical manufacturers are working with the U.S. Occupational Safety and Health Agency (OSHA) to develop appropriate workplace exposure limits for carbon disulfide. This effort is being co-ordinated with European companies.

- In the United Kingdom, member companies of the CIA have reduced discharges of Red List substances by 89 per cent since 1990. The trend for other measures including distribution incidents, energy consumption and lost time accidents continues to improve.

- Member companies of the Canadian Chemical Producers' Association have voluntarily reduced emissions of all substances except CO_2 by 50 per cent since 1992 and have projected a further 50 per cent reduction by 2000. Working with the Canadian government, CCPA members have pledged to voluntarily reduce benzene emissions 75 per cent by 2000.

- Finland's Kemianteollisuus Ry (KT RY) collects and publishes more than 20 performance indicators. Since 1988 lost time accidents have decreased by 50 per cent among KT RY members while the number of member company personnel participating in safety training courses has doubled.

- Members of the VNCI in the Netherlands continue to make progress in emission reductions, where a goal of reducing emissions by 50 per cent (1985 baseline) was achieved in 1994 more than five years ahead of schedule. VNCI members have set a goal of a 20 per cent increase in energy efficiency by the year 2000.

- PACIA in Australia reports that its members have reduced the number of transportation incidents involving chemicals by more than 35 per cent since 1990. Employee lost time injuries are down 30 per cent since 1990 and workdays lost per employee by 50 per cent.

- Members of the U.S. CMA have reduced the number of workplace injuries and illnesses from 3.15 per 100 employees in 1992 to 2.5 per 100 employees in 1995. CMA member company rates are significantly lower than those of the chemical industry as a whole, and one-fourth the rate for all manufacturing sectors.

Product stewardship activities

- Working with the OECD's Risk Management Programme, a group of chemical companies concerned about the health and environmental effects of brominated flame retardants have conducted extensive research and education activities on these products, including bromine recycling. The companies have sponsored a series of a conferences on brominated flame retardant issues in Europe, Japan and the U.S. and distribute a newsletter on these issues to an international audience of customers, users and other interested parties.

- Chemical companies working in concert with shippers and users of hydrogen fluoride in the United States and Mexico have sponsored a number of programs to improve the safe handling of this material. Safety seminars and mutual assistance networks have been created. Because of the success of the program in promoting safe handling of hydrogen fluoride, the U.S. Environmental Protection Agency reported to the U.S. Congress that no additional regulations were needed for this material. The co-operation on hydrogen fluoride issues is part of a larger effort to co-ordinate chemical distribution safety programs in North America. This larger effort is co-sponsored by the U.S., Canadian and Mexican chemical associations.

- In Europe, 16 of 21 member federations of the European Chemical Industry Council (CEFIC) have processes for responding to chemical transportation emergencies under the umbrella International Chemical Environment (ICE) program. These national processes are known by their local acronyms: TUIS, BELINTRA, TRINS, FINTREC, CHEMSAFE, SIET, TRC, ATRIGUE and ERC. As a result of the success of ICE and these national processes, information on best practices for emergency response procedures have been transferred to countries in eastern Europe. A similar program, CHEMTREC®, has been operated in the U.S. by the CMA since 1971. Efforts to create emergency response programs in Latin America and Asia are strongly supported by the chemical industry as a means of improving transportation safety and emergency response processes.

- Working with the United Nations Environment Programme (UNEP), the chemical industry has supported and participated in more than 50 local, national and regional APELL seminars and workshops. ICCA member associations support the maintenance

of a safety professional at UNEP for managing the Awareness and Preparedness for Emergencies at Local Level (APELL) program. APELL has provided an opportunity for chemical industry experts to work with local officials on emergency planning and risk reduction.

- To encourage the spread of the Responsible Care® ethic to allied industries, ICCA is encouraging the creation of Responsible Care® Partnerships. These partnerships allow non-chemical manufacturers to fully participate in the program, share best practices, and extend the ethic of continuous EHS improvement and responsiveness to the public throughout the distributor and customer supply chain.

- CMA and the CCPA each sponsor the Transportation Community Awareness and Emergency Response (TRANSCAER®) program to assist communities to plan and prepare for transportation incidents involving hazardous materials. In both the U.S. and Canada, the chemical industry, along with major transportation associations, sponsors numerous activities to provide training to local emergency responders. A prominent feature of each association's TRANSCAER® program is its "Whistle Stop Tour", which allows local emergency response teams to tour railroad equipment used to transport chemicals. Several thousand local officials have participated in the TRANSCAER® activities in the two countries.

Although not comprehensive, the process and product stewardship results/activities listed above reflect a general trend within associations which have adopted Responsible Care®. As more national chemical associations collect performance data as part of their Responsible Care® programs, their member companies will be subject to greater performance expectations from their peers and outside stakeholders. This in turn will lead to greater performance improvements which are best achieved through full implementation of Responsible Care®. Currently, more than half of the associations implementing Responsible Care® are collecting EHS performance data. Many associations are only beginning to identify performance indicators for future use. The ICCA fully expects EHS performance results in these countries to mirror the progress being made in those countries where the data is already being reported.

Future Challenges

Despite Responsible Care®'s many successes, the global chemical industry, as represented by ICCA, acknowledges that many challenges remain. The industry must continue to improve performance and increase its collection and dissemination of these results as a means of responsiveness to the public. Currently Responsible Care® performance data reporting exists in many countries, but expectations for industry reporting continue to rise. Future performance measures must be meaningful to the public and demonstrate and deliver on the industry's commitment to continuous EHS improvement.

In addition to its focus on performance measures, the ICCA will pursue the goal of Responsible Care® verification within its member associations. This will allow chemical companies to confirm their commitment to, and progress in, implementing Responsible Care®. As other forms of auditing and verification such as ISO #14001 and European Eco Management and Audit Scheme (EMAS) are adopted, ICCA members will strive to integrate their verification processes with these useful standards and programs.

The ICCA and its member associations face a continuing challenge of spreading the ethic of Responsible Care® to all sectors of the chemical industry. Currently, Responsible Care® is being implemented in 42 nations which account for approximately 88 per cent of the world's chemical production. Within these nations, the percentage of chemical production by companies implementing

Responsible Care® varies from 20 to 90 per cent of total national production. The percentage of chemical production covered by Responsible Care® continues to grow, and is driven by peer pressure within chemical trade associations and by the positive performance achievements realized through implementation of the initiative.

The goal of the ICCA is to extend the initiative to an ever-increasing number of chemical companies around the world, to include as much of the world's production of chemicals as possible under the umbrella of Responsible Care®. Through Responsible Care® Partnerships, the ICCA intends to spread the ethic to customers, suppliers and allied industries which produce, use or transport chemicals. Partnerships will allow chemical companies to extend their knowledge of chemical risk management to other sectors, thus improving overall product stewardship.

The global chemical industry intends to use Responsible Care® as proof that voluntary industry initiatives which focus on flexibility and innovation can successfully complement appropriate regulation to succeed where command-and-control regulatory schemes have failed. Resource-strapped governments in both the developed and developing worlds are seeking new paradigms for environmental protection. Responsible Care® is a partial answer to this search. Through this initiative, which is based on the implementation of best management practices, continuous EHS improvement, and accountability to the public's and other interested parties' expectations, the chemical industry will continue to make progress in reducing chemical risks while maintaining its economic viability.

Conclusion

The past twelve years have seen significant changes in the chemical industry. Because of Responsible Care®, all types of chemical companies have publicly committed themselves to responsible EHS management. That commitment is changing the industry culture and affecting the industry's stakeholders in the form of reduced emissions to the environment, improved emergency response, fewer transportation mishaps, improved outreach and communication, safer working conditions, and overall reduced risk. These improvements are not restricted to one part of the world, but are occurring wherever Responsible Care® is being implemented.

The ICCA believes that Responsible Care® is a proven, effective means of achieving superior EHS performance. The ICCA seeks continued support for Responsible Care® from international institutions as the preferred model for voluntary industry efforts to promote chemical risk management and thereby help fulfill the objectives outlined in Agenda 21's Chapter 19. The ICCA further seeks national governments' understanding of the work we are doing and of the major importance of voluntary industry initiatives to complement appropriate regulation and thereby protect human health and the environment.

Voluntary Cessation of Manufacture of Benzidine Dyes

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Introduction

The voluntary cessation of benzidine dye manufacture by the major European dye manufacturers dates back to the early 1970s. This enables the subsequent developments to be traced over a quarter century to the present. Indeed, these developments are still an issue within the dye manufacturing and processing industries.

One disadvantage of reporting on such an "old" initiative is the difficulty of tracing back data from company files, and the general lack of reliable production and import/export statistics. In spite of these deficiencies, valuable lessons can be drawn from this particular case study, as described in the subsequent paragraphs.

The initiative covered the cessation of manufacture of benzidine dyes. At that time the use of benzidine dyes was not a major concern, and certainly the dyed goods (textile and leather products) were not considered to pose a risk.

Background information

Benzidine has been used as an intermediate in the manufacture of azo dyes since the late 19th century. The Colour Index lists 171 benzidine dyes, and the European Inventory of Existing Chemical Substances lists 58 benzidine dyes. It is estimated that about 45-50 benzidine dyes are currently in commerce worldwide. Although the suspicion that benzidine induces bladder cancer in exposed workers was reported before 1940, it was not until the epidemiological studies by Case of UK workers exposed over the period 1921-1950 that conclusive evidence of the carcinogenicity of benzidine was provided. Confirmatory findings indicating a high risk of bladder cancer in exposed workers were also reported from Japan, France, the USA, Russia and Germany. For example, in a retrospective survey of a single factory, 17 out of 76 workers exposed to benzidine alone developed bladder tumours.

IARC classifies benzidine as a Group 1 carcinogen and benzidine-based dyes as Group 2A carcinogens.

The chronology of key developments with respect to benzidine and the benzidine-based dyes is summarised in **Table 1**.

Table 1 Chronology of concern about benzidine and benzidine dyes

1906	Rehn reported correlation between benzidine exposure and bladder cancer in humans. (1)
1940	Suspicion that benzidine induces bladder cancer in workers. (6)
1954	Elevated bladder cancer incidence in workers. (2)
1957	Voluntary code of practice for carcinogenic amines set up by Association of British Chemical Manufacturers.
1967	Carcinogenic Substances Regulations (UK) prohibit use of benzidine.
1971	Bayer ceases to manufacture benzidine.
1971/2	Major European dye manufacturers cease manufacture of benzidine dyes.
1972	IARC Monographs Vol. 1 concludes benzidine is bladder carcinogen in man. (4)
1975	Metabolism of benzidine dyes to benzidine in monkeys. (7)
1978	NCI 90-day subchronic studies on three benzidine dyes. (8)
1980	OSHA/NIOSH health hazard alert on benzidine and some benzidine congener dyes. (9)
1987	IARC Monographs Suppl. 7 classifies benzidine dyes in Group 2A. (5)
1993	German TRGS 614, September 1993, recommends that benzidine and certain other carcinogenic azo dyes not be used. (10)
1994	German Consumer Goods Ordinance banning certain dyes (including benzidine dyes) in certain consumer goods. (11)

Stimulus for a voluntary cessation

Several factors prompted the voluntary cessation of manufacture of benzidine dyes.

(1) The major European manufacturer of benzidine decided to cease manufacture as, in spite of rigorous exposure controls, a possible risk to workers could not be excluded with absolute certainty.

(2) Chemical reduction of benzidine dyes could readily regenerate benzidine:

- discharge printing of textiles
- reductive stripping of non-specification dyed fabric
- cleaning liquids used by dye workers to decontaminate skin which could contain reducing agents.

(3) Any benzidine dyes resorbed by exposed workers could be metabolised to benzidine. This was of particular concern with respect to the customer industries, where occupational hygiene was often less well controlled than in the dye manufacturing plants.

Objective and scope of initiative

The initiative covered the cessation of manufacture of benzidine dyes by the major Western European and Japanese manufacturers.

Costs and advantages compared with mandatory requirements

In the United Kingdom, the Carcinogenic Substances Regulations of 1967 had effectively prohibited the use of benzidine in the UK, but the import and use of benzidine dyes was permitted provided the benzidine content did not exceed 1 per cent (subsequently this limit was reduced to 0.1 per cent).

Table 2 summarizes the phase-out of benzidine dye manufacture in Europe, the USA and Japan. No statistical data are available for the production or use of benzidine dyes in Western Europe in the early 1970s. Statistical data are available for the USA, where cessation of domestic production had been phased out largely by 1977 and totally by 1989-90. In 1994 the OECD conducted a survey of the then current situation with respect to manufacture or import of benzidine dyes.

The costs to the companies involved were substantial. Replacement dyes matching the benzidine dyes in both price and technical properties are still not available. As a consequence, the continuing, albeit declining, demand for benzidine dyes was met by manufacturers outside Europe and Japan.

The advantages of the voluntary action were that the occupational risks in Western Europe from the manufacture of benzidine and benzidine dyes were largely eliminated, and much more quickly than could have been achieved by regulation. The risks from occupational exposure to benzidine dyes in the processing industries probably were reduced also as a result of improved working practices and partial replacement of these dyes. However, at that time the regulators were concentrating on benzidine and benzidine content of benzidine dyes: benzidine dyes were not perceived at that time to be of major concern.

Disappointments and limits of this approach

The cessation of manufacture by the major dye manufacturers could only be an effective means of reducing risk for a limited period.

The cessation created a marketing opportunity for other manufacturers in the global market. These rapidly increased production levels to meet the ongoing demand for these dyes. The manufacture of these azo dyes is feasible in a multipurpose chemical plant from cheap, readily available starting materials.

Table 2 illustrates the shift in manufacturing of benzidine dyes from Western Europe (and Japan and the USA) to less developed countries. Although certain risks were eliminated in the Western European dye manufacturing industry, the risks were in effect transferred to these less

developed countries. Due to the generally inferior levels of occupational protection, the risk levels were magnified.

Successes and failures of program

Successes

- Cessation of around 90 per cent of the production of benzidine dyes in Western Europe, and elimination of associated occupational risks faster than would have been achievable by regulation.

Failures

- Usage of benzidine dyes in Europe continued, as demand was met by imports.
- Regulatory concerns concentrated on risks associated with benzidine rather than the benzidine dyes themselves.
- The European cessation created a bonanza for manufacturers in developing countries, unconstrained by national regulations to protect workers.
- On a global basis, risk levels were not reduced, merely transferred from the developed to the developing countries.

This case study illustrates how a voluntary initiative by industry (Europe and Japan) enabled more rapid introduction of risk reduction measures than would have been possible by regulation. Not all Western European manufacturers participated from the outset, but this did not detract significantly from the initial success. However, in a global industry unless there is international co-operation by regulators, the overall result can be the undesirable transfer of risk to less developed countries. Whereas the PIC procedure[1] addresses this for import of certain dangerous substances, it does not cover the corollary of "importing" dangerous processes, illustrated by this case study.

A significant contributory factor to the unsatisfactory follow-up to the cessation initiative was the failure to acknowledge the carcinogenic potential of benzidine dyes and to initiate appropriate steps internationally to control the associated risks in manufacture, processing and use.

[1] The PIC (Prior Informed Consent) procedure provides the governments of participating countries with information on specific dangerous substances prior to import.

Table 2 Benzidine dye manufacturing trends

Countries phasing out manufacture:

Europe	UK	UK manufacture ceased in late 1960s
	Germany	Major producers ceased in 1971
	Switzerland	Major producers ceased in 1971
	Italy, Spain, Poland, Czechoslovakia, Netherlands	Minor production until early 1980s
	France	Production ceased around 1982
USA	In 1948, 15 companies produced 14,000 t benzidine dyes, equivalent to ca. 21 per cent of all US dye production. By 1971, manufacture had declined to 5200 t. Between 1974 and 1978, production declined and the number of manufacturers was reduced from seven to two. The final producer ceased manufacture in 1989/90.	
Japan	Major producers ceased in the early 1970s.	

Countries maintaining and increasing production through 1995:

Argentina
Brazil
China
India, 1993 production estimated at 4000 tonnes (ca. 50% for exports)
Republic of Korea
Mexico
Taiwan

Reports of continued manufacture in Romania and Greece have not been confirmed.

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Reducing Cadmium Risk in the U.S. through an Industry Sponsored Nickel/Cadmium Battery Collection and Recycling Program

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Background

Nickel/cadmium (NiCd) batteries represent the largest and most rapidly growing segment of the cadmium market. While approximately 85 per cent of the large industrial NiCd batteries are presently recycled, the smaller consumer NiCd batteries, which account for about 80 per cent of all NiCds, are recycled at a much lower rate, approximately 10-15 per cent. Concern with the human health and environmental effects of cadmium in the mid 1980s, along with the rapidly growing NiCd consumer cell market, led to a series of regulatory initiatives requiring proper labelling, easy removability from products, and proper disposal of batteries. However, because of variations in U.S. State laws, barriers to collection and recycling of used NiCd batteries from existing federal regulations, and difficulties in the collection of small batteries from many diffuse sources, the NiCd battery producers and users were initially unable to simply collect and recycle consumer NiCd batteries as they had intended.

This paper describes the collective efforts of the NiCd battery producers and users, through the Portable Rechargeable Battery Association and the Rechargeable Battery Recycling Corporation, to develop a comprehensive program to establish uniform regulations across the United States regarding the labelling, collection and removability of NiCd batteries; to develop comprehensive mechanisms to ensure the fullest possible collection of consumer NiCds for recycling; to provide widespread publicity and information regarding the program to encourage public participation; and to provide for a funding mechanism by the NiCd battery producers and users to operate all aspects of the program.

To date, comprehensive legislation in the form of the Mercury-Containing and Rechargeable Battery Management Act has been established, a series of four collection mechanisms developed, a widespread publicity and information campaign developed, and funding by the industry established. Nickel/cadmium batteries collected through this program are recycled at the International Metals Reclamation Company (INMETCO) in Ellwood City, Pennsylvania, where the nickel and iron are recovered for utilization by the stainless steel industry and the cadmium is

recovered for reuse by the NiCd battery industry. This program is expected to increase the recycling rate for consumer NiCd batteries from 10 per cent in 1995 to 70 per cent by 2001.

Cadmium and nickel/cadmium batteries

Cadmium is one of the so-called "heavy metals" which, in certain forms and sufficient concentrations, can cause human health and environmental problems. While there is wide debate and ongoing controversy as to how severe its health effects are, there is little doubt that exposure to cadmium must be well controlled, both in the occupational setting and in the general population.

There are five major market areas for industrial cadmium consumption - batteries, pigments, coatings, stabilizers and alloys. Twenty-five years ago cadmium usage was dominated by cadmium coatings, but since the early to mid 1980s the nickel/cadmium (NiCd) battery market has grown significantly, with the result that today NiCd batteries account for approximately 67 per cent of worldwide cadmium consumption.

The NiCd battery market, at least from the point of view of cadmium usage, is further divided into two sectors – the large industrial batteries utilized for applications such as railroad and aircraft starting, switching and signalling; and small consumer cells employed for portable appliances such as cordless power tools, notebook computers, camcorders, and cellular and cordless telephones (the "4C's" market). The large industrial NiCd batteries utilize approximately 20 per cent of the cadmium consumed by the NiCd battery industry, with the remaining 80 per cent going to the portable consumer applications. In the past decade, it has been the rapid growth in the small consumer cells which has led to the strong growth of the overall NiCd battery market.

Environmental issues

The human health and environmental issues associated with nickel/cadmium batteries arise mainly from the ultimate disposal of the spent batteries. In general, occupational exposures to, and manufacturing wastes and emissions from, nickel and cadmium in NiCd battery production are well regulated and controlled. There is virtually no danger of cadmium or nickel exposure during normal use of NiCd batteries. Even when NiCd batteries are disposed of in landfills, there is little danger of risk or exposure, at least in the short to mid term, to nickel or cadmium from the battery's electrodes since they are always encased in at least two layers of steel or plastic or both. In addition, a high percentage of the large industrial NiCd batteries, approximately 85 per cent, are currently recycled, mainly because they originate from only a few sources and are relatively easy to collect. The small consumer NiCd cells, however, which represent the most rapidly growing market, have been a source of increasing concern in recent years. Their ultimate disposal is the main environmental issue for the NiCd battery and cadmium industries, and is the subject of the industry-sponsored collection and recycling voluntary initiative described in this paper.

In the past 20 years, the space available for the disposal of waste in landfills has diminished rapidly, in some of the densely populated countries much more than in others. In several countries in Europe, and in Japan in particular, incineration and the human health and environmental issues arising from incineration have been instrumental in the promulgation of regulations affecting heavy metal products. Since 1985, in the United States some municipalities and local jurisdictions have made huge investments in solid waste incinerators to reduce the volume of disposal waste, and because there just has not been sufficient space available for landfilling. However, these incinerators have not proved to be cost-effective because of the expense of disposing of the incinerator's waste products, ash and slag. Unfortunately, these wastes and slags may contain levels of heavy metals which result in their being classified as "hazardous". The end result is an enormous increase in ash management and disposal costs.

In 1989, Franklin Associates published a report under contract to the U.S. EPA on the sources of lead and cadmium in municipal solid waste which clearly identified NiCd batteries as the major source of cadmium. U.S. State jurisdictions, especially those with heavy commitments to new incinerators, began to propose legislation and regulation to divert NiCd batteries from the waste stream, and several even mandated NiCd battery collection programs which in turn led to voluntary action by some companies. However, shortly after issuance of the Franklin Report, EPA changed its test protocol for determining what wastes should be classified as hazardous. The new test protocol, the TCLP test, required that used NiCd batteries first be crushed or cut to a certain size much smaller than the size of the battery itself, thereby exposing the internal cadmium and nickel electrodes, and then placed in an acetic acid solution for about a day to simulate the relative amount of cadmium or nickel leaching from the batteries into the landfill leachate over a protracted period of time. Not surprisingly, used NiCd batteries failed the TCLP test and were classified as "hazardous waste."

As a consequence, the transportation, storage and handling of used NiCd batteries immediately came under the jurisdiction of the United States' Resource Conservation and Recovery Act (RCRA) under which waste generators are required to obtain identification numbers from federal or state regulators, transporters must meet stringent regulatory requirements, and collection and recycling facilities need comprehensive and expensive permits. Such an array of regulatory requirements immediately halted the voluntary collection and recycling programs previously started for NiCd batteries, even though some states were beginning to put legislation in place requiring collection and recycling. To add further to the confusion, RCRA requirements on used batteries did not apply to those generated from household wastes, but did apply to batteries from institutional generators. If a mixture of NiCd batteries from both sources was collected, then all were regulated.

Previously, the U.S. EPA had specifically promulgated regulations which exempted used lead acid batteries from the regulatory burdens of RCRA in order to facilitate the already well-established recycling of automotive batteries. As a result, lead acid batteries enjoyed a recycling rate of better than 95 per cent. NiCd batteries, however, were not included in this earlier scheme, and at the time the TCLP test was initiated its potential impact on NiCd batteries was not recognized and no provisions were made to facilitate their recycling.

The NiCd battery recycling problem

In April 1991, the NiCd battery manufacturers approached the U.S. Environmental Protection Agency with their problem. Even though they wanted to recycle NiCd batteries to get them out of the municipal solid waste stream, and needed to comply with several State recycling mandates to do so, they were unable to do so because of the "hazardous waste" classification of used NiCd batteries. There was no way to segregate exempted "household" used batteries from regulated "business" batteries, and too many of the mass-market distributors whose co-operation was required to collect the batteries simply would have nothing to do with handling hazardous wastes. Even if collection systems could be set up, they would be economically prohibitive to manage when, for example, shipments of used NiCd batteries had to be transported by manifested hazardous waste carriers.

Even though the U.S. EPA staff was sympathetic, no direct action was initially taken, and the NiCd battery manufacturers proceeded to file a formal petition for rulemaking to reduce the regulatory burdens on recycling of NiCd batteries. Their proposal suggested that EPA either suspend or defer the application of the TCLP test to used NiCd batteries intended for recycling, or that the exemptions granted for the recycling of lead acid batteries be extended to NiCd batteries as well. However, rather than adopt either of those suggestions, EPA indicated that it would treat NiCd batteries within the framework of its ongoing effort to adopt rules to facilitate recycling of a number of other products including pesticide containers, mercury switches, and fluorescent light bulbs. There were, however, potential problems and questions about recycling some of these products which

proved difficult and controversial. In spite of a groundswell of national support from NiCd battery manufacturers and users, little progress was made until political support on Capitol Hill was obtained. Even with bipartisan political support and fundamental agreement with the principles of the program, it was not until April 1995 that a final EPA regulation was issued and not until May 1996 that national legislation was signed into law which facilitated a uniform, national NiCd battery recycling program. Thus five years of intense effort and expense by the industry were necessary to implement what everybody agreed was a fundamentally sound idea in the first place.

The industry NiCd battery recycling program

The plan proposed by the NiCd battery industry as early as 1993, and which today is being implemented by the Rechargeable Battery Recycling Corporation (RBRC) and the Portable Rechargeable Battery Association (PRBA), is known as the "Charge Up to Recycle!" program. It contains several key elements which are specified in the EPA regulation (40CFR, Part 273), in various State laws governing NiCd battery recycling, and in the "Mercury-Containing and Rechargeable Battery Management Act". These include the following provisions:

- uniform battery labelling requirements
- removability of batteries from appliances
- national network of collection systems
- regulatory relief to facilitate NiCd battery collection for recycling
- widespread publicity to encourage public participation
- development of a funding mechanism for the program

The uniform battery labelling requirements, as specified for example in the "Mercury-Containing and Rechargeable Battery Management Act", mandate that each regulated battery or rechargeable consumer product without an easily removable battery bear the three chasing arrows recycling symbol or a comparable recycling symbol, the designation "nickel/cadmium" or "Ni-Cd", and the phrase "Battery must be recycled or disposed of properly." On each rechargeable consumer product containing a regulated battery which is not easily removable, the required labelling is "Contains nickel/cadmium battery. Battery must be recycled or disposed of properly."

The easy removability provision is also specified in the 1996 legislation and was an early provision in several of the State NiCd battery recycling laws. These provisions were developed at the time when many NiCd battery powered tools and appliances did not provide for easy removability, mainly as a consumer safety measure. Since the early 1990s, however, battery operated tools, appliances and other devices have been designed so that in most cases the batteries are easily removable while still ensuring consumer safety. In fact, many battery powered tools today market replacement battery packs which are interchangeable in a number of different tools. Only in certain systems, such as computer memory backup and medical devices, are the batteries permanently installed to avoid system failure.

The "Charge Up to Recycle!" program features four different avenues of collecting used NiCd batteries for recycling. These include:

- retail recycling plan (8500 retail participants)
- community recycling plan (300 enlisted)
- business and public agency recycling plan (1000 enrolled)
  - licensee recycling plan
- federal recycling plan

These four avenues of approach will ensure that the maximum return of the small consumer NiCd batteries will be accomplished. These batteries could only have been collected by these mechanisms provided that the regulatory relief which is embodied in the exemptions granted under 40CFR, Part 273 for the storage, handling and shipment of used NiCd batteries intended for recycling was developed. Essentially, this regulation exempts diffuse sources such as retail outlets, county and municipality collection points, commercial/institutional generators, and individual consumers from any regulatory burdens in collecting and shipping their used NiCd batteries back to either centralized collection points or the NiCd battery recycling plant itself. In the "Charge Up to Recycle!" program in the United States today, Kinsburksy Brothers in Anaheim, California, and the International Metals Reclamation Company, Inc. (INMETCO) in Ellwood City, Pennsylvania, are the two consolidation points for used NiCd batteries, while INMETCO is also the NiCd battery recycler.

Publicity and public awareness of the program have been generated through a number of means, and is increasing. There has been a great deal of information in the battery industry and metals industry press regarding this program for the past four years. However, to make the program really work and develop the levels of NiCd battery recycling desired, widespread public education is required. This has been provided by a number of approaches, including:

- information and collection kits for retail outlets
- arrangements for collection/shipping with municipalities
- arrangements for collection/shipping with institutions/corporations
- television celebrity as program spokesperson
- nationwide toll-free voice-automated response system

Finally, a scheme has been implemented to fully fund all aspects of the NiCd battery recycling program which is paid for entirely by the Rechargeable Power Industry. The program is funded through the licensing of the RBRC seal, the actual amount of the fee being proportional to the actual usage of the seal or numbers of batteries on which the seal is used. The RBRC seal may then be displayed on the NiCd batteries themselves, the devices powered by the batteries, their packaging, and the instruction manuals for the devices. The display of the RBRC seal clearly distinguishes those manufacturers who are participating in the program and those who are not. For batteries exported from the United States, rebates will be issued. The program also provides an incentive for NiCd battery users (licensees) to utilize their own distribution infrastructure to collect batteries and recycle them in a manner similar to that of the commercial/institutional generators. Licensees can receive a rebate of up to 75 per cent of their original licensing fee based on the weight of batteries collected for recycling. To date there are approximately 200 licensees signed up for the "Charge Up to Recycle!" program, which include virtually all of the major producers and users of NiCd batteries in the United States.

Because of the huge investment made in this program by the NiCd battery industry over the past five years, and the investments in licensing fees which are expected to be made in the years ahead, the industry is relatively assured of substantially increasing NiCd battery recycling rates in the years ahead. A conservative estimate of the consumer NiCd battery recycling rate for 1995 is about 10 per cent of the cells available for recycling. This rate is expected to increase about 10 per cent each year to a 70 per cent recycling rate in 2001. Assuming that the consumer cells account for 80 per cent of cadmium consumption in NiCd batteries in 2001, and that the remaining 20 per cent which are industrial cells are recycled at a 90 per cent rate, then the overall recycling rate for NiCd batteries by the year 2001 should approach 75 per cent. The recycling rates are expected to continue to increase because of the need for additional cadmium supply, which may be required for the NiCd electric vehicle battery market.

Benefits of the non-regulatory approach

The "Charge Up to Recycle!" program was undertaken primarily to reduce the environmental and human health concerns associated with NiCd batteries, but also partially to preclude a burdensome complexity of conflicting State laws and partially to improve the environmental image of NiCd batteries. The objective was to substantially increase the levels of recycling NiCd batteries from the current 10 per cent to the industry goal of 70 per cent by 2001. The scope of the initiative is nationwide as it was rapidly found that battery manufacturers and users sold and distributed their products on a nationwide basis. In today's international climate, both the battery producers and battery powered product manufacturers have become global, and many have argued that a uniform international collection and recycling system similar to the "Charge Up to Recycle!" program would reduce cadmium risk everywhere just as it will in the United States. Canada, for example, is already looking to implement the program and the Canadian Household Battery Association (CHBA) is working with PRBA, RBRC, and provincial and federal Canadian authorities to explore this possibility.

Had the patchwork of differing state recycling, labelling, removability and other requirements been implemented rather than the uniform, national and voluntary program worked out by the industry, the cost would have been prohibitive and the NiCd battery industry today would be a much different one than it is. The direct costs of carrying out the "Charge Up to Recycle!" program from 1991 through 1995, essentially to get the EPA regulation approved, convince as many state governments as possible to adopt this regulation, and obtain passage of the federal legislation, has been estimated at several million U.S. dollars. A considerable amount of time and money has also been given by the major companies involved in this effort, particularly the founding members of PRBA, which include the NiCd battery manufacturers Sanyo, Panasonic, SAFT, Energizer and Varta.

It must be kept in mind that much of the driving force, particularly at the outset, for this program came from the legislation and regulation being proposed in various individual U.S. states. To that extent, the "Charge Up to Recycle!" program which was established had to be generally consistent with the final result, which would have been obtained under the implementation of these state laws and regulations. While various jurisdictions might have developed different methods by which to obtain the goals, and may have even differed in the actual goal itself, i.e. the recycling rate, all appeared to agree that increases in NiCd battery recycling rates were essential and that the goals of the "Charge Up to Recycle!" program were ambitious and praiseworthy.

The major success of the voluntary industry program thus far is that the entire NiCd battery manufacturing and user industry is solidly behind the program. The program has received considerable publicity and widespread attention both in the regulatory/legislative arena and by the general public and, most importantly, it has increased the awareness of the importance of recycling NiCd batteries and led to increased tonnages of batteries being recycled at INMETCO.

The major difficulties, some of which have already been alluded to, were the sheer regulatory inertia, which seemed to require an inordinantly long time and great expense to accomplish what everyone from industry and the regulatory community agreed was a good idea. Part of the problem in the finalization of 40CFR, Part 273 was EPA's desire to include NiCd batteries along with other diffuse-source wastes in their Universal Waste Rule, which led to a much longer delay than anticipated. Passage of both state and federal legislation regarding recycling of NiCd batteries invariably became enmeshed with political considerations, attachment to other bills, and higher priority legislation. It was necessary in many cases to rely on political help to solve some of these problems as they arose. Vice President Quayle's Council on Competitiveness, for example, was instrumental in finally getting the Office of Management and Budget (OMB) to publish the draft EPA rules for comment. Final passage of the Mercury-Containing and Rechargeable Battery Management Act required enormous coalition-building on both sides of Congress.

While it is too early to state whether or not the program will achieve its goals, the initial commitment and enthusiasm of the industry for the program appear favorable. As the program gathers more widespread public recognition, increases in efficiency and cost-effectiveness are expected. The only limitation which can be foreseen at this time is that there will always be a small minority of NiCd batteries which will not be readily collected for recycling, and thus recycling rates ultimately may not achieve the 95 per cent level enjoyed for the lead acid batteries.

Publicity and recognition for the participants in the program was certainly recognized as an important and integral part of the "Charge Up to Recycle!" program. Initially the NiCd battery manufacturers – Sanyo, Panasonic, SAFT, Energizer and Varta – took the responsibility for leading the Rechargeable Power Industry in this program, and the environmentally responsible image that this program conveys is, no doubt, positive for these companies. In addition, all RBRC licensees who display the seal on their batteries or products will, likewise, be displaying a badge of environmental responsibility. Thus, while publicity and public recognition have not yet been established as important to the success of the project, they are expected to be.

Initially, the problem and possible solutions to the problem were framed by the above-named NiCd battery manufacturers. As the solution and the program evolved, more and more organizations from the Rechargeable Power Industry joined the effort, including raw material suppliers, product manufacturers, assemblers, distributors and marketers. Today, it is estimated that at least 75 per cent of the Rechargeable Power Industry supports PRBA or has purchased the RBRC license to participate in the program.

It is probably too early to tell what the environment benefits of the "Charge Up to Recycle!" program will be, at least from a quantitative point of view. Certainly, the recycling rates for NiCd batteries are expected to increase dramatically. The amount of NiCd batteries entering the solid waste stream will correspondingly decrease, and any risk, even a long-term risk, from cadmium and nickel in NiCd batteries is expected to decrease. The very fact that NiCd batteries will increasingly be diverted into a recycling loop will, of course, decrease the relative amounts of cadmium in solid waste incinerators and landfills, and mean that cadmium in those disposal options will not be as much of a concern as it has been in the past. Since cadmium consumption is increasingly devoted to the NiCd battery market, the overall human health and environmental concern regarding cadmium from products should likewise be reduced.

The success of the program is measured in the yearly increases in the recycling rates for NiCd batteries and in the tonnages of NiCd batteries collected for recycling as compared to the amounts available for recycling in any given year. This latter figure is important, since the NiCd consumer battery market is divided into a number of specific market segments and the size, composition and lifetimes of the various NiCd batteries used for these segments may vary. Another possible measure of success is the degree of industry participation in the program or what proportion of the NiCd battery manufacturers and users are RBRC licensees.

The lessons from the "Charge Up to Recycle!" program which should be considered by the OECD are several. Firstly, in spite of the acknowledged need and intent to simplify regulations to encourage recycling, it proved a very lengthy and expensive process to do so in the United States. In the future, regulators and industry must work together so that effective programs which are simple and uniform in scope can be worked out. There must also be a willingness to recognize business complexities and how imposition of certain regulations might affect the business being regulated. The interests of both the regulators and the industry must first be completely understood by both parties before a solution which satisfies both can be implemented.

The issue of centralization and uniformity vs. decentralization is also an important one. In the case of the "Charge Up to Recycle!" program, initial impetus to the program was provided by a few states, but once the concept for the program was created, it was absolutely necessary that a

national uniform system be established to complement the manner in which industry conducted its business. When considering the possibility of an OECD-wide NiCd battery recycling program, individual countries, like individual states in the USA, will wish to maintain their own flexibility for various reasons. However, to ensure success on a world-wide basis, the program must basically be an international, uniform system consistent with the manner in which the Rechargeable Power Industry conducts its business.

PANEL 2: CHALLENGE PROGRAMMES

The United States Environmental Protection Agency 33/50 Program

John Harman

United States Environmental Protection Agency

Introduction

The 33/50 Program is the US Environmental Protection Agency's groundbreaking non-regulatory initiative for reducing the releases and transfers of toxic chemicals. Representing a shift from the traditional command and control approach for lessening the risks associated with specific chemicals, the 33/50 Program seeks co-operation with industry rather than confrontation. EPA identifies the environmental goal and the preferable targets, while letting industry determine the best and most effective route for reaching that goal. Environmental protection that is achieved more rapidly, at less cost, is the expected result. In achieving this objective, benefits accrue to governments, industry and the public.

The success of the 33/50 Program lies in its simplicity. The overall objective is reducing the releases and transfers of 17 toxic chemicals. Ancillary, but no less important, is the goal of encouraging companies to utilise pollution prevention and improve communications with the government and the public. To help achieve the reductions in releases and transfers, EPA set two goals, from which the 33/50 Program derives its name. Using a 1988 baseline, the first goal is a 33 per cent national reduction for the 17 chemicals by 1992 and a 50 per cent reduction by 1995. The data used to track this progress comes from the Toxics Release Inventory (TRI).

Background

Following the publication of the first years of TRI data, there was concern about high levels of releases and transfers of toxic chemicals. While the TRI data showed reductions between 1987 and 1988, indicating that industry was taking steps on its own to lower emissions, EPA decided to try to accelerate the process. To determine whether a non-regulatory approach would foster faster decreases, EPA created the 33/50 Program. In early 1991, EPA sent letters of invitation to the 600 companies which TRI data showed had the largest total releases and transfers of the 17 33/50 Program chemicals. Another mailout later in the year went to all companies which submitted at least one TRI report for any of the targeted chemicals.

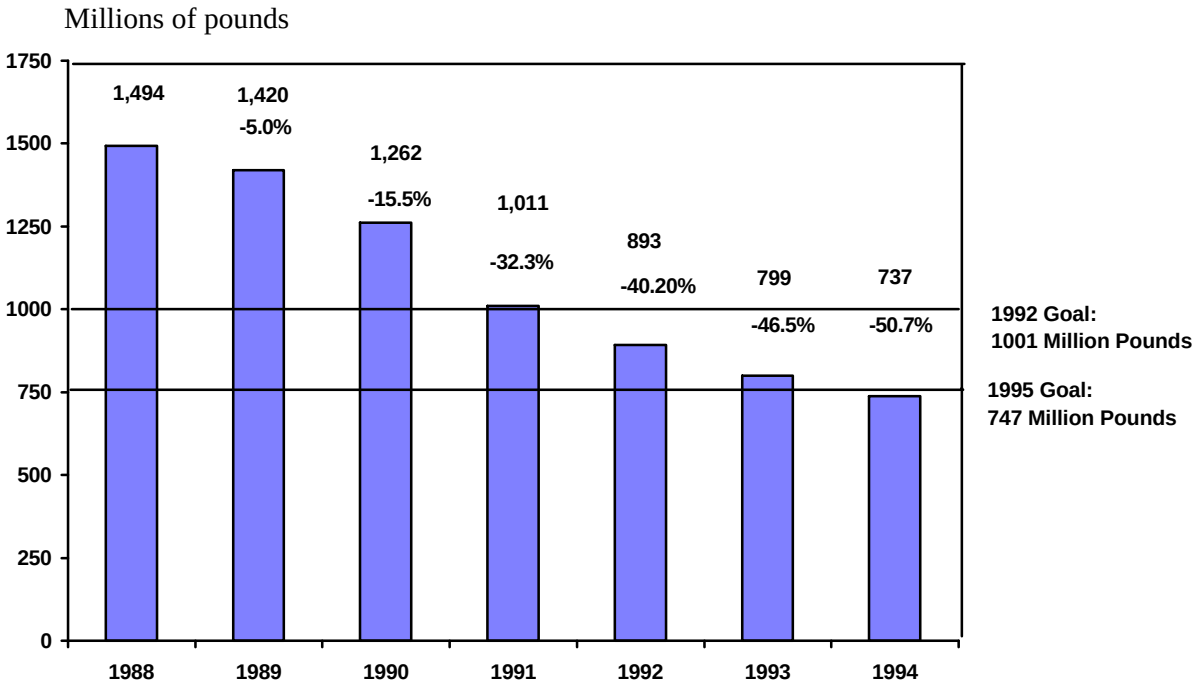
The interim 33 per cent goal was met one year early, in 1991. The 50 per cent goal similarly was attained a year ahead of schedule, in 1994. When the 1995 TRI data becomes available in early 1997[1], expectations are for still more reductions. Results indicate that the 33/50 Program has been a striking success.

[1] Final result for the 1995 data show a 55.6 per cent reduction from 1988.

33/50 PROGRAM CHEMICALS

Benzene	Lead & Compounds	Nickel & Compounds
Cadmium & Compounds	Mercury & Compounds	Tetrachloroethylene
Carbon Tetrachloride	Methyl Ethyl Ketone	Toluene
Chloroform	Methyl Isobutyl Ketone	Trichloroethane
Chromium & Compounds	Methylene Chloride	Trichloroethylene
Cyanides		Xylenes

The success of the program can be observed further by comparing the rates of reduction for the releases and transfers of the 17 33/50 Program chemicals with the rates for all other TRI chemicals. Between 1988 and 1990, the period before EPA contacted companies, the 33/50 Program chemicals decreased at a slower pace than the other TRI chemicals, 15.5 per cent versus 20.2 per cent. This trend was reversed dramatically beginning in 1991, the year that EPA mailed the first letters of invitation. Between 1991 and 1994, the most recent year of TRI data available, reductions in 33/50 Program chemicals outpaced the rest of the TRI chemicals by 41.6 per cent to 22.3 per cent.



Objectives of the 33/50 Program

While the immediate goal of the 33/50 Program was the 50 per cent reduction of the releases and transfers of 17 toxic chemicals, EPA also intended to use this initiative to foster other long-term objectives. At the time of the inception of the 33/50 Program, there were several cultural changes taking place in the arena of environmental protection, all of which EPA wanted to encourage. One was the realisation that the end-of-pipe method for controlling pollution had its limits, and that the most effective means of reducing pollution was by preventing pollution at the source. A second was that the involvement of the public in the environmental policies of industry can be helpful rather than a detriment. The final concept was the need to instill greater trust and co-operation between industry and the government on environmental matters. While the 33/50 Program by itself cannot attain these goals, the initiative could be a step in that direction.

Costs/advantages compared to regulations

Comparing the 33/50 Program with regulatory policies shows further advantages of non-regulatory initiatives. In terms of cost, the 33/50 Program is extremely inexpensive. The low cost associated with this project results both from the relatively few EPA staff needed to administer the project and from the fact that, in contrast to regulations, the program does not require large financial obligations. There are, for instance, no legal battles or enforcement demands. Besides these factors, another advantage of the 33/50 Program is the short time frame necessary for developing the initiative. Between concept and the first invitation mailout, only three months elapsed. This compares favourably to the five or more years that some regulations can take to be implemented.

A common complaint by businesses is that many regulations stifle creativity and flexibility. The concern is that traditional regulatory policies often require every business covered by a statute to implement the same action, sometimes with detrimental consequences. While the action put forward by the regulation might have a positive effect on the environmental situation of some businesses, the resources spent complying with the regulation could have been used more efficiently. There are no such restrictions with the 33/50 Program. EPA only set the priorities by selecting the 17 toxic chemicals, and established the 50 per cent goal; and then asked for industry's help. While emphasising pollution prevention, EPA left the decisions on how to achieve lower releases and transfers to industry.

Legal framework

An important point about the 33/50 Program is that there are no legal underpinnings. The 33/50 Program is non-regulatory in the truest sense. EPA merely asked companies to participate. There were no consequences for those companies which chose not to join the initiative. This point was important in the effort to build co-operation and trust between EPA and industry. The hope was that this good-faith action by EPA would spur greater participation in subsequent non-regulatory initiatives. The lack of a legal framework also allowed the 33/50 Program to proceed from concept to implementation at a quick pace, as there were no disputes between government and industry which needed to be resolved.

If there are no legal aspects to the 33/50 Program, the question that arises is how EPA ensures the accuracy of the data. The answer is that the 33/50 Program relies on the mandatory provisions for TRI. Companies which meet the requirements of TRI must file reports which accurately provide release and transfer data. The lesson, therefore, is that the 33/50 Program is a non-regulatory initiative which is built upon, and receives accountability from, a regulatory policy.

Limitations

Although the 33/50 Program has had many successes, there also have been shortcomings. One problem is overcoming the reservations of some businesses to joining the initiative. Out of approximately 8000 eligible companies – any company which submitted at least one TRI report for any of the 17 targeted chemicals – 1300 companies are committed to the program. Breaking these numbers down shows that the participation rate for the 600 largest companies is over 60 per cent, while the rate for the small and medium-sized companies is around 13 per cent. What these statistics indicate is that, for future non-regulatory initiatives, EPA has greater hurdles to overcome with the small and medium-sized companies than with the larger companies.

Another issue relates to the limitations of the TRI data. While the information from TRI forms the backbone of the 33/50 Program, there is important information which is unavailable from the database. Ascertaining the reasons for any decreases in releases and transfers is difficult. Reductions can result from the utilisation of pollution prevention activities, from end-of-pipe practices, or merely from a slow-down in business. TRI is limited further by the unavoidable time lag between the reporting year and when EPA publishes the data. Managing expectations against the inevitable shortcomings of the non-regulatory initiative is a subject worth addressing.

Public recognition

EPA attributes several reasons to the positive response by the business community to the 33/50 Program. A primary motivator, however, was the strong interest in gaining recognition by EPA and improving public relations. EPA rewarded this interest by providing participating companies with various forms of acknowledgement. To every newly committed company, EPA provided a certificate signed by the EPA Administrator. EPA subsequently profiled various companies which achieved release and transfer reductions through pollution prevention activities. Through a self-nominating process, EPA now is receiving descriptions from companies describing how the 33/50 Program spurred lower emissions of the 17 chemicals.

Companies used the certificates and the participation in the 33/50 Program for both internal and external purposes. The 33/50 Program offered companies the ability to show employees and the local communities that environmental protection was taken seriously. On the local level, in particular, the 33/50 Program certificates provided companies the opportunity to improve relations both with employees and with the community. There were numerous instances in which a company requested duplicate copies of a certificate so that a copy could be placed in a central area of each facility belonging to that company.

Process of invitation

The method of asking companies to join the 33/50 Program was very simple. EPA merely identified those companies which had submitted a 1987 or 1988 TRI report for one of the 17 chemicals and then sent letters of invitation. In early 1991, only the data from these two reporting years were available. The first mailout went to the largest 600 companies. A second mailout went to the remaining 5400 companies. When TRI data was published for 1989, and then for each of the subsequent reporting years, EPA identified any new companies which filed a TRI report for one of the 33/50 Program chemicals and mailed letters of invitation.

33/50:
An experiment that works

In early 1991, the Environmental Protection Agency (EPA) decided to test a new way of doing business. It was an experiment to see if voluntary efforts by industry could achieve pollution-reduction goals faster than regulation. In the space of just two years, industry proved it works, and the nation's air is becoming cleaner in the process.

Called 33/50, EPA's initiative targeted 17 priority toxic chemicals, such as benzene and xylenes. The goal was to get participating companies to reduce emission of these chemicals 33 per cent by 1992, and 50 per cent by 1995. The reductions are measured against Toxics Release Inventory data reported by industry, with 1988 as the baseline.

According to EPA, the 33/50 Program has made rapid and impressive progress:

• Chemical emissions have declined by nearly 600 million pounds or 40 per cent between 1988 and 1992, surpassing the 33 per cent goal by over 100 million pounds.

• EPA's projections indicate the program's ultimate target of a 50 per cent reduction could be met nearly two years ahead of schedule.

Voluntary efforts work, and the spirit of these initiatives is infectious. When Mobil signed on to 33/50 in 1991, we were one of 230 companies. More than 1,200 companies participate today.

Mobil was among a select group of companies participating in 33/50 to be recognised by the EPA for making substantial reductions in emissions (a million pounds or more) or especially rapid reductions (virtually 100 per cent). By year-end 1992, our five U.S. refineries and a number of our chemical manufacturing facilities had cut emissions 2.5 million pounds from our 1988 baseline.

Protecting the environment is a responsibility we take very seriously. We recognised the need for it in 1956, when we formulated a formal environmental policy, 14 years before EPA was created. And the resources -- people, capital investment and technology -- we dedicate to this charge have grown over the years. For three years in a row, our spending has topped $1 billion.

Experience has taught us that voluntary efforts rather than the command-and-control regulatory process are often the best way to continuously improve environmental performance.

Which is one reason Mobil applauds and supports the federal government's voluntary approach to reducing greenhouse gases through its Climate Change Action Plan. Included in the plan are nearly 50 initiatives that foster co-operative approaches to improving environmental performance. We already participate in several of these programs and are evaluating others. We've signed on for:

• **Green Lights**. This EPA program encourages U.S. businesses, governments and institutions to switch to energy-efficient lighting and save money doing it. Mobil's efforts earned us EPA's first "Partner of the Year" award in 1994.

• **Waste Wi$e.** This program complements existing business waste-reduction efforts and also helps companies get off to a fast start. As a charter member, Mobil has committed to a number of waste-prevention and recycling goals.

• **Energy Star**. This EPA/Department of Energy initiative encourages use of more efficient technologies to reduce energy usage in commercial buildings. Several Mobil facilities worked with EPA to evaluate the viability of several energy-efficiency technologies.

We're encouraged by these co-operative efforts. So's the government. An experiment like 33/50 shows that American business can pass the test with flying colours.

Mobil®

New York Times June 9, 1994

These letters were the primary, but not the only, means of contacting companies. There also were attempts to spread the word about the 33/50 Program by contacting trade associations and writing or encouraging positive articles in trade publications. In response to the invitation, companies simply sent EPA a letter indicating their decision to participate. There was no other requirement. While EPA encouraged further communications, including individual company goals or progress reports, the only demand for a company was the letter of commitment.

The 33/50 Program and regulatory programs

While the results point to a very successful program, the 33/50 Program, like all non-regulatory initiatives, works in concert with, rather than in place of, regulatory policies. Without TRI, the 33/50 Program would not have been possible, as there would be no opportunity for EPA to verify the progress of companies. Regulations often set the bottom-line standards for environmental protection. Non-regulatory initiatives, on the other hand, represent the leading edge. Proactive companies recognise the value of environmental protection and working with the government to become cleaner. While projects like the 33/50 Program are efficient methods for reducing pollution and possibly lessening the need for regulatory action, regulations nonetheless are essential to keep the more intransigent companies in line.

Measuring success

Although the stated means by which EPA measures the success of the 33/50 Program is with TRI data, there also are other factors which point to the initiative's value. One example is the positive response and support from the business community. Companies regularly cite the 33/50 Program as an illustration of how the government and industry can work together to solve problems. Another indication of the initiative's influence comes from some companies which are non-participants. Some of these companies targeted the 17 33/50 Program chemicals for environmental activities. The 33/50 Program thus helped focus efforts, both for participants and non-participants.

The 33/50 Program for other countries

There are many aspects of the 33/50 Program which can be transferable to other nations. With more countries implementing systems similar to TRI, known internationally as Pollutant Release and Transfer Registers (PRTRs), opportunities to create projects very similar to the 33/50 Program are possible. Numerous countries also collect data on urban pollutants or on greenhouse gases. A non-regulatory initiative like the 33/50 Program could be used to lower the use and emissions of these chemicals. The basic building block for such an initiative is a credible database of release or transfer data from which a goal can be set, a baseline established, and progress tracked.

Individual aspects of the 33/50 Program also can be useful for other non-regulatory initiatives. One of the most important and pivotal features is the establishment of targets. When the government provides a goal, businesses might be encouraged to increase the efforts to reach that goal. By identifying a set of pollutants, business can tailor environmental policies more efficiently. A related factor is that the 33/50 Program has a definite end, with the 50 per cent goal set for 1995. A program with a beginning and an end encourages a feeling of accomplishment.

Another important component of the 33/50 Program is incentives. There needs to be a reason for a company to join the non-regulatory initiative. In the case of the 33/50 Program, this incentive is public recognition. Companies can trumpet their own successes or point out the

successes of the non-regulatory initiative, stressing that the company is playing a role in those accomplishments. As with other aspects of the 33/50 Program, the types of incentives that a nation chooses can and must vary to meet the needs and characteristics of that nation.

From a recent EPA publication:

33/50 Hits the Mark!

The 33/50 Program achieved overall reductions of 50.7 per cent in 1994, a full year ahead of the 1995 target date for a 50 per cent reduction. All told, 757 million pounds of releases and transfers have been eliminated since the 1988 baseline year for the program.

Other notable 33/50 achievements include:

- The 1300 companies participating in 33/50 are projecting continued reductions in 1995 and 1996.
- The 17 chemicals targeted by 33/50 have been reduced at nearly twice the rate of other TRI chemicals since 1991, when the program began.
- 33/50 participants have gone well beyond their commitments, achieving 50 per cent more than the amount of reductions originally pledged to the program.
- 33/50 participants are achieving reductions at a much faster rate than other companies – 50 per cent vs. 30 per cent from 1991 through 1994 and 60 per cent vs. 35 per cent since 1988.
- Overall generation of production-related waste for the 33/50 chemicals has declined slightly since 1991 and is projected to continue declining, even as waste for all other TRI chemicals increases.
- 33/50 chemicals are more frequently targeted for source reducing than other TRI chemicals.

A MESSAGE FROM

THE US VICE PRESIDENT

The Environmental Protection Agency's 33/50 Program symbolizes the Clinton Administration's aim to reinvent federal environmental management. Through voluntary partnerships with more than 1,290 companies, the 33/50 Program launched one of the most successful emissions reduction efforts ever attempted.

Started in 1991 with a staff of five and a budget of $150,000 – too small to warrant a separate line item in EPA's budget – the 33/50 Program worked with industry to develop innovative ways to decrease the emission of industrial pollutants. A 33% reduction of emissions was targeted for 1992, with a 50% reduction by 1995. The program exceeded these goals without implementing new federal regulations. And these goals were met faster and cheaper than with a command-and-control approach, and without its inefficiencies and aggravations.

In the first year, the 33% target was exceeded by 13%, which amounted to a toxic emissions decrease of 100 million pounds. And the data for 1993 already indicate a 46% decrease. While it is too early to tell what the 1995 percentages will be, the numbers suggest the decrease will far surpass the 50% goal. This means less pollution in the air we breathe and a healthier environment for our children.

The 33/50 Program proves that the federal government and industry can work together to protect public health and safety without additional burdensome regulations. Companies know that environmental efficiency helps businesses become more competitive. After all, pollution really is waste – what's left over from the production of goods and services. Reducing the pollution - economic waste – increases profits and makes our industries more competitive.

This Administration has worked hard to reform environmental regulation. As the President said on March 16, 1995, "The philosophy guiding our reform process is simple: Protect people, not bureaucracy; promote results, not rules; get action, not rhetoric; wherever possible, try to embrace common sense."

The key to the success of the 33/50 program is flexibility. The program did not dictate specific reduction goals for each participant, specify technologies that had to be used or require elaborate new reporting mechanisms. It simply set a broad, national target for reducing pollution, and asked companies to come up with their own ways to meet reduction goals.

Our environmental programs must work better and cost less to meet the challenges of the future. The 33/50 progam shows that, by working together, we can create a new way of doing business - guided by common-sense principles that work in the best interests of environmental protection and economic growth.

Al Gore
Vice President of the United States of America

Accelerated Reduction/Elimination of Toxics (ARET) (Government Perspective)

James Riordan

National Office of Pollution Prevention
Environment Canada

ARET stands for the Accelerated Reduction/Elimination of Toxics. Its purpose is to reduce the potential adverse effects of toxic substances on human health and the environment by accelerating the reduction or elimination of emissions of selected toxic substances. The focus of ARET is on those toxic substances that persist in the environment and may bioaccumulate in living organisms.

ARET grew out of a joint proposal from leading industry executives and environmentalists to the federal Minister of Environment in late 1991 to work co-operatively to develop a quick way to identify those substances that represent the most significant toxic concern and to experiment with a new and potentially more effective and faster way to reduce or eliminate their release. The Minister responded by launching a group known as the ARET committee.

ARET is based on the premise that voluntary action on the part of emitters of toxic substances may work quicker and more effectively than the traditional regulatory approach alone. While governments recognize the role, value and importance of voluntary action, they will continue to use regulations as part of their environmental protection strategies to help achieve the goal of sustainable development. Through ARET, organizations have an opportunity to participate in an open and non-prescriptive decision-making process to reduce or eliminate their toxic emissions in a cost-effective and flexible manner. ARET enables companies which release toxic substances to develop customized site-specific action plans to reduce or eliminate their emissions, while taking into consideration their particular circumstances and the business environment in which they operate. The ARET process has the potential to be less costly not only to industry but also to government.

In addition to requiring significant amounts of time to develop, regulations can be costly to monitor and enforce. The regulatory approach can also be adversarial. On the other hand, being a voluntary multi-stakeholder process, ARET promotes co-operation between industry, governments and other stakeholders. Finally, through ARET environmental leaders have an opportunity to gain credibility, public trust and support while improving their competitiveness and environmental performance.

In designing the ARET process, a lot of discussion was held to determine the right mix and number of stakeholders on the ARET committee. Members of the ARET committee were drawn from the federal and provincial governments, professional, health, environmental and labour organizations, and eight industry associations. The number of industry stakeholders was slightly greater than that from the environmental community, to ensure that industry sectors with significant toxics emissions were represented. All sectors were asked to nominate representatives, which they did. More environmental non-government organizations (ENGO's) would have been welcomed, but they were not nominated by the Canadian Environmental Network.

All members of the ARET committee participate fully and equally in the decision-making process. They are driven by a desire to actively use co-operative, non-adversarial ways to solve difficult issues. The ARET committee is consensus-oriented, and makes decisions on the basis of sound science combined with common sense. It supports the principles of sustainable development and public participation. A number of companies have engaged local community involvement in the ARET process. Members of the ARET committee also view pollution prevention as the most effective way to reduce or eliminate toxic emissions and recognize the need to adopt a multi-media approach in dealing with toxic emissions.

With the help of two technical subcommittees consisting of scientists and experts representing all the initial ARET stakeholders (government, industry, ENGO, and labour), the ARET committee selected 30 priority substances that met all of ARET's criteria for persistence, bioaccumulation, and toxicity (List A1). As well, 87 other substances that met the criteria for toxicity and bioaccumulation (List B1), toxicity and persistence (List B2), or simply toxicity (List B3) were selected for inclusion in the ARET list. Only 13 of these substances are regulated, many only partially.

In September 1993, environmental and labour groups withdrew from the ARET process. This resulted from the ARET committee's inability to reach consensus on the issue of eliminating toxic substance use and generation as opposed to reducing emissions, and on the viability of voluntary approaches to achieve action on toxics. Labour and environmental groups had expected the ARET process to lead to the identification of the worst toxic substances followed by a legislated program focusing on their elimination. Even though they withdrew from the ARET process in September 1993, representatives of these groups continued to work on the technical subcommittees until they finished their work in November 1993. This allowed ARET to secure a substantial list of toxic substances targeted for action, based on multi-stakeholder consensus. Despite the withdrawal of the environmental and labour groups, the current ARET members chose to continue with the process to achieve environmental improvement.

In early 1994, the ARET committee challenged selected Canadian companies, institutions, and government facilities to reduce or eliminate emissions of targeted ARET substances. For the 30 persistent bioaccumulative and toxic substances on List A-1, ARET seeks the virtual elimination of emissions, with a 90 per cent reduction target by the year 2000. For the other 87 ARET substances, the challenge is a 50 per cent reduction in emissions by the year 2000. Facilities committed to voluntary action have been encouraged to aim for their best efforts on ARET substance emissions. Participants were provided with broad guidance, but were encouraged to be flexible in both the development and public presentation of their plans. They were asked to provide to the ARET Secretariat their action plans, including reduction commitments and timelines. Many organizations have gone beyond the ARET challenge targets by committing, for example, to virtually eliminate their emissions of persistent and bioaccumulative toxic substances by year 2000.

Consistent with the spirit of openness and transparency, participants in the ARET initiative agreed to make their action plans and commitments publicly available. In addition to committing themselves to implement their action plans, they agreed to regularly report progress against their commitments in their annual reports, the National Pollutants Release Inventory (NPRI), and by submitting progress reports to the ARET Secretariat for inclusion in ARET's annual reports. While ARET's first report in March 1995 reported commitments by participating organizations, the second

report due in November 1996[1] will report on progress made in 1995 toward meeting their year 2000 targets. Some argue that there are few, if any, substantial consequences if participating companies do not achieve their targets. With increasing public pressure and scrutiny, and greater community involvement at the local level, companies stand to gain considerably by living up to their commitments to reduce their toxic emissions. The November report will provide the score card for each participant and recognize the environmental leaders.

Since ARET is an open and voluntary process, participants are responsible for the accuracy, consistency and validity of their reported emissions. Some argue that ARET lacks a credible verification mechanism. A recent analysis of the ARET and the National Pollutants Release Inventory reports for 1993 emissions has shown that, for 49 substances common to both inventories, ARET captured 83 per cent of the amount reported to the NPRI on its first challenge round. The analysis also revealed that some 250 facilities across Canada, emitting some 3600 tonnes of ARET substances, are not participating in ARET. When contacted and invited to take up the ARET challenge, they did not respond or showed little or no interest to join ARET.

Since the ARET challenge was launched in March 1994, 300 facilities from 170 major corporations have taken up the challenge. Collectively these organizations have filed action plans with toxics release reduction commitments of over 24,000 tonnes annually by year 2000, representing a 72 per cent release reduction overall from base year. For the high priority A1 substances, emissions of chlorinated organics have been reduced by 99 per cent while PAHs have been reduced by 50 per cent from base year.

Even more impressive is the fact that on average 68 per cent of the members of ARET's sectoral stakeholder associations have signed up for the program. Participation rate ranges from 46 to 97 per cent. Some industry sectors, such as chemical manufacturing and mining, have excellent participation rates. Ninety-seven per cent of the members of the Canadian Chemical Producers' Association participate in ARET. Mining companies representing 83 per cent of the value of base metal production in Canada also participate in ARET. Although other sectors have smaller participation rates, a substantial part of the output of these sectors is covered because of participation by the larger members. Overall participation in ARET is expected to increase as more members of stakeholder associations take up the ARET challenge and efforts are made to get the smaller companies to join ARET.

In addition to the environmental benefits that are being achieved, the ARET initiative is having noteworthy effects in changing corporate behaviour in terms of how industry is communicating with the public, planning, purchasing, testing and monitoring, manufacturing and making decisions within their respective sectors. In certain cases, corporate executives and managers are meeting regularly with communities to provide information on their environmental commitments and progress under ARET. In other cases, managers from the planning, purchasing, and production departments, along with employees, are sitting together to plan and develop strategies to achieve their ARET commitments.

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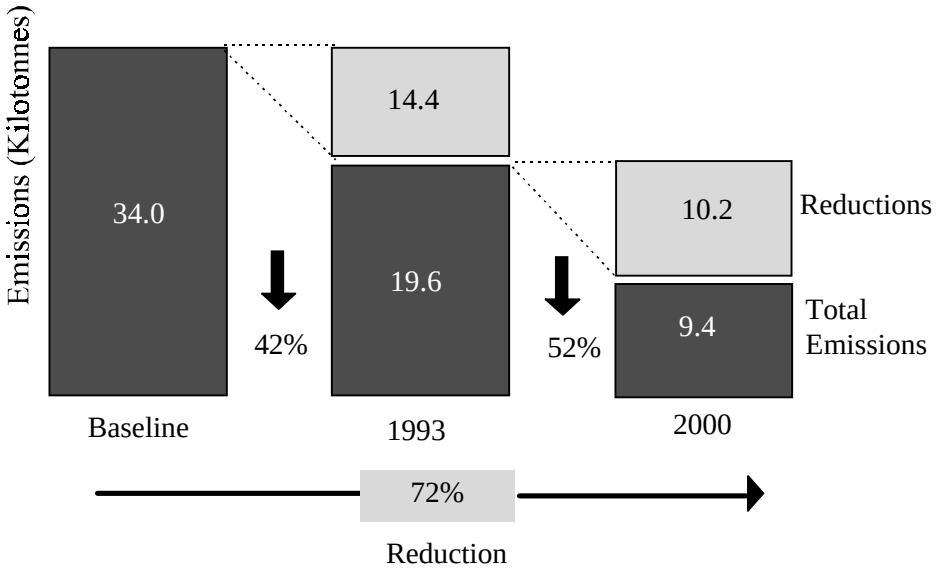
[1] The second ARET report, Environmental Leaders 2, was released in January 1997. The report begins with a Ministers' Message signed by the Minsters of Environment Canada, Health Canada and Industry Canada. In their message, the Ministers state, "Voluntary initiatives like the Accelerated Reduction/Elimination of Toxics Program are valuable and cost-effective strategies to safeguard our enviornment." Environmental Leaders 2 reports to that date, results show that ARET participants have made significant progress toward the goals committed to in their action plans. Together, 278 facilities participating in ARET have reduced toxic substance emissions to the environment by almost 17,500 tonnes - adecrease of 49 per cent from base year levels to December 1995. These decreases are mainly due to participation in ARET. Participants also commit to further reduce their emissions of toxic substances by another 8,000 tonnes from 1996 to 2000.

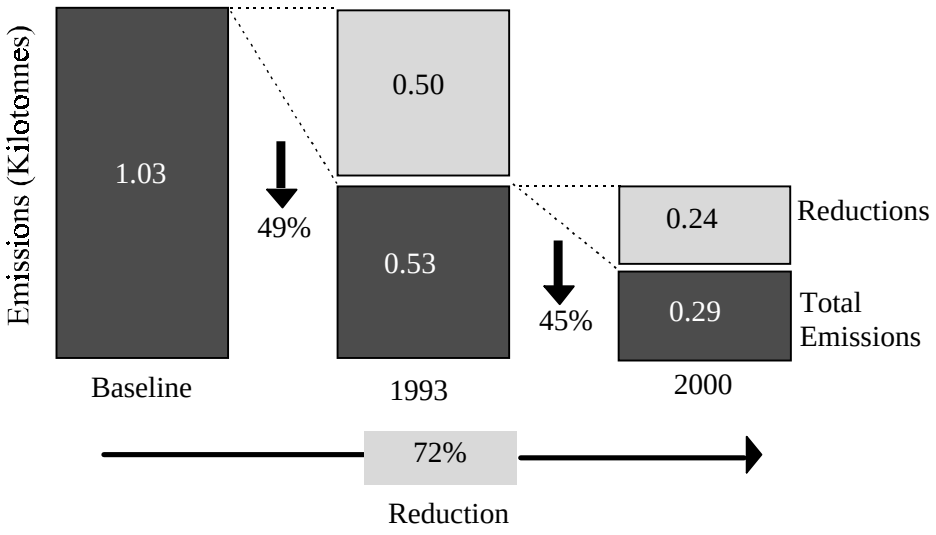
Over the past couple of months, two reports have been released. One by Queen's University's Dr. William Leiss, "Lessons Learned from ARET: A Qualitative Survey of Perceptions of Stakeholders", assesses the lessons learned by ARET. The other by Industry Canada, "Voluntary Environmental Action: A Participant's View of ARET" (author David Roewade), reports on the range of benefits resulting from the program.

Environmental Leaders 2, which is an analysis of the actual results of ARET, will be completed this fall. All indications are that this is a positive program with measurable results. Some of these results will be illustrated by our next presenter.

Overall ARET Emission Reductions (All Substances)



List A-1 Emission Reductions



Accelerated Reduction/Elimination of Toxics (ARET) (Industry Perspective)

Steve West

Hudson Bay Mining and Smelting
Canada

Hudson Bay Mining and Smelting (HBMS) Company, Limited, operates a zinc refinery and copper smelter at Flin Flon, Manitoba, which is located in west-central Canada, approximately 600 km northwest of Winnipeg. The metallurgical plant – which produces about 80,000 tonnes of copper and 100,000 tonnes of zinc per year – has been in operation for over 65 years.

The regulated limits for sulfur dioxide and particulate which currently apply to the operation were developed by the Manitoba provincial government and involved extensive consultation with all stakeholders. Put in place in the late 1980s, these included a reduction in sulfur dioxide emissions by 25 per cent and particulate emissions by 50 per cent by January 1, 1994. Hudson Bay recognised that there were significant process problems to achieve the limit, but committed to reduce more than one regulatory requirement and as much as was technically and economically feasible. Concern over community health, work place conditions, and high environmental performance was the focus of this commitment.

Methods of treating sulfur dioxide-laden process off gases were extensively researched. The conventional approach to this – the production of sulfuric acid – was and remains uneconomical due to the isolated location of the operation. If production of acid were possible, off gases could be largely eliminated, as would particulate emissions. Pressure leach technology, at the time in use for nickel and for single-stage zinc processing, was extensively researched to determine its application by HBMS for its zinc processing.

From the company's viewpoint, pressure leaching offered environmental efficiency combined with certain cost and competitive advantages.

HBMS undertook a $200 million zinc technology upgrade to meet the sulfur dioxide requirement, and anticipated that the change would as well provide sufficient particulate control. In September 1993, Hudson Bay placed on stream the world's first two-stage pressure leach facility, which processes zinc concentrates directly to electrolyte solution without emitting any off gas. This start-up allowed the sulfur dioxide reduction to be achieved, but the new process was not able to reduce particulate releases to an acceptable level.

The emergence of the ARET program was a perfect fit philosophically for HBMS. In 1994, HBMS committed to the concept and goals of the ARET program and set out to achieve those goals.

The ARET program provides an annual public reporting; a company's results are thereby measurable against the commitment. In the case of Hudson Bay, a liaison group has been developed involving community, government, worker-representatives, and environmental groups to review and

audit the company's environmental performance. These reporting mechanisms are powerful incentives to encourage continuous improvement.

The two gas cleaning technologies employed by HBMS – electrostatic precipitators and fabric bag filtration – were rigorously examined to determine where and what improvements could be made. These evaluations and reviews were done employing the team "breakthrough" approach, whereby the workforce and their knowledge were key and fundamental inputs. Technical staff and expert consultants assisted with rather than conducted the work. HBMS, after much technical review, decided to upgrade the precipitators to the extent possible within the existing configuration, and undertook a number of flue and damper modifications. The major undertaking, however, was to replace the fibreglass filters in the baghouse with membrane cloth filters at a per unit cost increase of approximately ten times. The application of this technology is, to the best of our knowledge, the largest installation of its kind in the world, under operating conditions which are a "reach" beyond those normally considered for the technology. Work continues within the process itself on the deportment of minor metals between the zinc and copper process.

If driven only by the statutory limit, upgrading the electrostatic precipitators probably would have sufficed. In other words, without the corporate commitment to go as far as possible, and the introduction of ARET the regulatory requirement by itself would not have achieved the same level of success in Flin Flon.

The commitment to meet the voluntary ARET goals as compared to only meeting set regulated standards gave the corporation several opportunities and advantages and, in the end, delivered significantly better environmental achievements than a pure regulatory approach:

(a) "Lowest common denominator" broad standards were not the goal.

(b) The regulatory approach focused only on total particulate; the voluntary approach dealt with individual components of the releases.

(c) The voluntary approach provided flexibility to the company in its technical options; the best economic site-specific approach could be used.

(d) Broad-based consultation involving all stakeholders – and in particular the work force itself – allowed a co-operative and constructive approach to determining the optimum solution to the problem faced.

What are the results?

Parameter	**Regulatory reduction required**	**Actual reduction achieved* (1996 vs. 1988)**	**ARET goal**
Total particulate	50%	over 80%	-
Cadmium	none	72%	50%
Lead	none	65%	50%
Arsenic	none	71%	50%
Mercury	none	90%	50%

* Based on first half of 1996

The results indicate that, without regulatory requirements, major environmental improvements can be produced through voluntary programs. Further, it can well be argued that a corporate commitment to be the best it can is much more effective than a requirement to meet a general regulatory requirement imposed by third parties with, in many cases, insufficient consideration to site-specific needs, technology availability, economics, and multi-stakeholder interests.

Responsible corporations act responsibly. The results from the ARET program demonstrate that voluntary programs can efficiently deliver environmental improvements.

A Non-Regulatory Approach for Risk Reduction of Potentially Hazardous Chemicals[1]

Bunro Shiozawa[2]

Ministry of International Trade and Industry
Japan

Introduction

In February 1996, the Safety Measure Committee of the Chemical Products Council of the Ministry of International Trade and Industry (MITI) developed a policy recommendation entitled "Direction of Promotion of Comprehensive Chemical Safety Management – Voluntary Management Based on the Responsibility of Industry". A summary of the report has been prepared for distribution as a separate paper.

The report presented the following recommendations to MITI:

1) Comprehensive risk management of potentially hazardous chemicals is becoming more important than risk management that focuses only on a specific hazard in relation to the individual use and life cycle of a chemical. And reduction of the total risk which may be posed by a variety of hazardous chemicals should be achieved considering these chemicals' whole life cycle;
2) In seeking measures to manage the risk of such chemicals, the best combination of regulatory and voluntary risk management measures should be pursued based on scientific knowledge of a chemical's hazard, an estimate of the level of risk posed by the chemical to human health, and available methods or technologies to reduce the risk;
3) When a risk level posed by a chemical seems not to be so serious that a regulatory measure may be required, voluntary risk management activities conducted by industry would be quite viable and cost-effective measures for risk management. And if this is the case, such an initiative should be fully utilised. In this respect, the "Responsible Care" activities promoted by the International Council of Chemical Associations (ICCA) and being actively implemented by the Japanese Chemical Industry Association (JCIA) will play an important role in risk management; and
4) In the implementation of risk management, international harmonization should be kept in mind in every element of risk management. For example, the selection of hazardous chemicals, the methods which may be used for risk evaluation and methods, and the intensity of risk reduction measures would be some of those elements.

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[1] This paper reflects the author's personal views wherever views and opinions are stated in relation to the facts presented in the paper.

[2] Director, Chemical Products Safety Division, Basic Industries Bureau, MITI.

Based on the recommendations mentioned above, MITI, in co-operation with the Environment Agency (EA) and JCIA, has developed a new non-regulatory approach for reducing the risk of potentially hazardous chemicals to human health.

This approach will be applied, on a trial basis, to risk reduction of toxic air pollutants in parallel with the Responsible Care activities in which industry is undertaking various voluntary measures for reducing potential risks of chemicals being handled by them. It would be worth mentioning here that a number of voluntary risk management measures have been established in relation to potential chemical hazards and are being implemented by various industry associations in Japan. These measures include the Japanese voluntary risk reduction measures which were introduced and approved in the OECD Risk Reduction Programme for brominated flame retardants. The new non-regulatory approach was developed as a supplemental measure of the Responsible Care activity, in order to reduce emissions of pollutants whose risk level seems not to be very high or to be uncertain based on presently available scientific evidence for imposing regulatory measures, but seems higher than the risk of chemicals which could be controlled only by Responsible Care activities. Once the government is convinced that risk reduction measures implemented by industry are sufficient to control the risk of a chemical, industry's initiative under the framework of Responsible Care should take over the government involvement that would occur in this new non-regulatory approach.

This approach is a non-regulatory measure and does not have enforcing power in a strict sense. However, it tries to ensure reasonable and flexible risk management activities based on available scientific knowledge, and to enhance and improve transparency and implementation of voluntary industry risk reduction activities. Furthermore, this approach is designed to achieve risk management of potentially hazardous chemicals with less involvement of the government, i.e. with the requirement of less financial and human resources of regulatory bodies.

The approach

The approach described consists of the following elements:

1) Identification of chemicals to be controlled

   Chemicals which are potentially hazardous to human health will be listed by MITI in collaboration with the Environment Agency. Both agencies will collect publicly available hazard data, information regarding the production volume and use of a chemical, and environmental monitoring data. Based on this information, MITI, in consultation with the Environment Agency, will develop a preliminary list of chemicals to be controlled by this approach. The list will then be scrutinised by experts to identify potential hazards. If a chemical's risk is regarded as very serious, as mentioned before, regulatory measures to reduce the risk will be considered. If not, MITI will publish the list of chemicals which will be subject to this approach and will suggest to producers and users of the chemicals that they establish a voluntary risk management plan.

2) Data collection

   Once the list is published, JCIA will carry out a detailed survey to study listed chemicals' emissions to various environmental media. Chemical companies handling these chemicals will be encouraged to collect and provide more detailed hazard data to JCIA, MITI and EA. Such data collection will be conducted as a part of the Responsible Care activities being promoted by JCIA. Thus, hazard data collected by industry would be used in this approach and in the Responsible Care activities as well.

3) Suggestion for a risk management plan

In parallel with the above mentioned studies conducted by the JCIA and relevant chemical companies, MITI, in collaboration with the Environment Agency, will prepare suggestions for industry to develop its voluntary risk management plan for individual chemicals. These suggestions will cover how industry can establish measurable goals for risk management and what kind of risk management measures may be considered in the development of a risk management plan. In formulating a suggestion, MITI will ask for opinions and comments from Chemical Products Council experts. MITI will also collect information on the best available technologies for risk reduction for inclusion in the suggestions.

4) Development of a risk management plan

Based on the information collected and suggestions mentioned in (2) and (3) above, each company handling a chemical subject to this approach is encouraged to develop a risk management plan for the chemical. Then industry associations covering various chemical products such as aromatics, paints, adhesives, inks and rubbers will develop a risk management plan for a chemical based on the risk management plans developed by each company handling the chemical. JCIA will provide necessary support to these industry associations, and will then formulate a nation-wide voluntary risk management plan for individual chemicals.

5) Elements of a risk management plan

A voluntary risk management plan formulated by JCIA is expected to contain the following elements:

a) risk reduction measures to be implemented. They may include a quantitative goal for the reduction of emissions and use of a hazardous chemical, and a qualitative goal such as change to a substitute chemical, change in production or processing processes, or change in disposal methods;

b) provision of hazard data on a chemical to users and provision of training to users for safer handling of the chemical; and

c) contribution to and participation in international risk management programmes for an individual hazardous chemical.

6) Pledge

JCIA will make public a voluntary risk management plan and submit the plan to MITI and the Environment Agency. MITI will then provide the plan to the experts in the Chemical Products Council for their review. In this manner, industry will pledge the implementation of a voluntary risk management plan in a transparent manner.

7) Review

A progress report on the voluntary risk management plan will be reported regularly to MITI by industry, and the report will then be reviewed regularly by the Chemical Products Council experts. The results of the review will be reported to MITI and the Environment Agency and made public.

Idea behind the approach

The approach described above was developed based on the following:

1) For risk management of a potentially hazardous chemical, industry handling the chemical concerned should take primary responsibility for controlling a risk which may be posed by the chemical. Moreover, since a chemical company normally has multiple approaches to reducing the total risk of pollutants being discharged by the company to the environment, such a company has to know and must be in the best position to devise the most effective measures to manage the risk. Therefore, it is important to consider a mechanism to ensure industry's active involvement in the risk management of a chemical.

2) When a foreseen risk of a chemical is considered not to require a regulatory measure, devising a measure to encourage more active involvement of industry in risk reduction should be considered. Such a measure would certainly cost the government less in achieving the goal.

3) In carrying out such a measure, it is important to maintain the transparency of industry's risk management activities and to review the quality and performance of the result of these activities, in order to build public confidence in industry's activities.

4) International harmonization of methods which would be used by industry in risk evaluation and risk management should be ensured. Government should provide industry with information regarding technologies or methodologies which are internationally applied in risk evaluation and management activities.

5) Hazard information on chemicals should also be provided by governments to industry. As intensive efforts to study hazards of a chemical are being conducted and international exchange of hazard information on toxic chemicals is being promoted under the framework of Chapter 19 of Agenda 21, governments should actively provide industry with this information in order to encourage and enhance its risk management activities.

6) Governments should establish a "techno-infrastructure" for the risk management of a hazardous chemical in order to encourage better voluntary industry risk management activities. Such a techno-infrastructure may include, for example, the collection of basic science data regarding potential hazards, research and development for the measurement of emissions levels and for environmental monitoring of hazardous chemicals, the study and development of risk evaluation methods, the development of standardised criteria for prioritising risk management tasks, and the development of an inventory of the best available risk reduction technologies.

Future issues

The approach described above is now in the process of preparation and is planned to be implemented from this coming autumn 1996. Though the viability and effectiveness of this approach will be tested as it is implemented, the following challenges are foreseen:

1) effective involvement of user industries;
2) implementation among small and medium-sized chemical manufacturers and users; and
3) introduction of market incentives for the further promotion of voluntary risk management activities.

It is expected that, taking into account the experiences gained and lessons learned through the implementation of this mentioned approach, it will be modified and improved to achieve its goal. Our plan is to review the status of implementation and the effectiveness of the approach about every year. It is also expected that this new approach will further activate industry's voluntary risk management activities and contribute to obtaining more public confidence in the voluntary risk management activities being conducted by industry.

PANEL 3: BILATERAL/MULTILATERAL AGREEMENTS

Initiatives and Voluntary Agreements Concerning Detergents and Cleansing Agents

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Background

In the framework of the German Washing and Cleansing Agents Act (WRMG), producers and importers of detergents and cleaning products have to notify the marketed products to the Federal Environment Agency in order to provide information on the environmental compatibility of these products.

The detailed content and procedural rules of the notification, as well as submission of additional information enabling the Agency to assess possible environmental risks, has been agreed between government and the respective industry associations in the so-called *procedural regulations*.

Several substances or substance groups have become the subject of specific voluntary agreements with respect to reduction or renunciation of their use in detergents and cleaning products.

Introduction

The German Washing and Cleansing Agents Act of 1986 aims in principle at the protection of the aquatic environment. The objective of this Act is to (1) avoid disturbance of the nature of surface waters; (2) ensure the efficiency of waste water treatment by careful use of washing and cleaning agents; and (3) consume as little detergents, cleaning products, energy and water as possible by using appropriate technical washing and cleaning equipment. Apart from these overall objectives, a number of specific requirements are stated: for example, concerning certain ingredients (minimum degradation by surfactants, limitation of phosphate content), labelling of the packaging, and, according to Article 9 of the WRMG, submission of information on environmental compatibility of the products. An overview of the legal requirements according to this act is given in **Table 1**.

Article 9 of the WRMG includes the duty to notify detergents and cleaning products. However, detailed notification procedures, including specification of the information to be provided, have been agreed in the so-called *Procedural regulations for submitting the information required by Article 9 of the Washing and Cleansing Agents Act.* In the following, an overview is given of these procedures, of existing voluntary agreements for certain substances, and of voluntary initiatives concerning the labelling of washing and cleaning products.

Table 1 Legal requirements according to the Washing and Cleansing Agents Act

1. Avoid disturbing
   - Nature of surface waters
   - Efficiency of sewage treatment

2. Careful use of washing and cleaning products

3. Requirements for technical washing and cleaning equipment:
   - Consumption of as little detergents, water and energy as possible

   Ban on use of non-degradable detergents (surfactants regulation)

5. Ban on exceeding the maximum amount of phosphorous compounds
   (regulation on maximum phosphorous content)

6. Authorization of regulation restricting or banning the use of certain ingredients

7. Requirements for labelling

8. Information on local water hardness

9. Information on environmental compatibility
   - Notification of product formulation within a specified range of composition
   - Submission of data

10. Control: Federal States

1. Procedural regulations for submitting information on environmental compatibility

The regulations have been established in order to specify the general requirements stated in the Act according to Article 9. Without these regulations, an additional decree would have been necessary in order to meet existing legal requirements.

Form of the agreement:

Communication of involved industry associations to the Federal Environmental Ministry in December 1988:

Involved industry associations:

- Industrial association for health and beauty aids and laundry detergents;
- Association for industrial cleaners within the chemical industry association;
- Industrial association for cleaning and polishing products;
- Industrial association for textile and leather aids, tanning materials, and raw materials for detergents.

Publication and information:

The letter and enclosed procedural regulations have been published in the *Bundesanzeiger*, the official journal of the German Parliament.

The above mentioned industries are obliged to publish the procedural regulations in suitable ways in order to inform as well companies which are not members of the associations which signed the communication.

Content of the procedural rules:

The procedural regulations contain all specifications necessary to fulfill the requirements of Article 9 of the Washing and Cleansing Agents Act. The content can be summarized as follows:

1. Specification and definitions according to Article 9 WRMG
2. Details of the notification procedure, including definitions, format, and instructions for filling out the forms
3. Basic information on detergents and cleansing agents
4. Submission of information on environmental compatibility of ingredients

1.1 Basic information

The basic information has to be provided by any manufacturer or importer of detergents and cleaning products according to the procedural regulations.

Apart from the legally required registration number (UBA number) and the corresponding information such as name and location of the notifier, and trade name of the product, the following information is required:

Product formulation:
i.e. chemical name of each ingredient and the percentage each ingredient makes up (within a range) of the total product composition

Ingredients described in categories of their function:
e.g. solvent, anionic surfactant

Product type according to standard descriptions:
e.g. Domestic textile cleaning
laundry detergent for wool

Production, sale or import quantities:
expected quantities in ranges of 10, 100, 1000, 10,000 tonnes/year

For laundry detergents:
density dosage and washing efficiency, referring to water hardness

1.2 Information on environmental compatibility

Information on biodegradability of surfactants and data on ecotoxicity have been made available and are listed in the status report of the Main Committee on Detergents (*Hauptausschuß Detergentien*).

The Federal Environment Agency evaluates the available information on the ingredients of detergents and cleaning products. In case of indications that there is an environmental risk or that the waste water treatment plants might be disturbed by an ingredient, the substance is subject to further clarifications and/or investigations by means of a dialogue with the industry.

More information on degradation will be needed in most cases. Data on acute fish, daphnia and algae toxicity might be required additionally.

The industry associations participating in the programme are willing to co-ordinate inquiries and responses among the concerned companies and the Agency if needed.

1.2.1 Additional information provided by the industry associations

The German Committee for Surface Active Substances provides annually a list of quantities of surface active substances used in washing and cleaning products.

The industry association for health and beauty aids and laundry detergents provides a list of all ingredients (which are not listed above) used in washing and cleaning products (household use) with more than 2 per cent in the major products of member companies, with the quantities used per year.

2. Efficiency, advantages and disadvantages of the procedural regulations

Since the new Washing and Cleaning Agents Act came into force and the procedural regulations were published in support of the Act, about 60,000 notifications including the above described basic information have been received by the Agency. Currently about 40,000 actual formulas are registered, corresponding to about 2700 notifying companies.

The Federal Environment Agency estimates that the great majority of companies producing or marketing detergents and cleaning products as defined by the law are following the procedural regulations. Implementation of the law is monitored by the Federal States who analyse the contents of products and compare with the information stated in the registration (the UBA number specified on the label). Until now the procedural regulations are widely accepted as a "binding voluntary scheme" substituting for specific legal regulation.

In the case of a legal regulation corresponding to the basic Washing and Cleaning Agents Act, it is estimated that the information obtained would have been much less than it is now on a voluntary basis. One reason is certainly that the Act is a national law, and prescribing the submission of a set of data in a national law would have been seen as a marketing restriction in Europe.

This also implies the disadvantages of the scheme: at the time the procedures were initiated, the washing and cleaning market was not so international as it is now.

As a result, these international companies must now learn these procedures which can be time consuming for them and also for the Agency which must explain the requirements.

3. Voluntary agreements or declarations on the restriction of certain substances

In the framework of environmental risk assessment for major ingredients in washing and cleaning agents, a set of agreements or declarations have been made on restrictions or the non-use by the concerned industry.

In the following, examples are given of such agreements.

3.1 Alkylphenolethoxylates (APEO)

APEO is a group of non-ionic surfactants formerly widely used in nearly all product groups for washing and cleaning purposes. Especially because of the lack of ultimate biodegradation, leaving a persistent and toxic metabolite, nonylphenol, APEO was subject to further risk assessment.

In 1986 the concerned industry associations committed themselves by letter to the responsible Ministry to a stepwise abandonment of the use of APEO in washing and cleaning products. The stepwise procedure was described according to the various use patterns, e.g. household cleaning products and laundry detergents should be "APEO-free" by the end of 1986 whereas, for certain industrial use areas, substitution possibilities were expected only by the end of 1992.

In 1993 the Federal Environment Agency evaluated the reported formulations for APEOs and concluded there was still about 1100 tonnes of APEO, namely nonylphenolethoxylates, in washing and cleaning products, which, however, corresponded to a 90 per cent reduction compared to 1986.

3.2 Volatile chlorinated hydrocarbons

Volatile chlorinated hydrocarbons (dichloromethane, trichloroethane, trichlorethylene and perchloroethylen) have been widely used in cleaning products as floor cleaners, car cleaners, etc. but also for industrial cleaning purposes.

By letter to the Environment Ministry in July 1987, the concerned industry associations committed themselves to the substitution of these substances in cleaning and polishing products by the end of 1987.

In the meantime, most of these substances have been widely regulated, so that the agreement applies today practically only to dichloromethane.

3.3 Distearyldimethylammoniumchloride (DSDMAC)

DSDMAC has been widely used in laundry softeners. As an outcome of the environmental risk assessment, DSDMAC was subject to discussions on its further use in laundry softeners. The concerned industry association voluntarily declared in 1990 that DSDMAC in laundry softeners would be substituted by better degradable substances during 1991.

3.4 Musk xylene in perfume formulations

During 1993, musk xylene and related compounds were found in the framework of the German food monitoring programme. The substance was used widely in perfume formulations in detergents and cosmetic articles. Because of the toxicological but also ecological profile of this substance class, the concerned industry association voluntarily committed itself to substitute musk xylene in detergents and cleaning products by the end of 1993 and to recommend its abandonment in cosmetics as well.

4. Experiences, advantages and disadvantages of the voluntary agreements

For all the above mentioned agreements or declarations it can be summarized that the measures are much quicker than long-lasting procedures for legal bans. In the specific case of products used in the domestic area, a certain public control is also supporting the efficiency of such agreements. The agreements which are valid for the washing and cleaning products are verified through the formulation notification system in connection with controls by the Federal States.

In the case of a notified frame formula containing substances for which agreements exist, the Agency enters into dialogue with the company referring to the agreements.

This procedure clearly has limits in the case of companies from other countries, and to a lesser extent also in the case of companies which are not members of the associations, because all the agreements are made by national associations and are almost based on the principle of the national Washing and Cleaning Agents Act.

Due to the increasing opening of markets, it has become difficult for national agreements to retain their efficiency.

Product Agreements: The Approach in the Netherlands

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Introduction

For approximately ten years products have been an important issue in environmental policy in the Netherlands. Within a few years' time, several product groups were examined because various environmental problems seemed to be caused by the environmental impacts of products, either within the production phase or with the use of products. Gradually this approach, which was focused mainly on the reduction of specific emissions or the elimination of other specific impacts, developed towards a Product Policy which is based more on a cradle-to-grave approach. Moreover, a policy in which legislative instruments play the most important role is evolving into a policy of more voluntary agreements.

In this contribution to the workshop, I will present an impression of the way the Dutch government has tried to develop environmental product policy. To indicate how it works in practice, I will focus on the experience we have with product policy in the product groups of detergents and paints, including preserved wood materials.

General environmental policy

In order to develop environmental policies, you need basics. In the Netherlands we actually have three of them: the so-called National Environmental Policy Plans. Each of the three Ministers of Environment we have had during the last seven years presented one of them.

In 1989 the first National Environmental Policy Plan was presented, setting targets for several environmental problems dealing with specific substances, target groups, or general problems like energy or climate change. In 1990 the Minister of Environment at that time added his view on the environmental issues in the Environmental Policy Plans Plus. Finally, in 1994, the National Environmental Policy Plan 2 was presented to Parliament. In general, you could say that each of these plans contains strategic targets for periods of, in principle, four years. More detailed policies are laid down in various operational plans.

Product policy

In relation to products, we have two main additional operational plans:

1. *General Policy on Substances:* This policy is based on risk reduction of the use of several specific substances and derived from the Dangerous Substances Directive 67/548/EEC and the Dangerous Preparations Directive 88/379/EEC.

2. *Policy Paper on Products and Environment and an additional letter to the Parliament*: With respect to products, the Policy Paper from 1994 is a very important one, giving the outlines of the policy towards products from an environmental point of view. In addition to this paper, a letter on "Product Care" was sent by the Minister of Environment to the Parliament in November 1995.

The main issues are the cradle-to-grave-approach (or life cycle approach), eco-labelling, product information, and a future system of product care. In general, one could say that this paper presents the outlook for product policy in the Netherlands during the coming years.

A rather new instrument in Dutch environmental policy that will be used within the product policy is the so-called “product care” system, which was introduced in the additional letter to the Parliament. As a new aspect of product policy, it aims at the continuous improvement of products by using a managerial system of permanent attention to the environmental aspects of products by manufacturers throughout the products’ life cycle. This product care system should be considered as an important component of environmental management. This includes initial concept, product design, research and development, production, storage, distribution, application or use, recycling and disposal. In fact, this system should reduce governmental attention to cleaner products in the future and provide for necessary environmental improvements by industry itself. Important elements in this system should be product analysis, priority-setting, and improvement plans. It requires co-operation between all the actors in the product chain involved in handling, from raw material sources to ultimate disposal. How these systems will work in practice, or which is the preferable system, has yet to be worked out. Ideas about how we want to proceed with product care will be focused on later.

Until now, product policy has been strongly focused on policy development for specific products. A very interesting question is how we develop specific policies for products.

Policy development for specific products

An important aspect is that we usually develop policies in close co-operation with all parties involved: not only with governmental parties (the Ministry of Economic Affairs, for instance) but also with private sectors of the national community. In relation to paint, for example, we discuss policies with paint manufacturers, paint applicators (within various areas, such as industry, construction, building, car repair, etc.), trade (e.g. retail companies, do-it-yourself markets) and consumers.

When you work together with so many actors, you need some kind of network management, not least because every actor tends to point at the others when it comes to taking measures against environmental damage. By networking, we try to avoid that. Each actor has his own responsibilities, and we try to connect those different responsibilities and to construct a balanced policy.

It is also important that, at the end, there will be an agreement – or better, commitment. A commitment to the resulting policy, but also to the instruments that will be used to make the policy

work. Instruments often used are voluntary measures (sometimes laid down in a covenant), legislation, permits, information transfer, or support of demonstration projects. What kinds of instruments will actually be used depends on the specific problem or the specific needs of the co-operating parties. Usually we make use of combinations of instruments. Special attention is given, furthermore, to enforcement and monitoring. When you implement a policy, you want to know at a certain moment whether it is successful or not. That's why monitoring in particular becomes more and more important.

I mentioned co-operation as a main principle. It is interesting to see that there has been an evolution during the last years on the subject of co-operation on the environment. When we first started this principle of co-operation, we tried to stick to one problem at a time. We had maximal involvement of the various parties, we agreed about joint responsibility, but we dealt with only one issue at a time: in the case of detergents, for example, the necessary reduction of DTD-MAC contents. By doing that, we realised later, we were asking for trouble. For instance, it led to separate discussions on all issues raised over the years and consequently to lack of priority-setting. Industry was more or less asked to implement the growing number of different policies concerning a single product all at one time, and in the worst case we had to deal with conflicting measures.

In the last few years we have been changing that approach. We try to initiate so-called "round table" discussions with industry and all the other network partners related to a product group, discussing all issues together on one agenda. With this integral approach, priority-setting is suddenly possible and conflicts can be avoided. Moreover, a complete overview of the environmental agenda for a product group may be given, based on products' total life cycle.

The agenda for specific product groups focuses, therefore, not only on aspects or substances, but more and more on the environmental impacts during the total life cycle.

Until now I have given you a general overview of product policy. To give an impression of how it works in practice, I will deal with the more specific elements of the Dutch policy towards products. I will focus on two cases: detergents and coatings.

The case of detergents

In relation to detergents, we developed (in addition to the above mentioned plans) a separate operational plan. The Dutch Environmental Ministry (VROM) and the Dutch Soap Association (NVZ) agreed in 1991 on a Voluntary Plan of Action (PoA) on Detergents and the Environment. In this PoA a systematic evaluation of the environmental consequences of all the ingredients of soaps and detergents was formulated. Since this action plan was accepted, a lot of work has been done. The implementation of this plan is the main issue on the agenda for the frequent (round table) meetings we have with the Soap Association and other related actors.

Other issues on the agenda are: conversion to compact products, product care, and monitoring. Besides these agenda issues, attention has been paid to certain separate ingredients which were being focused on internationally, and to eco-labelling and the EC biodegradation Directive for detergents.

Organisational and consultative structure

At the start of the PoA in 1991, the consultative structure was as follows.

1. *The steering committee on detergents* provided a forum for consultations between senior officials from NVZ and VROM. The Deputy Director-General for Environmental

Management attended most of the meetings. The committee discussed the main points of the programme and any problems arising during implementation.

2. *A project group on detergents* consisted of representatives from the Products and Risk Policy divisions of VROM, together with NVZ members (such as Henkel, Lever and Procter & Gamble) and its General Director. Other parties could be involved if required, including water quality management authorities and representatives of the National Institute of Public Health and Environmental Protection (RIVM).

3. *The expert consultative group on detergents and environment* consisted of experts, acting in a personal capacity, from various organisations. These included government authorities and representatives of industry, science and consumer organisations. This group could maintain the quality of the studies and also advise the project group.

In 1995, the Steering Committee on detergents was dissolved because of positive developments.

Results of PoA

About 50 different chemical substances are being used in varying combinations and amounts in detergent products, and a certain priority concerning which substances should first be looked at was needed. Based on a screening method that took into account aquatic toxicity as well as estimated exposure, a selection was made among these 50 substances. Four substances were selected (LAS, AE, AES and soap) as substances with the highest priority, for which an in-depth risk assessment has been performed for the Netherlands. These four substances belong to the group of detergents and are the most used within this group (together they form 80 per cent of the use of detergents). All toxicological data were critically reviewed by the industry and formed the base for an inventory of all ecotoxicological data. These data were evaluated by RIVM, and together with industry a Maximum Permissible Concentration (MPC) for surface water was derived for the four substances.

A joint monitoring programme was initiated, with the co-operation of the Institute for Inland Water Management and Wastewater, the University of Amsterdam, RIVM and the NVZ, to measure the concentrations of the four ingredients in influents and effluents. This programme was executed at seven representative municipal sewage treatment plants across the Netherlands.

The average removal for LAS, AE, AES and soap was predicted to be high (98-99 per cent) using the specified input model. The monitoring data confirm an effective removal/degradation of all major priority surfactants during sewage treatment of 99.1 to 99.8 per cent). The risk assessment for the selection of four substances was finished at the beginning of 1995.

The costs of the program were paid partly by the government but mainly by industry. Exact figures are not available.

The results of the investigation were that the concentrations of these major surfactants used in detergents are about 100 times less than the maximum permissible concentration (MPC) in surface water, this under the condition of adequately functioning municipal sewage systems. Detailed reports are available from the Dutch Environment Ministry. Based on the results of this assessment, it was decided that it was not necessary to reduce the load of these types of surfactants. Moreover, it was concluded that it would not be useful to assess the risks of other surfactants in the same way. Since the toxicity of the other surfactants would be comparable, and their use was much lower, it was expected that their concentrations would be more than 100 times less than their MPC values

However, the dialogue on detergents and the environment between VROM and the NVZ has continued. Other ingredients in addition to surfactants which need attention have been identified, and for these ingredients further actions are underway to assess their environmental risks and other issues have to be examined. And more items have to be worked on.

This brings us to the other issues on the Detergent Agenda.

Conversion to compact products

In the last few years compact household detergents, washing-up liquids, general purpose cleaners, etc. have been introduced into the Dutch market. In particular, the switch from traditional to compact heavy-duty household fabric detergents has been very successful (85 per cent change over). As a result, the total use of ingredients for domestic purposes diminished by more than 20 per cent. Moreover the amount of packaging waste has been substantially lowered.

A point of discussion with the NVZ at this time is a further conversion of the traditional powders for all fabric detergents and the dish-washing machine detergents.

Product care

Discussion has started with industry on how a Product Care System can be developed for detergents.

Monitoring

Every year the quantities of household detergent chemicals used in the Netherlands are monitored by industry. Based on this overview, extra measures which may be necessary can be discussed.

At an earlier stage (i.e. before the elaboration of the Plan of Action), the industry had already taken the initiative to eliminate phosphates and DTD-MAC from detergents, following consensus-orientated discussions with the Ministry. Essential in this approach is that time-consuming and sometimes frustrating discussions about regulatory instruments can be avoided, while targets are reached by voluntary actions.

The case of coatings

A similar approach (agenda-setting, joint policy development) is followed in the case of coatings. It should be mentioned that the coatings agenda focuses not only on aspects of substances, but also on different applications and other products related to coatings activities. The main issues on this agenda are:

- Volatile organic compounds (VOCs)

  In 1989, the KWS2000 policy plan was presented. This plan contains an integrated voluntary reduction strategy for VOCs. For coatings this includes all types of solvents.

- Heavy metals

  At the end of this year a policy statement on heavy metals will be presented. However, within the coatings group work is already in progress.

- Polycyclic aromatic hydrocarbons (PAHs)

  A policy statement on PAHs was published in 1994, aiming at a substantial reduction in the emissions of these substances.

- Waste
- Antifoulings
- Wood preservation
- Paint removal
- Product care

Besides the agenda issues, attention is paid to possible measures against the organic psycho syndrome, to eco-labelling, and to the question whether measures against alkylphenolethoxylate are necessary.

Organisational and consultative structure

A quarterly meeting between representatives of the national government and the coatings industry is the core of the organisational structure. The different agenda issues are discussed within this group and necessary actions are prepared. Other actors within the coatings network are invited when the issue also concerns their activities. Priority-setting takes place within this group. This "round table" was formally installed by high-level representatives from both government and industry. These representatives also take part in a steering committee which meets approximately once a year. The central group has the possibility to install ad hoc working groups for specific subjects. Consultation of representing organisations takes place frequently.

This brings us to the several issues:

VOCs

The necessity of VOC reduction in the paint sector, i.e. the reduction of solvent content, is well known. The aims of our national policy are rather ambitious – an almost complete change-over to low-solvent coatings: waterborne coatings, high-solid, solvent-free coatings, or powder coatings. There is no preference for either of these alternatives as long as the quality is sufficient.

There are several target groups: construction and building, consumers, the metal industry, the furniture industry, and car repair. Over the years it has been our experience that each sector needs not only its own approach, but also its specific package of instruments. We have identified the necessity of voluntary measures, permits, legislation (although only on a national scale difficult to realize), publicity, demonstration projects and international measures.

The implementation of this policy has been under way for several years now. Although several obstacles had to be removed, one could say that in most areas this approach is successful.

Heavy metals

The aims of the policy towards heavy metals are twofold: minimize substances (that is, the amount of specific metals used in paint) and minimize risks. The latter implies that it is sometimes necessary to switch from one metal to another, provided the latter is less harmful.

Heavy metals policy focuses on chromium, lead and zinc on one hand, and cadmium and mercury on the other. The last mentioned metals are no longer used in coatings, more or less as a

result of former policies on heavy metals. The remaining measures are the phase-out of lead oxide red, a substantial reduction of chromates, and the reduction of several minor compounds, which is often application-specific.

The Ministry expects that a voluntary reduction of these substances by paint manufacturers will be sufficient to reach the goal. An agreement on that must be possible in due time.

PAHs

Polycyclic aromatic hydrocarbons are nowadays an important issue on the international agenda. In the Netherlands the most substantial measure up till now is a ban on coal tar products. These products are used on inland ships and in conservation of objects. This ban was published only a few months ago and will be effective in mid 1997. The ban will be supported by a co-ordinated publicity campaign of government, manufacturers and applicators.

Although a national measure is almost operational, we have a preference for an international approach on this subject. The reason is simple: transport by water is more and more an international issue. Our national ban will only partly solve the problem of PAHs in inland waters.

During the discussion of this ban and the text of the Directive, we were confronted with another aspect of PAH content: several solvents used in paints are polluted with these substances, which means that there may be another problem to solve. At this time, however, this subject is still under study.

Waste

The waste problem in relation to coatings concentrates on three issues. First, there is the packaging. We signed a covenant with among others, the paint industry to reduce the amount of packaging waste gradually. For packaging already in use, there is still a discussion with paint manufacturers about the possibilities of collection of used tins from households.

In the industrial area we try, together with paint applicators, to reduce the amount of overspray of paint. There are several options under discussion: technical measures concerning spray pistols (designed for better efficiency), certification of spray painters, and recycling of oversprayed products.

Antifoulings

A very challenging subject is the use of antifoulings on inland ships, recreational boats and sea-going vessels. The aim is to ban both TBT coatings and copper coatings. The problem, however, is that for certain applications you cannot ban them both. For a sea-going vessel some kind of antifouling will be needed. The use of antifoulings on recreational boats, however, is another story. Those coatings are not necessarily needed, but... try to tell the boat owners. A ban is already operational on the use of TBT on boats smaller than 25 metres.

At this time the discussions focus on different studies on alternatives or cleaning methods instead of preventive coatings. It is obvious that there is a strong preference for an international approach.

Wood preservation

The aims in the area of wood preservation are minimization of the use of creosote, minimization of the content of specific substances in preservative products (such as arsenic and copper), and a ban on brushing creosote. In particular in this field, complex negotiations are going

on. Obviously there are many conflicting interests. However, consensus remains the main principle for the elaboration of solutions.

Paint removal

Some paint removal products contain a high percentage of methylene chloride. The discussions focus on either a strong reduction of the content of this compound in removal products or substitution by other solvents or other products. Here also there seem to be several conflicting interests.

Developments in product care

I promised you to come back to the latest developments in product care. Very recently the Ministry of Environment in the Netherlands has established a programme including a financial mechanism in order to encourage and enable companies and branch organisations to introduce environmental product care systems as a management tool within their respective management systems.

This mechanism provides financial support for the establishment of environmental product care systems. One of the main targets for introducing this financial mechanism is to encourage a minimalization of the environmental impact of products in every phase of their life cycle, i.e. "from the cradle to the grave". In order to assist companies achieve this policy target, the management tool of environmental product care systems could be extremely helpful for the implementation of a continuous process of improving the environmental performance of products.

Environmental product care systems can be seen as an elaboration and an addition to the nowadays rapidly introduced environmental management systems based on the European Eco Management Audit Scheme (EMAS), British Standard 7750, or similar standards. Because of their compatibility with these standards, product care systems form an addition in the sense that environmental management systems are mainly based on the environmental impact of (production) processes, whilst environmental product care specifically aims at the environmental performance of products themselves. Self-evidently these care systems ought to be based on the principles of integral chain management.

As mentioned before, the Netherlands Ministry of Environment only recently started its environmental product care programme. At this time not much can be said about the results. However, the programme is an important part of the Netherlands' environmental policy, as a consequence of which we have high expectations regarding its results

International dimension

I will end this overview of products and environment in the Netherlands across the borders. Many products are a subject of international trade. Fortunately, we can notice that growing international attention – direct or indirect – is being paid to products.

There are several international strategies of importance for both product groups mentioned here. For example, for coatings there is the UN-ECE Protocol on VOC, which contains some paragraphs on coatings. The EC Directive on solvents contains many paragraphs on coatings. And the proposal of the European Paintmakers Association (CEPE) on solvent reduction contains all paragraphs on coatings. Furthermore, there is international work in progress, including UN-ECE Protocols on Heavy Metals and Persistent Organic Pollutants (e.g. PAHs). Standards for an eco-label for paints have also been developed.

With reference to detergents, it should be mentioned that descriptions and results of the approach in the Netherlands have been submitted to manufactures in other countries and that international organisations such as Osparcom are taking additional initiatives.

Yet more international co-operation is needed. Let us hope this international workshop will bring us a few steps forward.

The Design for the Environment Printed Wiring Board Project: Risk Reduction Through Voluntary Partnerships

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Project objective and scope

Printed wiring boards (PWBs) are the platforms upon which electronic components (e.g. resistors, capacitors and microchips) are mounted and interconnected. The electronics, automotive, defense, information processing and communication industries are all heavily dependent on the efficient production of PWBs for use in their equipment. The U.S. PWB manufacturers' global market share decreased during the 1980s, in part due to environmental costs (e.g. waste disposal, regulatory compliance). This fact, and the desire to reduce potential public health and environmental risks, motivated the U.S. PWB industry to look for risk reduction and pollution prevention opportunities.

The vast majority (90 per cent) of independent U.S. PWB manufacturers have annual sales under $10 million dollars and employ less than 100 people. Therefore, they are unable to independently (or through trade associations) develop the data necessary to identify alternative materials, processes and technologies, to and evaluate their human health and environmental risk, performance and cost. Through the Design for the Environment (DfE) PWB Project, the U.S. PWB industry is working in a voluntary partnership with the U.S. Environmental Protection Agency (EPA), PWB trade associations, research and academic organizations, other governmental agencies, and public interest groups (non-governmental organizations, or NGOs) to identify and evaluate cleaner technologies for use in manufacturing PWBs. EPA's overall objective is to effect behavior change to improve the environmental performance and economic strength of the U.S. PWB industry.

Several alternative technologies for manufacturing PWBs are being evaluated in the DfE PWB Project. In comparison to the standard technology that they are designed to replace, these alternative technologies are expected to generate less hazardous waste, use less water and energy, reduce the use of some toxic chemicals (e.g. acids), and eliminate the use of other chemicals (e.g. formaldehyde). Data on human health and environmental risk, performance, and cost of the alternative technologies are being generated and will be compiled into a Cleaner Technologies Substitutes Assessment (CTSA) document. The CTSA and other information products developed during the project – an industry and use cluster profile, a pollution prevention and control technology survey report, a summary of environmental regulations, and pollution prevention case studies – will

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then be disseminated to the PWB industry to encourage implementation of the cleaner technologies and other pollution prevention options. All documents have been or will be developed in a relatively short time frame (two years or less) and will allow individual PWB manufacturers to make environmentally informed choices based on data reviewed by EPA, their industry peers, and other interested parties (e.g. environmental organizations).

EPA's Design for the Environment Program

The advent of pollution prevention philosophy has caused many companies to "design for the environment": to direct their environmental efforts earlier in the production cycle – from clean-up and control technologies to better management of manufacturing processes, source reduction, reuse, and ultimately to the very design and redesign of their products. Decisions made at the design or redesign stage affect a product's impact on worker and consumer safety, the risks and releases to human health and the environment, and the characteristics of the product's waste stream.

The term "design for the environment" (DfE) is most commonly viewed as an adaptation of the "design for X" concept, where "X" represents a desired product characteristic (e.g. safety, durability) that is integrated as a goal into the design process. In DfE initiatives, environmental considerations, as well as cost and performance, become an integral part of the design or redesign of a product.

Under the authority of the Pollution Prevention Act of 1990, EPA created the Design for the Environment Program to build on the DfE concept pioneered by industry. In this program, EPA encourages businesses to incorporate environmental considerations into the design and redesign of products, processes, and technical and management systems. One way in which EPA accomplishes this goal is by forming voluntary partnerships with particular industry sectors to develop the information and tools needed to make environmentally informed choices. EPA's DfE Program also includes broad institutional projects aimed at changing general business practices, which include the following:

- working with the National Science Foundation to encourage academic research into alternative methods for producing chemicals that minimize or eliminate the use or generation of toxic substances (the "Green Chemistry" program);
- working with the private sector to develop accounting tools that will incorporate environmental costs and benefits into accounting and capital budgeting practices ("total cost accounting");
- working with the insurance industry to incorporate pollution prevention principles into the underwriting and risk management decision-making process;
- working with the financial community to make it easier for companies to finance pollution prevention initiatives; and
- establishing a National Pollution Prevention Center at the University of Michigan and developing curricula that incorporate pollution prevention, life cycle analysis, and DfE principles into a variety of disciplines, including business, engineering, accounting and marketing.

In DfE projects with businesses, trade associations, and other stakeholders in specific industry segments, EPA helps the industry gather and develop the information and tools necessary to evaluate available or emerging alternative chemicals, processes and technologies by taking advantage of EPA's risk management methods and expertise. In addition, the DfE Program may provide other incentives for industry participation, including funding to develop and analyze critical information,

demonstrate alternative processes and technologies, and communicate information to individual companies and other interested parties regarding cleaner alternatives. The DfE Program is currently working with stakeholders in the printing, dry cleaning, and metal finishing industries, as well as the PWB industry.

Advantages of the DfE approach

The DfE Program's approach to environmental protection differs from the traditional "command and control" regulatory approach in several ways. First, it addresses the environmental challenges of an industry sector as a whole (i.e. all chemicals associated with a process or technology) rather than evaluating the risks of one chemical that may be used in a variety of ways in several different industry sectors. The DfE approach also evaluates the potential risks of *substitute* chemicals, processes or technologies. In contrast to the media- specific approach mandated by traditional environmental statutes, the DfE approach assesses releases and impacts on all environmental media. Also, the DfE Program promotes source reduction and cleaner technologies rather than pollution control technology or other methods to achieve environmental protection.

Another advantage of the DfE approach is that it leverages the limited resources of small to medium-sized businesses. For example, funds provided by EPA for the PWB Project have been augmented by significant in-kind contributions from the PWB industry in time, materials and labor. Together, these resources have filled a critical gap in funding for research to promote environmental improvement in the industry. This type of approach also produces useful data in a relatively short time frame, in part due to the project management resources provided by EPA. There are many indirect benefits of this type of partnership approach, as well, including a change in industry's perception of EPA and an increased industry awareness of pollution prevention.

A voluntary and co-operative approach to environmental protection is particularly effective in situations where a "one size fits all" regulatory approach is not appropriate. For example, the technologies being evaluated in the DfE PWB Project are inherently different from one another, and each has advantages and disadvantages. Therefore, many factors will determine which, if any, of the cleaner technologies can be successfully implemented at a particular facility (e.g. existing equipment and layout, desired operating conditions, types of boards being produced and their end use application, available capital). The DfE approach allows each manufacturer to use the technical data generated in the project to make informed decisions that include consideration of the potential public health and environmental impacts (and performance and costs) of available processes and technologies.

Conducting a successful DfE project

The first step in conducting a DfE project is to identify an industry that presents a significant opportunity for risk reduction and that is motivated to address its environmental issues. The government agency or agencies considering such a project must also be receptive to working with the industry in a voluntary and co-operative fashion. The idea to conduct the DfE PWB Project grew out of an April 1993 study by the research consortium Microelectronics and Computer Technology Corporation (MCC), entitled "Life Cycle Assessment of a Computer Workstation." In this study EPA, the U.S. Department of Energy, and industry partners such as SEMATECH found that the production of PWBs uses toxic chemicals that pose potential risks to human health and the environment, generates significant quantities of hazardous waste, and uses significant amounts of water and energy. These findings indicated a significant opportunity for risk reduction in the industry.

From an industry perspective, a company's ability to address its environmental challenges and reduce costs can mean the difference between ultimate success or failure in the current competitive trade environment. Increasingly, companies are finding that source reduction and the use of cleaner technologies result in substantial cost savings in terms of materials, regulatory compliance, and liability. In addition, performance, productivity, and even marketability are often enhanced by implementing cleaner processes and technologies. These factors motivate industries to form partnerships with EPA's DfE Program.

Before beginning a DfE project, it is important to identify key stakeholder groups and organizations and to recruit individuals within those organization who are willing and able to commit the time necessary to complete such a project. In the PWB Project, EPA is working with individual PWB manufacturers and technology suppliers, national and regional trade associations (e.g. Institute for Interconnecting and Packaging Electronic Circuits), research and academic institutions, EPA Region and state government officials, and public interest groups. The dedication and commitment of the participating individuals from these organizations have been a key factor in achieving the successes of the project to date. It is also important that the people designated to lead the project have the time and resources needed to keep all project activities moving forward.

One issue that may need to be addressed in a DfE project is confidential business information. For example, it may be necessary to obtain such information in order to compare the relative risk of various technologies. In the PWB project, it has taken nearly a year to develop and sign final confidentiality agreements between the technology suppliers and the organization conducting the technical work (an academic institution), in order to obtain information on the identity and concentration of proprietary chemicals in the process baths. Clearly, it is best to begin discussing confidentiality issues as early in the project as possible.

Another issue that may arise in this type of voluntary partnership project is the credibility and validity of the data produced by the project. In the PWB project, we addressed this issue in several ways. For example, the performance demonstration was designed by a workgroup that included technology suppliers, PWB manufacturers, trade association representatives, EPA staff, and other interested parties, to ensure that the resulting data would be useful and credible to the target audience (PWB manufacturers). Also, we worked closely with the technical committees of the U.S. PWB trade association (IPC) that are interested in the technologies we evaluated, and we presented and discussed the performance demonstration results at the recent national meeting of the IPC. Another way in which we increase the credibility of our project information is to distribute all draft documents (or sections of documents) to each stakeholder group for review as early as possible, before publishing the documents in final form.

PWB project activities

There are several types of work that contribute to effecting behavior change in an industry and reducing risk: gathering and generating technical data, communicating project and technical information to interested parties, and activities designed to promote implementation of cleaner technologies. To accomplish this work, DfE PWB Project volunteers were recruited to form three working groups (Technical, Communication, and Implementation Workgroups), and a small group of representatives from each of these groups was designated to serve as a "Core Group" or Steering Committee. The Core Group makes all major project decisions, including which processes and technologies to evaluate in the technical work, and individual members help obtain the information and expertise necessary to complete the project's work. The PWB Project Core Group also holds monthly conference calls to review the project's progress and address any issues that arise. Specific activities of each of the PWB Project Workgroups are described below.

Technical studies

In late 1994, the DfE PWB Project Technical Workgroup mapped out the major steps in PWB fabrication and chose four major functional areas – each of which includes several process steps – for further evaluation. The areas chosen for evaluation were: inner layer etching and plating, outer layer etching and plating, hot air solder leveling, and making drilled through-holes conductive. The Workgroup then identified the chemicals used in existing and emerging technology alternatives for each of the functional areas, and conducted a preliminary assessment of potential human health and environmental risks and pollution prevention opportunities associated with each area, by using EPA's Use Cluster Scoring System.[3]

Based on the use cluster scoring results and an analysis of the availability of viable technology alternatives, the DfE Project Core Group selected the "making drilled through-holes conductive" step for detailed analysis in a Cleaner Technologies Substitutes Assessment (CTSA). The CTSA report, which is being developed by the University of Tennessee's Center for Clean Products and Clean Technologies, will contain information not only about the potential health and environmental impacts (e.g. releases to the environment, hazardous waste generation, water and energy use, and comparative risk) of existing and emerging alternative technologies, but also about their cost and performance. The information in the CTSA and other project documents will allow PWB industry decision-makers to evaluate their existing processes and practices and identify cost-effective technologies that reduce risk and perform well. The PWB CTSA is expected to be completed by early 1997.

To demonstrate the effectiveness of available alternatives to the standard electroless copper technology, performance demonstrations were carried out for seven technology categories at a total of 26 sites, including several in Germany and France. The sites were identified by the technology vendors as ones that had successfully implemented the alternative technologies, and the companies were recruited by EPA and other project participants for voluntary participation in the demonstration. A standard PWB was designed by the Technical Workgroup, and multiple boards were produced at one site. Three boards were then sent to each of the 26 sites, where they were processed through the alternative technology lines. The boards were sent to one site to complete the final manufacturing steps, and then were tested for electrical and mechanical reliability. The results have demonstrated that, when implemented correctly, the alternative technologies perform as well as or better than the current electroless copper technology.

An analysis of the costs and cost savings associated with each alternative technology will also be conducted and included in the CTSA. The analysis will include information on the costs of installing the technologies (i.e. materials, equipment, labor), as well as information about the costs and savings associated with using the technologies on a day-to-day basis (i.e. water and energy use, materials, maintenance and labor). Individual PWB manufacturers may then use this information to assess the costs and benefits of the different technologies, based on their specific situations.

In addition to the CTSA, PWB project participants have developed a number of other useful documents for the PWB industry. The *Printed Wiring Board Industry and Use Cluster Profile* (EPA 744-R-95-005; September 1995) contains information about the current economic status of the PWB industry and the current methods by which PWBs are manufactured. It describes industry demographics, the types of products produced, the size of the market, trends in international trade, and other industry characteristics. It also describes the basic steps in PWB manufacturing and alternative technologies currently in use for each of the major process steps.

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[3] A "use cluster" is a group of materials, processes or technologies that may substitute for one another to perform the same function.

A survey of pollution prevention and control technology was conducted by industry participants. The survey report (*Printed Wiring Board Pollution Prevention and Control: Analysis of Survey Results*; EPA 744-R-95-006; September 1995) contains an in-depth analysis of the pollution prevention technologies currently being used in the industry and data on chemical use, waste reductions, and the amount of savings that has resulted from implementing the technologies. EPA also developed a document to help the PWB industry assess the regulatory implications of process and technology changes: *Federal Environmental Regulations Affecting the Electronics Industry* (EPA 744-B-95-001; September 1995).

Communication efforts

Throughout the project, EPA and the project stakeholders have conducted outreach activities to promote awareness of the project and to generate interest in the project's technical and information products. Project stakeholders have given presentations at PWB trade shows, written articles for the PWB trade press, distributed DfE information products at booth exhibits, created project fact sheets, and are currently creating a World Wide Web site for the project[4] . In addition, a Communication Workgroup was formed and has developed several pollution prevention case studies[5]. The case studies provide practical information on substitute materials, processes, technologies, or work practices that result in risk reduction. The case studies are based on the experiences of PWB manufacturers who have successfully implemented pollution prevention initiatives at their facilities. Later case studies will be based on information contained in the CTSA.

Implementation activities

The Project's Implementation Workgroup was established to provide assistance and to encourage individual PWB manufacturers to consider implementing the cleaner technologies identified in the CTSA. Specific activities of the Workgroup include the following:

- developing a World Wide Web site that will contain all documents generated by the project, and that will link to other related EPA and industry sites;
- developing training and informational materials that complement the CTSA;
- conducting seminars for PWB manufacturers and community and local government representatives to present information generated in the project; and

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[4] HTTP://WWW.IPC.ORG/HTML/EHSTYPES.HTM#DESIGN

[5] The following case studies can be obtained from:
Pollution Prevention Information Clearinghouse
U.S. Environmental Protection Agency
401 M Street (7409) Tel: (202) 260-1023
Washington, DC 20460 Fax: (202) 260-0178
e-mail: PPIC@epamail.epa.gov
URL: http://es.inel.gov/p2pubs/ppic/ppic.html
Case Study #1 EPA 744-F-95-004 Pollution Prevention Work Practices
Case Study #2 EPA 744-F-95-005 On-Site Etchant Regeneration
Case Study #3 EPA 744-F-95-009 Opportunities for Acid Recovery and Management
Case Study #4 EPA 744-F-96-003 Plasma Desmear: A Case Study
Case Study #5 EPA 744-F-96-024 A Continous-Flow System for Reusing Microetchant
Case Study #6 EPA 744-F-97-006 Pollution Prevention Beyond Regulated Materials
EPA-R-97-001 Implementing Cleaner Technologies in the Printed Wiring Board Industry Making Holes Conductive

- involving local community and government organizations in the project, by establishing working relationships with organizations in key geographical regions (e.g. those cities in which seminars will be conducted) and developing informational materials about the project in order to educate and motivate those organizations to participate in the seminars.

Another tool that will assist PWB manufacturers to implement cleaner technologies is total cost assessment (TCA) software. TCA software is being developed specifically for the PWB industry by Tellus Institute, through funding from the National Institute for Standards and Technology (NIST). The software will help companies analyze the expected financial benefits of switching to a cleaner technology.

Benefits of the project to the PWB industry

Participating in the DfE PWB Project provides many benefits to the PWB industry. For example, the information that results from the project will help companies proactively manage their environmental affairs, reduce the potential health and environmental impacts of their businesses, reduce material and regulatory compliance costs, and reduce liabilities, all of which serve to increase competitiveness. In particular, the industry will benefit from the results of research on alternative technology risk, performance, and cost that was conducted by neutral parties (EPA and the University of Tennessee), rather than by those with a vested interest in the research results (e.g. technology vendors). The industry will also benefit from EPA's risk assessment expertise and from access to unpublished data at the Agency. In addition, EPA provides full-time project leadership, which facilitates the generation of critical data in a relatively short time frame. The PWB industry's participation in the DfE PWB Project will ultimately benefit not only the industry, through risk reduction and cost savings, but also public health and the environment.

Measuring project success

Currently, approximately 15 per cent of PWB manufacturers use the cleaner technologies being evaluated in the DfE PWB Project. Our project goal is to significantly increase this percentage. Project success may therefore be measured by determining how many PWB manufacturers have implemented the cleaner technologies. This information can be obtained by conducting an industry survey and through vendor sales data. Additional pollution prevention information (e.g. case studies, pollution prevention technology report) has been developed and disseminated by project participants to encourage adoption of various pollution prevention techniques. The success of this effort can be measured by the number of documents distributed, and by obtaining feedback through industry surveys and direct contact with industry representatives (e.g. at industry conferences).

Application to other countries, industries and organizations

DfE-type projects present an opportunity for industry, government, and NGO representatives from OECD Member countries to evaluate and implement cleaner technologies within a particular industry on a global scale. For example, such a project could be led by a group of representatives from several national industry trade associations. The results of such projects would benefit not only public health and the environment, but also the economic strength of the participating industry.

For additional information

For further information about the DfE Program or the DfE Printed Wiring Board Project, contact:

Pollution Prevention Information Clearinghouse (PPIC)
U.S. Environmental Protection Agency
401 M St., S.W. (3404)
Washington, D.C. 20460
Tel: (1) 202-260-1023
Fax: (1) 202-260-0178
e-mail: ppic@epamail.epa.gov

PANEL 4: OTHER APPROACHES

Trail Community Lead Task Force (Canada): "A Co-operative Approach to Community Risk Management"

Steven R. Hilts and Terry L. Oke

Trail Lead Program
Trail, British Columbia, Canada

Background

Trail, British Columbia, Canada has been the site of a large lead/zinc smelter since 1916. In 1990, the Trail Community Lead Task Force was established and given responsibility for developing a strategy to reduce children's blood lead levels. With funding from the provincial government, the smelting company and the municipal government, the Task Force began to carry out blood lead screening, case management, community education, exposure pathways modelling and remediation trials. The decline in children's blood lead levels appeared to accelerate following the implementation of these programs. The average blood lead levels in Trail children aged 6-60 months fell 16 per cent from the fall of 1991 to the fall of 1992, whereas for the previous 16 years the average annual decline had been about 4 per cent. From 1991 to 1995, the percentage of children with elevated blood lead levels (≥15 µg/dl) has fallen from 42 per cent to 21 per cent. Throughout the six-year history of the Task Force, its members have demonstrated a strong sense of common purpose and have worked co-operatively to reach consensus on most issues.

Proposed Panel Participants

His Worship, A. Sandy Santori (Presenter)
Chair, Trail Community Lead Task Force
Mayor, City of Trail

Dr. Nelson Ames
Trail Community Lead Task Force Member
Medical Health Officer, BC Ministry of Health

Mr. Graham Kenyon
Trail Community Lead Task Force Member
Manager, Environment and Health, Cominco Ltd.

Mr. Barry Wood
Trail Community Lead Task Force Member
Head, Municipal Section, BC Ministry of Environment

Objective, stimulus and scope of the program

Trail, British Columbia has been the site of a major lead and zinc smelting facility since the turn of the century. In 1975, a study found that children's blood lead levels in Trail were significantly higher than those in the nearby comparison community of Nelson, but within the Canadian standard of 40 µg/dl at that time. A further study in 1989, prompted by Cominco Ltd. and carried out by a University of British Columbia research team, found that the average blood lead level had declined from 22.4 µg/dl for 1-3 year olds in 1975 to 13.1 µg/dl for 2-5 year olds. Although still within Canadian health standards, 39.4 per cent of the children tested in 1989 were above the US Environmental Protection Agency's level of concern of 15 µg/dl.

The 1989 study prompted the formation of the Trail Lead Study Liaison Committee. The study authors recommended that the Committee focus its environmental assessment efforts on tracking lead in soil to its origins, investigating bioavailability factors, and intensively mapping the depth and consistency of soil leads. The study also advised that a comprehensive awareness and education campaign be implemented, but cautioned that massive soil removal might not be an effective remedial measure until after smelter emissions had been controlled.

A program strategy was prepared by the Liaison Committee and peer reviewed. During this time the Trail Lead Study Liaison Committee was expanded into a 16-member volunteer organization and renamed the Trail Community Lead Task Force. The BC Ministry of Environment gave the Task Force the mandate of developing a strategy for reducing the lead exposure of children in Trail. The challenge facing the Task Force was to produce a strategy to help the smelter and community to co-exist by focusing on actions that would be ongoing and acceptable in a community with a continuing polluting source.

The Task Force followed the recommendations resulting from the program reviews and initiated ambitious community education and case management programs. This approach ensured that interventions to reduce lead exposure were operating simultaneously with the required environmental assessments necessary for a better understanding of lead exposure pathways. The philosophy adopted by the Task Force was that environmental remediation should not be conducted without evidence that it would be effective in reducing the blood lead levels of children in Trail. Remediation options would be considered in light of new information on exposure pathways and then tested for effectiveness.

By mid-1991 it was already apparent that it would take several years before the exposure pathway assessment and other environmental groundwork could be completed. At the same time, members of the Task Force and Lead Program staff began to receive feedback that the community wanted something done to improve environmental conditions. The Task Force felt that a number of environmental interventions which could be implemented at relatively low cost should be initiated. In particular, there was wide support for a program to "green" public areas accessible to children by planting grass and shrubs. The premise was that covering areas of bare, high-lead soil with vegetation would reduce children's contact with the soil and decrease movement of dust by wind. A number of dust control projects were employed, many in co-operation with the Rotary Club of Trail. Some of the projects included dust control in unpaved alleys, street cleaning, and provision of seed and fertilizer to householders. In the meantime, information from these projects and studies was being compiled to assist with the development of a remedial plan.

These and other projects have allowed the Task Force to produce a series of reports on its work in Trail. The reports will provide the basis for development of a remedial plan, which will be recommended to the Ministry of Environment for approval. Cominco recently began construction of a new lead smelter using state-of-the-art Kivcet technology. Completion of the new smelter in late 1996 is expected to reduce lead emissions by about 80 per cent. It is anticipated that the remedial

plan developed for Trail will include various options, depending on the new plant's impact on environmental conditions and blood lead levels. Although Task Force membership includes six community representatives, plus two City of Trail representatives, a broader community consultation process involving the use of focus groups, surveys and/or public meetings will be developed to ensure that the final remedial plan meets with public expectations and requirements.

Function and structure of the task force

The Trail Community Lead Task Force is currently composed of a representative from each of the four funding agencies (BC Ministry of Environment, BC Ministry of Health, Cominco Ltd. and the City of Trail), various community organizations and interested parents who serve as community representatives. The Task Force now meets bi-monthly to receive reports from staff, discuss issues and make decisions. These meetings are open to the public and are usually covered by the local newspaper and radio. Task Force members have shown a spirit of co-operation on most issues which has enabled the Task Force to reach decisions by consensus.

The formal long-term goal of the Task Force is to reach an acceptable level of (blood) lead exposure risk for the sensitive populations in Trail and vicinity. A short-term goal was accepted following the annual fall clinic in 1995 which states that at least 90 per cent of children will have blood lead levels below 15 µg/dl by 1998. These goals fit in with current recommendations by Health Canada that the proportion of children with blood lead levels >10 µg/dl should not be more than double that of the general population. Approximately 5 per cent of Canadian children currently have blood lead levels >10 µg/dl. Therefore, the long-term goal will have to be at least 90 per cent <10 µg/dl.

There are three sub-committees to the Task Force: an Education Committee to promote community awareness, develop communication initiatives, and oversee the education program; a Finance Committee to ensure financial accountability to the agencies funding the Task Force programs; and a Technical Committee to develop a scientifically based program to provide the Task Force with the information it requires to make informed, cost-effective decisions. As with the Task Force, members of these committees are volunteers.

The Task Force is supported by a small staff, including technical, environmental, health and communications personnel who work as a team to conduct the blood screening clinics and intervention programs, to carry out pilot projects to test exposure reduction options, and to conduct the various studies and periodic sampling programs that will be compiled into the final remediation report. The staff also provides the direct day-to-day link between the Task Force and the community, and thus serves as an important communications "sounding board" that has been a key component in the effectiveness of the program.

The Task Force is funded through a cost-sharing arrangement between the funding agencies which has been accepted by the community and which is viewed as an essential aspect of the Task Force program. The funding formula in place has been 30 per cent from each of the two ministries, 30 per cent from Cominco Ltd., and 10 per cent from the City of Trail. However, as the Task Force draws closer to its proposed completion in the year 2000, the provincial government is pressing to change the funding formula so that Cominco will increase its portion of contributions. It should be noted that recently enacted legislation will require that parties responsible for contaminating sites pay the full costs of remediation. Some community members fear that the constructive relationship that has existed may be jeopardized if the company is required to pay for all remedial programs.

In addition to financial contributions, the provincial government and Cominco provide technical resource people with health, environment and public relations backgrounds to participate in program planning. Cominco has made independent efforts to educate their workers and the

community, and find themselves in the somewhat unusual position of having to convince some citizens that lead contamination is a health concern which should be dealt with.

Participation in the annual fall screening clinics has been strong. Of children identified between the ages of 6 months and 6 years, 78 per cent attend the voluntary clinics. This support has enabled the Task Force to gather firm data on blood lead trends, identify children with elevated blood lead levels, and individually counsel these children and their families through a comprehensive case management program.

Costs and advantages of this approach

In 1991 the Task Force estimated the cost of residential soil replacement in Trail proper at over $55 million. This was the commonly accepted practice for remediation at that time, but the Task Force had been advised to proceed cautiously with remediation. A number of issues surfaced in addition to the financial deterrent and questions of efficacy, including the concern that excavation and soil transport might result in a transient increase in lead exposure. Soil replacement is still a remedial option, but will be examined in light of other options and new information.

To date the Task Force has spent $2,562,601 on program elements, with another $1,773,300 projected for completion of the Task Force program to the year 2000. It must be noted that these costs do not include remediation (other than trials of ground cover and dust control measures). This makes it difficult to compare the Trail program with those of other communities which have continuing polluting sources, as programs at other sites of a similar nature include remediation as a component of their program. As the remedial plan for Trail has not yet been determined, there are no effective means by which to project the cost for remediation.

However, two Australian communities with aggressive lead programs can be utilized as examples of the total cost for a similar program, including remediation. Port Pirie, South Australia, is a community with an active lead smelter. The state-run lead program has received two grants from the South Australian Health Commission for community education, case management, environmental studies and remediation for $30 and $10 million respectively. A new lead program is being initiated in Broken Hill, New South Wales. Broken Hill is an active mine site which has received a government grant of $3.4 million for a two-year study and has recently requested a further grant of $9.9 million for a five-year program.

A local example of risk management would be the Pacific Place site located at False Creek, Vancouver, British Columbia. This relatively small site was contaminated by a number of different substances and sources and has been managed by the BC Ministry of Environment. Remediation of the final parcel is just being completed for a total project cost of roughly $80 million.

It is premature to state that the multi-stakeholder approach is a cost-effective method for risk management at this time. However, it is expected that the balance of viewpoints involving the government, the company and the community itself will achieve an appropriate risk management strategy that all can accept. This contrasts with alternative, regulatory-driven approaches, where rigid requirements and a focus on apportioning blame has resulted in a wasteful diversion of funds and an adversarial climate. In Trail, all the parties have been involved in designing and funding the studies, resulting in an environment where all the stakeholders are in agreement and support the outcome. This has not only saved on the physical costs of duplicated studies, but has prevented the unnecessary expenditure of funds in costly legal battles.

Legal framework

It should be noted that the Task Force is not a regulatory body. When created under the auspices of the BC Ministry of Environment, the Task Force was given the mandate to reduce children's lead exposure through the development of the remedial plan. The Task Force has no legally enforceable authority to create or monitor regulations regarding operations at the Cominco site.

When the remedial plan is completed, it will be submitted to the Minister of the Environment for British Columbia. Based on acceptance of the plan, the BC Ministry of Environment will oversee the remedial activities that take place in Trail. All other Cominco processes will continue to operate under permits currently in place and those negotiated between the two parties in the future.

Regulations have recently been developed to deal with contaminated sites in British Columbia, but the scope of the program in Trail, and the physical size of the area, cause a dilemma as to how those regulations and the prescribed numerical standards should be interpreted and applied. Provision has been made for "Wide Area Remediation Plans" to accommodate the Trail situation, with increased emphasis on health outcomes and risk assessment rather than rigid compliance with risk contaminant standards. The intent is to provide some flexibility for the community to determine an acceptable level of risk, while also meeting the government's mandate to protect public health.

Measurement of success

It was recognized in the early stages of the program that the success of any single community action would not be measurable by impact on blood lead levels. Rather, the combined actions would be assessed by their collective ability to reduce exposure and thereby decrease blood lead levels. The Task Force accepted that individual projects would help to educate and involve the community, and that they would be individually evaluated in terms of practicability in Trail, rather than in terms of impact on blood lead.

Clearly, if the Task Force had insisted on quantifying the effect each remedial action would have on blood lead levels before implementing it, several of the valuable programs would never have been initiated. The fact that childhood lead intake is derived from many sources and occurs via numerous pathways makes it extremely difficult to prove an impact on blood lead due to individual remedial actions such as soil abatement or house cleaning.

The exposure pathway modelling exercise from data collected in 1992 indicated which remedial measures are most likely to be effective in breaking the primary pathways of exposure. But until physical remediation occurs, intervention will continue to focus on education, case management and environmental efforts that will reduce children's exposure to mobile dusts. Education messages aimed at hygiene and habits can be effective if personal contact is made with families at risk. Dust control measures such as house cleaning and ground cover improvement have proved effective when used in combination with family education.

Successes and disappointments

The entire package of education, case management and intervention can be evaluated in terms of annual declines in Trail blood leads, relative to global background declines and the historical rate of decline, and by achieving the short-term goal in 1998. As mentioned previously, community blood lead levels for children aged 1-5 fell from 13.5 µg/dl in 1991 to 10.4 µg/dl in the fall of 1995.

This decline is statistically significant and greater than both the historical rate of decline and the global background decline of approximately 4 per cent/year. Results from the fall clinic in 1995 indicated that at that time 79 per cent of the children had blood lead levels below 15 µg/dl, which indicates that the short-term goal of at least 90 per cent of children below 15 µg/dl by 1998 should be achievable.

These reductions have been achieved during a period of limited environmental interventions. Although a number of dust control projects have been initiated within the community, the lead smelter currently relies on outdated process technology and, despite efforts to control stack emissions, the amount of lead discharged to the environment is about 350 kg/day. Smelter emissions, and therefore soil contamination rates, are expected to continue at these rates until the new smelter construction is completed and the Kivcet smelter is fully on line. The current rate of contamination has deferred a number of environmental programs until after the new smelter is operating.

An independent education survey was conducted in 1993 during the annual fall clinic, with the primary objective to determine levels of parental satisfaction with the Lead Education Program. Over 76 per cent of parents rated the overall information received from the Task Force from good to excellent. A further 79.9 per cent stated the level of service rated from good to excellent, with 92.3 per cent responding that the lead education program had increased their awareness about lead and its effects on health. This increase in awareness produced a change in attitude towards lead in 83.7 per cent of the parents, with a slightly lower response of 82.4 per cent who indicated there had been a change in behaviour!

As success has been shown in reducing community blood lead levels, public participation in Task Force meetings has waned. In earlier years, a reasonable turnout could be expected for the meetings when the fall clinic results were presented. During the last couple of years, there have been only a few members of the public present. It is not unusual for there to be no representation from the public at the regularly scheduled bi-monthly meetings. This is not from a lack of effort on behalf of the Task Force, or lack of support from the members of the Task Force. One explanation for this trend is the dissemination of information through the local media.

One of the unexpected benefits was the voluntary work that has been undertaken on-site by Cominco Ltd. Their support of this process and desire to reduce community exposure has resulted in the initiation of a number of dust reduction and elimination programs to control fugitive emissions. There has also been a significant regeneration of vegetative cover in the surrounding area since SO_2 controls were initiated in the 1930s, resulting from an International Joint Commission ruling with Washington State. This regeneration is the result of both natural growth and aggressive planting and fertilizing programs.

When the Task Force program was initiated in 1990, the expectation of all parties was that the program would be in existence for no more than five years. Cominco had just completed the construction of a new lead smelter to replace the old technology and emissions were expected to drop dramatically. Unfortunately the new technology failed, which was a huge disappointment for the community and a major setback for the lead program. The old smelter was restarted. while plans were implemented to build yet another new smelter using a different technology. This operation will start up at the end of this year. This disappointment set the program back six years, as it was recognized that remediation would not be practical given the current rate of contamination.

Representation of stakeholders

The Task Force has maintained a careful balance of representation from interested parties. During the formation of the Task Force it was recognized that community perception would ultimately determine the credibility of the Task Force. Therefore, each of the funding agencies has only one representative on the Task Force, with the exception of the City of Trail, which has two, since the Mayor of the City of Trail is also appointed as Chair of the Task Force.

Community organizations involved in aspects of the community relevant to the health and education of young children sit on the Task Force, e.g. the local school district and local physicians. Local groups with environmental concerns are represented on the Task Force, as are a number of parents, who help ensure that Task Force programs remain focused on young children. This combination of diverse interests and opinions has given the Task Force the ability to consider issues from a wide variety of viewpoints before making their decisions.

Suggestions for other interested organizations

Although it is too early to tell if the Task Force will be successful in reducing blood lead levels to an "acceptable" level, the indications are that these goals will be achieved and that the process itself has been successful. The process is centred around the belief that the community has the right to make informed decisions regarding its own outcome. There is no doubt that, when concerned with the welfare of its young, society will lean towards conservative and preventative measures. It is also suggested that communities will probably have a broader and more balanced perspective on the various factors that affect the quality of life, which is an important consideration in communities that have co-existed with industry for a long period of time.

It is absolutely imperative that the community be kept informed with relevant and timely information. Without a good understanding of the full and realistic extent of the issue, knowledgeable decisions cannot be made. The benefit to this process is that the decisions reached will be through fair and impartial discussion. There simply is not enough leverage for any of the major stakeholders to pressure the committee or bias a decision.

The four major stakeholders in the process have also been given a greater degree of responsibility with their additional role as funding agencies. This kept the process on track, with a minimal amount of red tape and a continued interest in the progress and achievements of the Task Force. Programs at other sites have indicated that success may be achieved when the program is entirely funded by either government or industry, but perhaps at a greater cost than what may be necessary.

Certainly, the BC Ministry of Environment could have established new and specific regulations for the Trail Operations of Cominco Ltd., but at what cost? The cost to the Ministry has been much less than at other sites where they have managed the remedial program. The cost to industry is anticipated to be less than through a regulated approach, as the remedial program will be aimed at what is practicable and desired, not what is achievable. Public opinion has been in favour of the Ministry's co-operative, multi-stakeholder approach – a viewpoint not always enjoyed by government. And the community has taken ownership of the situation, rather than denying that a risk exists.

Although this process might not be applicable, nor even acceptable, for all risk management processes, its success gives new hope that government, industry and the community can operate effectively when they share a common goal and purpose.

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“Good Health is Good Business”

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Summary

This paper presents a summary of a campaign which is being run by the Health and Safety Executive in the UK to improve the standard of management of occupational health risks. It is called "Good Health is Good Business". Reducing the health risks arising from occupational exposure to chemicals is a major part of this campaign.

The paper explains the background to the campaign, its content, and some of the lessons that are being learnt in pursuing this initiative. References and contacts are given to enable any follow-up enquiries to be made.

Background

The HSE is the responsible enforcing authority for the legislation affecting health and safety in the workplace, and many different techniques are used to encourage employers and others to achieve a high level of compliance and therefore establishing acceptable risks to employees and others whose health and safety may be affected. The work of HSE is described in the Health and Safety Commission Annual Report (Ref 1).

In recent years national and international concern over the scale and cost of occupational health to individuals, industry and society has resulted in new legislation and administrative action to improve prevention and control of health risks. The Health and Safety Executive therefore carried out a fundamental review of occupational health risks in 1992 to establish a clear framework for action which resulted in a series of strategic recommendations and action programmes for each of the main health risk areas reviewed. These included risks such as noise and manual handling but risks arising from chemicals was one of the main areas covered by the "Health Risk Review" (Ref 2).

The fundamental reviews where based on the estimates that, in 1989-90, 750,000 workers had time off work for work related illness and an equal number were affected by work related illness although they did not take time off. Furthermore, about 7 per cent of general practitioner consultations by working aged patients were thought to be work related. These figures represented a substantial cost to society. Furthermore, there was a three-fold increase in compensation awarded for occupational illness between 1983 and 1988, with a cost to employers of some £600 million. Occupational health is difficult to deal with because of the uncertainty in cause and effect, complicated by varying individual susceptibility and response and invisibility due to the long latency of many diseases.

This review concluded that at least 100,000 cases of ill health are attributed to exposure to toxic substances at work, with around 10,000 deaths occurring per year from cancers and from chronic bronchitis. The occupational health statistics and conclusions are drawn from a Labour Force Survey research paper produced by HSE (Ref 5) and information contained in the Decennial Supplement (Ref 4). All employment sectors and groups of workers and the public are affected, ranging from irritation to death. The review concluded that, as an action programme, HSE should consider respiratory sensitisers, carcinogens and dermatitic agents as a priority.

A common theme arising from the health risk reviews was that the level of understanding and management competency in dealing with health risks required improvement. In terms of chemicals, this included a lack of understanding of the process of risk assessment and the provision of good information to employees about the risks encountered at work.

It was necessary to raise the profile of occupational health, and a Steering Group was set up within HSE to develop a four- to five-year campaign aimed at improving management competence and performance in managing occupational health. Other aims of the campaign were to provide information on the control of health risks, support the field staff of HSE, and encourage the contribution made by intermediaries.

HSE firmly believes that successful management of health risks not only reduced the risk of ill health to employees but is also good business sense. Not only is there a moral and legal obligation on employers to avoid damaging the health of their employees, when taking into account the rewards of fewer days lost, greater productivity, and fewer compensation claims, there is little doubt that good health is good business.

The “Good Health is Good Business” campaign

The campaign itself was designed to run from May 1995 to the year 2000, with the underlying theme of improving management competency. Within that period the campaign would highlight certain priorities and be run as a series of phases.

The topics selected reflect the concern for health effects arising out of exposure to chemicals.

The different topics were seen as building blocks to be added to as the phases are reached, with the impact of each phase being continued.

The campaign itself is made up of different parts, including publications and publicity; field inspection activity; and the involvement of intermediaries.

Publications

At the start of the campaign, it was recognised that a key publication already available was the booklet "Successful Health and Safety Management HS(G)65" (Ref 3). This booklet had been very well received, but was aimed at large employers and used managerial and organisational terms which are not common to the operation of a smaller business. The campaign team therefore contributed substantially to the production of a publication, "Health Risk Management – A practical guide for managers in small and medium sized enterprises HS (G)137” (Ref 9). This publication was founded on real problems and their practical solutions.

The publication described four key stages for employers to address:

1. Finding out if there was a problem.

2. Deciding what to do about it.

3. Taking action.

4. Checking what has been done.

To publicise the campaign, a publication in a folder format was initially produced, to be replaced later by "An Employers Guide to Good Health is Good Business – Phase 1" (Ref 12) and an employees' leaflet which, with other information, can be put together to form a campaign pack.

As well as our own publications, HSE has co-operated with a publishing company to produce a booklet entitled "Managing Health Risks in the Manufacturing Industry" and with the *Financial Times* to produce a supplement supporting the campaign.

Timetable for the Campaign

May 1995 - October 1996	-	1st Phase Noise Respiratory Sensitisers Musculoskeletal.
October 1996 - March 1998	-	2nd Phase Dermatitis Cancer.
April 1998 - October 1999	-	3rd Phase (Provisional) Solvents Pesticides Hand/arm Vibration
November 1999 - April 2001	-	Final Phase Review of all topics

Publicity

There can be little doubt that, as one of the aims of the campaign was to make the general public and employers in particular more aware of occupational health issues, publicity in its broadest sense has a critical role to play. The intention from the start was to have a very high profile for the campaign and to ensure that there was substantial media coverage. There was a range of publicity activities.

Press launches

At the start of the campaign, a major press launch was conducted in the principal cities of London, Glasgow and Cardiff. Each was headed by a senior member of the Health and Safety Executive, with invitations to both national and local press. As a result, the launch of the campaign received nation-wide coverage.

A further press launch was held in May 1996 to publicise the production of the new employers' guide and particularly to launch the HSE-produced video, "Make Health your Business" (Ref 7). This video is presented by Sir John Harvey Jones, former Chairman of ICI, and contains demonstrations of practical measures that can be taken to manage occupational health. From the period from May 1996 to September 1996, this video can be supplied by HSE free of charge provided employers indicate their willingness to pay attention to managing health risks within their company and submit an order form contained in the employers' guide.

The press launch has generated headlines in newspapers and placed considerable demands on staff responding to local media interest.

Press advertisements

As well as securing editorial coverage of the launch of the campaign, HSE has also been proactive in running an advertising campaign in outlets ranging from publications such as *The Director*, and the national daily and Sunday newspapers, to the popular commercial "Classic FM". Besides advertising the general theme of the campaign, specific advertisements have been placed highlighting the risks from musculoskeletal injury, from noise, and from exposure to respiratory sensitisers. Of this last group, the publications targeted were related to industries where the highest incidents of occupational asthma occur: for example, *Autotrade*, *Body Shop* and *Motortrader*, which relate to the use of isocyanates in vehicle paint finishes, and publications such as *Bakers Review* and *Food Processing*, highlighting the risks from exposure to flour dust. The total advertising budget has been about half a million pounds.

It was recognised that the advertising campaign was reaching a selected audience. There was clearly a need to ensure that the general public were aware of the campaign and had the opportunity of seeking further information from HSE. Therefore, the advertising campaign was extended to television in May of this year. The TV slot in particular was very hard-hitting and dramatic. It was widely shown at peak viewing times and specifically asked everyone to consider whether the advice provided by HSE could be of use to them.

Evaluation of publicity

With such an investment in promotion of the campaign, it is appropriate to carry out an evaluation to see whether the publicity has had the impact that was intended. In terms of total response, this is listed below.

Publicity Response Update at 1 August 1996

	Coupon	**Telephone**	**Total**
Television (inc. 6 cefax)	0	6,896	6,896
National press	2,308	2,447	4,755
Safety and management press	142	583	725
Radio	0	1,136	1,136
Other (uncoded) – included response generator ads	57	4,137	4,194
Total	**2507**	**15,199**	**17,706**

No. of campaign packs distributed – approximately 160,000.

No. of videos distributed in response to forms in "An employer's guide to Good Health is Good Business" – 5224.

In absolute terms, this seems to be a substantial response to the campaign. Certainly the distribution of campaign packs and videos must be expected to have a real impact on the standards of control of occupational health.

We are not relying solely on these figures, but have contracted an independent evaluation of awareness of occupational health, taking a base line before the campaign and at different phases throughout the campaign. To date it appears that, within a target audience, the initial awareness of occupational health issues was 21 per cent and has been raised to 45 per cent. This is still below a target figure of 60-65 per cent. The investment of effort must therefore be continued, with the development of innovative ideas.

For further information about publicity programmes and evaluation, contact:

Mr P. Rimmer,
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Room 203 , Daniel House
Stanley Precinct, Bootle
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Tel (44) 151 - 951 - 4045.

Field inspection activity

One of the major ways the Health and Safety Executive passes information to employers and employees is through the activities of their field inspectors. As a consequence, inspectors have played a major part in pursuing the aims of the campaign.

For instance, inspectors have been holding and contributing to conferences (20+) and seminars (35+) and providing resources at exhibitions (6+) . These range from national conferences held in London to a seminar aimed at small businesses in the Western Isles in Scotland. Every part of the country and most industry sectors have been brought into the campaign through the efforts of inspectors. The messages that inspectors have been putting across are that:

- Management of health risks may not be difficult or expensive,
- Employers can do much themselves,
- Simple steps ensure value for money,
- Actions should be taken on a scale to match the risk.

In order to stimulate activity and interest amongst field inspectors, each of the operating Regions has appointed a Regional Campaign Co-ordinator with a specific responsibility of providing a liaison between the work of the campaign Steering Group and the work of the field inspectors. To support the Co-ordinators, a series of "Updates" (in-house information newsletters) has been prepared. They have also had their own formal meetings with the campaign headquarters every six months. This level of input and constant provision of information and advice has been essential to keep the campaign in the forefront of inspectors' minds.

Most of the inspectors' time is spent at workplaces giving advice and guidance on health and safety matters, and the campaign and the attention to health risks is prominent in their daily contacts with industry.

It was recognised that the priority topics would be the subject of many presentations made throughout the Operating Divisions. To minimise the local preparation effort and ensure maximum consistency of the advice being given, a series of "speakers packs" has been developed and provided for field staff. These packs, designed for each of the priority topics, contain a narrative and supporting 35 mm slides and overhead projection slides. These are expensive items to produce and therefore are restricted in number, but through the system of the Regional Campaign Co-ordinators the supply has met the inspectors' demand. They have been found very useful in the field application.

There have been a number of enquiries asking whether these "speakers packs" could be made available to the general public or to organisations as an on-sale item. Consideration is being given to this at the present time, and a review of the commercial and training benefit of making the packs is to be undertaken.

Involvement of intermediaries

The efforts made by HSE to publicise the campaign have been substantially enhanced by the recognition, by a number of intermediaries, of the value of the campaign and a common interest in promoting it.

Examples include:

Employers federations and trade associations

These organisations recognise that their particular industries ought to set high standards of health and safety, and indeed most employers have this objective. Therefore, employers associations, in providing good advice and information to their members, have recognised the advantage in co-operating with HSE in promoting the campaign. For instance, the Engineering Employers Federation have held a series of "roadshows" for their members concerned with employers' liability and the increase in claims for occupational health. HSE inspectors have contributed to these roadshows by lecturing on the campaign and providing references to the HSE guidance. As a measure of the impact of these events, at a similar series of 14 seminars almost 1000 engineering companies were met and in an evaluation three-quarters considered the presentation to be good and almost all considered the technical level to be right for the audience. This supports the view that whilst campaigns can be general and of national interest, employers appreciate specific advice which relates directly to their own particular circumstances.

Insurance companies

As an example, discussions have been held with insurance companies to promote the video and we now learn that the companies will be using a master of the video to produce their own copies and distribute them widely to their clients. The reduction of insurance premiums and the reduction of claims by employers for cases of occupational ill health is a direct financial incentive to employers.

The Association of British Chambers of Commerce (ABCC)

Many small businesses are members of the ABCC, who have a network of groups throughout the UK. Arrangements are now being made to hold a series of seminars at which HSE provides the technical input, with the seminars arranged and organised by ABCC. This is a clear example of co-operation with intermediaries for mutual benefit.

Trades unions

As an example, HSE have provided help to the Trades Union Congress in drawing up a leaflet for their members setting out ten questions that their safety representative might wish to ask their management. It has the same overall theme of assessment, action and review. The leaflet will be used for safety representatives' training and has been copied to individual trades unions for wide distribution.

Universities and institutes

There is a considerable role that educational bodies can play. As an example related to the control of chemicals, a series of lectures was organised across the country on the topic of respiratory sensitisers. They were sponsored by HSE, but independently presented. There were approximately 1000 people attending, and an evaluation of the immediate impact showed that the vast majority found the seminars useful and were intending to put what they heard into practice. A follow-up evaluation, a year later, by a more detailed questionnaire put to a random selection of delegates will show what has actually been achieved.

Legislative background

Within the UK there is a strong legislative framework designed to prevent ill health from exposure to chemicals.

At the point of supply, there are regulations requiring that containers of chemicals be labelled based on a hazard and a risk assessment of the substance. These labels contain sufficient information with warning signs to enable the user to recognise the potential risk from exposure. To supplement this, the supplier also needs to provide data sheets explaining in more detail the precautions that need to be taken when using the chemical. These regulations are the Chemicals (Hazard Information and Packaging for Supply) Regulations 1994 (Ref 8).

There is also an overriding statute, The Health and Safety at Work etc. Act 1974 (Ref 10), which provides a framework for management in that it requires employers to provide a written statement of general policy which includes the organisation and arrangements that are in force for carrying out that policy.

This is further expanded now by the Management of Health and Safety at Work Regulations 1992 (Ref 6), which require the provision of health and safety arrangements coupled with the provision of competent assistance, dependent on the nature of the undertaking.

As well as these general requirements, the Control of Substances Hazardous to Health Regulations 1994 (Ref 11) place duties to assess the risk from exposure to hazardous substances including chemicals, and for some specific substances such as asbestos and lead there are dedicated regulations.

Therefore, the control of risk from exposure to chemicals is well regulated and is overseen by a framework of regulations requiring adequate management standards.

The campaign does not stress these legal requirements, but from HSE's point of view failure by an employer to provide proper controls could be dealt with by enforcement for a breach of statute if all other means proved to be unsuccessful.

Therefore, whilst the campaign itself is non-regulatory, it is backed up by statutory requirements should an employer disregard the advice that is given.

What we have learnt from running the campaign:

1. There are benefits in managing the campaign by a multidisciplined Steering Group with authority to put initiatives into practice. In our case we have established a group made up of inspectors, policy staff, technical experts and publicity managers. No one aspect

of the campaign can stand on its own, and the whole effort requires co-ordination and overall control.

2. In running the campaign, a very high publicity profile is required. The use of "celebrities" as known faces to the public has enhanced the immediate appeal of the publicity initiatives.

3. The campaign has been led by the most senior management in the HSE and the Commission, which not only demonstrates the importance to the public but also ensures that individual inspectors and other staff recognise the importance of their own work in contributing to achieving the objectives of the HSE.

4. The involvement of field staff requires training, administration, and practical support.

5. Co-operating with intermediaries makes an impact on employers and reaches a wider audience than HSE could alone.

What are some of the difficulties encountered so far?

1. An inadequacy and uncertainty in true occupational ill health statistics.

2. Whilst the campaign can be evaluated from the point of view of "awareness" and "immediate satisfaction" or tests of "relevance", the longer-term impact of occupational health is as yet uncertain.

3. Running the campaign uses considerable HSE resources and must be justified in comparison with other compliance activities.

4. The decision to prioritise topics in phases is essential to target resources, but considerable care has to be taken to retain an integrated approach throughout the life of the campaign.

Conclusion

The launch of the "Good Health is Good Business" campaign has been a major initiative on the part of HSE to improve the standards of management of health risks, and there are some immediate signs of success. The resource input needs to be sustained to achieve a lasting effect. The long-term value and the permanency of such an input of resource is yet to be determined.

There are lessons to be learnt and difficulties to be overcome which may be of interest to other OECD Members.

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Publications obtainable from :

HSE Books
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Compliance Leadership Through Enforcement, Auditing and Negotiation (Clean) Project

William Sonntag

American Electroplaters and Surface Finishers
United States

Project objectives

This New England-based project is intended to:

(1) combine pollution prevention assistance and enforcement amnesty as incentives for improved environmental performance by metal finishers, and

(2) achieve measurable environmental results and increased compliance on both a facility-specific and industry-wide basis.

Project highlights

EPA and the New England states operate a variety of compliance and pollution prevention assistance programs to address the needs of metal platers. Participants are usually industry leaders who are actively soliciting assistance. The CLEAN project will target those segments of the metal finishing industry not currently participating in the existing programs. These firms may not be using available government assistance programs because of concern about disclosure of real or perceived compliance problems.

Funded through grants, the Center for Technology Transfer/Maine Metal Products Association (CTT/MMPA) and the University of New Hampshire (UNH) will assemble multi-disciplinary teams to conduct multi-media pollution prevention opportunities and compliance issues. They will develop specific recommendations, including implementation plans which will prioritize P2 projects based on waste stream volume and toxicity, environmental benefits, compliance requirements, project costs, ease of implementation, etc.

Companies that undertake pollution prevention assessments and commit to facility-wide pollution prevention and source reduction options will receive enforcement amnesty for any violations discovered in the process and corrected. The amnesty will be generally consistent with the principles described in EPA's "Interim Policy On Compliance Incentives for Small Business", issued in June 1995.

Project status

Endorsed by the Subcommittee. Project is funded and pilot states selected (New Hampshire and Maine). Approximately 16 volunteer firms have been identified and audit/amnesty protocols

established. Local stakeholders are being contacted. Compliance/pollution prevention audits underway this spring for pilot firms.

Expected timeline

Implementation will continue through September 1996. Preliminary results by summer. Broad recommendations and expansion of the program to other states by fall 1996.

Project contacts

Workgroup Chairs:	Russell Rhoades, Arizona Dept. of Environmental Quality	
	John Craddock, Munice Bureau of Water Quality/WEF	
Other key contacts:	Stanley Eller, CTT/Maine Metal Products Association	
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The project has numerous industry, state government, and public stakeholders. Contact the EPA project team leaders listed above for information on these participants.

An Overview of:
Voluntary Initiatives and Innovative Environmental Policy Approaches

Brian Guthrie
The Conference Board

Ottawa, New York, Brussels

Objective of this Presentation

- To provide a global overview of voluntary initiatives
- To provide context and stimulate discussion for subsequent breakout sessions

Information Sources

- Conference Board research:
    - National and international case studies;
    - Comparisons: private/public; US/Canadian;
    - Energy sector: analysis of factors of success;
    - Reforming public policies for sustainability.
- Workshops with business & gov't - Feb '96
- Deliberations of previous day of Workshop

What is a Voluntary Initiative?

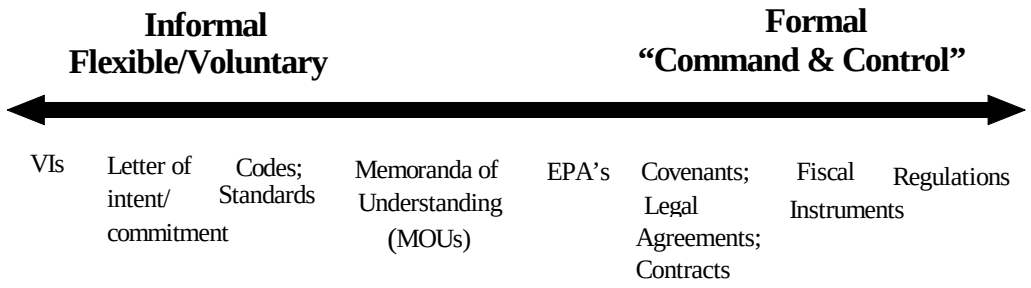
- A proactive commitment to protect the environment beyond "minimum requirements" (such as regulations, industry norms, etc.)

Usually involves:

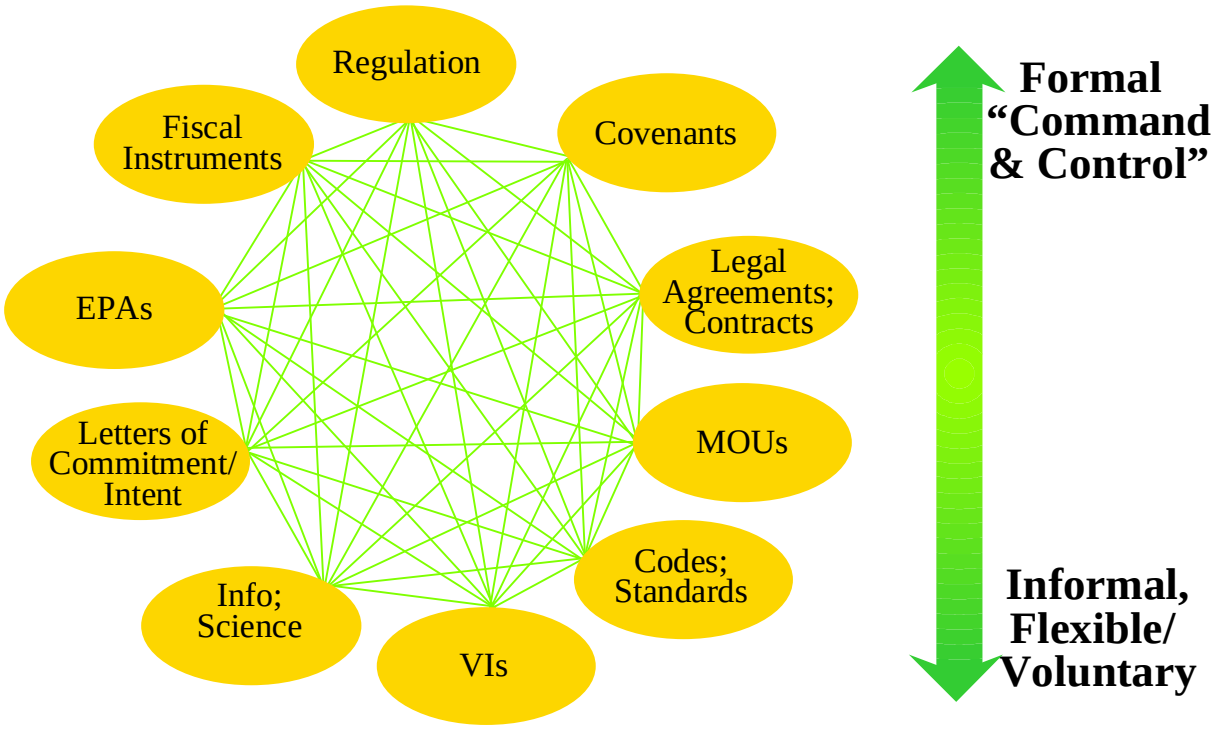
- A declaration of actions and/or targets . . . to internal or external stakeholders or potential stakeholders
- A complement or response:
    - To regulations, threat of regulations, other command-and-control policy levers; or
    - To market forces (e.g. efficiency).

Not an alternative to regulations. Does not stand alone or replace regulations or other policy levers.

Policy Approaches: A Continuum



Policy Approaches: Innovation, Interactions, Clusters



Case Example: A Danish "Cocktail"

- Increased taxes are being phased in for energy consumption in trade & industry.
- Funds are "recycled" into energy efficiency measures.
- In order to ease the transition, industries can get tax relief if they implement voluntary measures.

Case Example: New Zealand & CO_2

- Voluntary agreements to reduce emissions.
- Government CO_2 target for year 2000.
- If not on track for year 2000 targets by June '97, then a carbon charge will be introduced in Dec '97

What is a Voluntary Initiative? (Cont'd)

- General perception that voluntary approaches get results more efficiently (than regulatory approaches).
- However, it takes time to develop a climate conducive to volunteerism, and to get results.
- Consumer/market forces may be more influential in driving VIs in future.

Case Example: Consumer Behaviour in Australia

- Successful initiatives provide mechanisms to translate attitudes & intentions into action, including. . .
- Economic incentives, messages at Persistent Organic Pollutants (POP), threats of penalties, non-environmental incentives, etc.
- Recycling in Wangaratta: Easy to comply, considerable publicity, fines.
- Public transport in North Sydney: Car parking difficult, impossible or expensive.
- Excise tax on leaded gas: Clearly articulated benefits.
- Failures: Limited mandate, poor mechanisms, no clear benefits.

Starting Point

- *An organisation must first establish its objectives:*
- Whether it wants to:
    - Meet the bare minimum; *or*. . .
    - Exceed the minimum.
- If the latter, then VIs are one approach.
- Some companies wish to be innovative and leaders.
- Other companies wish only to meet minimum requirements.
- But all companies want a *level playing field*, and all parties (including the public) recognise government's role in ensuring it.

Types & Characteristics: Commitment Vehicles

- Promotional initiatives.
- Principles/Guidelines/Codes of Practice.
- Letters of intent/of commitment.
- Memoranda of Understanding (MOUs); negotiated agreements.
- Covenants/legal agreements/contracts.

Case Example: Dutch Covenants

- MOUs with industry. Based on government policies and objectives.
- Limited "voluntariness" – strong social climate to co-operate
- Administered by the Netherlands Agency for Energy and the Environment.
- Targets negotiated, but current emphasis on plans & actions.

Case Example: Japan's Voluntary Agreements

- Early environmental incidents.
- First informal "agreements", now contracts.
- Made at level of prefecture, city, town.
- Company needs agreement of local population – wants/needs this before building. Agreement may be written into a site (land) contract.

Types & Characteristics: Partnerships

- **Unilateral**: 3M, Shell.
- **Private/Private**: Responsible Care.
- **Private/NGO**: Merck/Inbio; McDonalds/EDF.
- **Private/NGO/Gov't**: PSE&G/EDF/DoE.
- **Private/Gov't:** Japan Prefectures; MVMA; British Sugar.

Case Example: 3M: 3P and 3P+ Programs

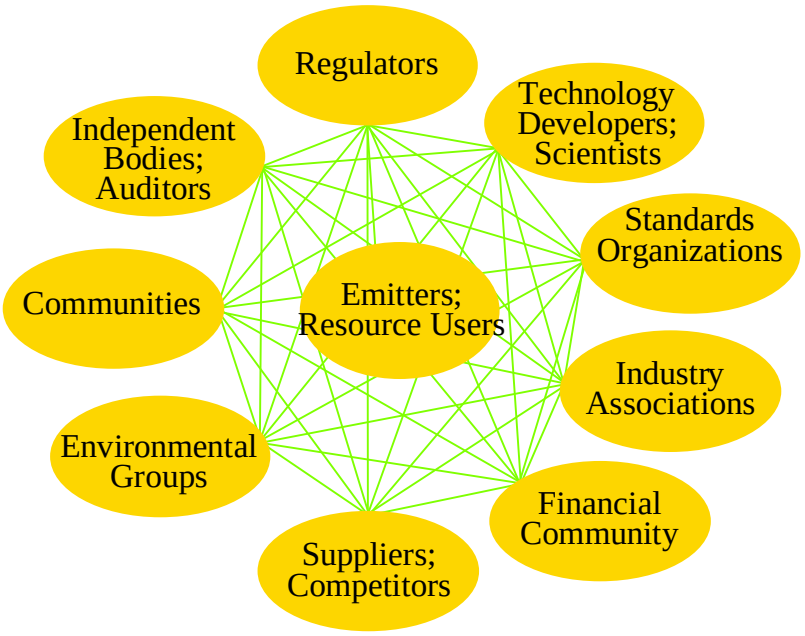
3P (Bottom up):

- Seed money and employee rewards for innovation.

3P + (Top down):

- Company strategy and performance goals.
- Branch plant goals and rewards.

Partnerships: Innovation, Interactions, Clusters



Case Example: Emery Creek Environ. Assoc.

- Local industrial park concerned with water pollution.
- Informal association to learn, educate & share information.
- "Business helping business."
- Led & funded by larger companies.

Types & Characteristics: Time Horizons

Time horizons affect an organisation's objectives:

- *Short-term*:
  - "Meeting Tuesday's payroll".
- *Medium-term*:
  - Five-year "Sustainability Plan".
- *Long-term:*
  - Ecological and societal values.

Motivation & Benefits: The Primary Reasons

- Regulation or threat of regulation.
- Shorter-term cost savings, efficiency gains, Return on Investment (ROI); "Good business practice".
- Longer-term markets and image.

Case Example: Colorama Dyeing and Finishing

- Water & sewage costs higher than Quebec & U.S. competitors.
- Trying to meet Tuesday's payroll: Need to reduce costs!
- Gov't help in pollution prevention activities.

Motivation & Benefits: Secondary Reasons

- Control: a company establishing its own issues and priorities.
- Flexibility & innovation in solutions.
- Integrating environmental and financial goals.
- Building trust and credibility with government and the public; threat of public censure (e.g. chemical industry)
- Minimising uncertainty, liabilities and risks.
- Due diligence; legal implications.
- Personal liability; threat of fines or imprisonment.
- Building understanding (within organisation).
- Government savings in the regulatory process.
- Lack of uniform regulations or standards.

Case Example: Responsible Care

- Some chemical companies have received favourable loans and insurance rates due to participation in program.
- That is, the financial community perceives decreased risks and liabilities.

Measurement & Monitoring: Challenges

- Technical direction: Establishing baseline cost and emission data. Internal capability is required to analyse options.
- Resources: For ongoing monitoring. Measuring must be viewed as a priority.
- Resolution: Environmental data are often embedded in other process measurements.

Case Example: Woodbridge Foam

- "What gets measured gets done."
- Speak in accountants' terms.
- Accountants & CEOs relate to the cost of waste per unit of production.
- Differentiate between short-term projects (bottom up) & long-term projects (top down).

Lessons Learned

- Measures of success are illusive at this time: initial actions may be a leap of faith.
- VIs take some time to implement and nurture. Companies are learning as they go.
- Free riders: Less of a problem for pervasive unilateral programs.
- "Make sure you do it right!" Need a sustained effort. Follow-through is essential.
- "Don't penalise the leaders!"
- No two VIs are the same (just as no two companies are the same).
- Some involve government and public stakeholders early, in a real and sustained fashion. Others avoid external communications.
- Corporate culture is a necessary condition:
    - VIs must be supported from the top. . .
    - Execution comes mostly from the bottom.
    - Basic principles: motivated employees, innovation on shop floor, continuous improvement.
- ISO: Variety of views; the market will be ultimate arbiter.

Closing Remarks

- Voluntary initiatives work in concert with other approaches, not in lieu of them.
- There are many more cases than we realised: exponential growth, and a story to be told.
- There are few mature cases of VIs.
- Industry is clamouring for more information.
- SMEs: help from govt's or associations?
- There are not yet clear measures of success.
- There are a variety of types, applications and opportunities for VIs.
- Potential benefits include long-term sustainability and near-term competitiveness.
- As a policy approach, VIs will not survive without mutual industry, public & gov't support/trust.

LUNCHEON REMARKS BY LYNN R. GOLDMAN (US EPA)

Luncheon Remarks by Lynn R. Goldman (US EPA)

Today is an important day in the *future* of the OECD Chemical Risk Management Programme. For it is today that OECD has an opportunity to turn a corner. At this workshop and at our next workshop on chemical use clusters later this week[1], you will have a unique opportunity to consider how innovative risk reduction approaches may work in each of our own countries and co-operatively in OECD Member countries.

I have high hopes for this workshop and the "mid-course" correction that the OECD Chemical Risk Management Programme is now undergoing. In addition to EPA's and the US Government's commitment to OECD, I am personally committed to this programme. OECD has had several important successes in the past year. OECD Member countries have signed agreements on a Pollutant Release and Transfer Registers (PRTR) and on lead risk reduction. In addition, OECD encouraged an industry agreement on brominated flame retardants.

However, OECD's pace has been slow and agonizing. Anyone familiar with the lead risk reduction project will agree that there has to be a better way. OECD has been hampered by an intensive risk management process and an inherent difficulty of all OECD countries, acting together, to make tough decisions. If it's any consolation, the experiences of OECD are not unlike our experience in the United States, and the experiences of other Member countries – where these issues are often played out at length.

We are looking to the OECD for leadership in chemical risk reduction. In a global economy, Member countries increasingly share the same uses of chemicals and we frequently share a common set of exposure concerns for children, workers, the general public, and the environment. Solutions, too, are often common within and among Member countries – although we sometimes implement solutions in different ways.

By accelerating its own chemical risk reduction program, OECD can potentially accelerate priority chemical risk reduction within Member countries. This can be done by:

- Tackling bite-sized projects focused around specific chemical uses and their resultant exposures.
- Encouraging industry to undertake risk reduction programs for priority chemical exposures.
- Sharing information on toxicological and ecological issues.
- Facilitating risk reduction practices in non-OECD countries.

And by:

- OECD acting as a convener for international industry, and
- OECD sanctioning international agreements (including voluntary actions).

[1] An OECD Workshop on "Use Clusters" co-sponsored by the US Environmental Protection Agency, the Chemical Manufacturers Association (US) and the Canadian Chemical Producers Association, was held immediately following the workshop on Non-regulatory Initiatives for Chemical Risk Management and concluded on 13th September, 1996.

No matter how efficient and effective a new process becomes, however, OECD cannot do it all. An effective OECD risk reduction program should be designed to encourage and promote industry action. As such, I would recommend that OECD not limit itself to projects or problems that OECD must directly accomplish itself.

In the US we have found that voluntary programs can be very effective. People are turning more and more to voluntary approaches and to industry/government partnerships to achieve environmental goals. We have found voluntary programs springing up from all sorts of different places: Some have been initiated by EPA, some by states, or groups of states, and some by industry.

Why is this happening?

- First, voluntary programs can be a great way for a company or industry to go "beyond compliance". Non-regulatory approaches can often be implemented more quickly and with greater flexibility.
- Second, regulations can miss the biggest opportunities for environmental and public health protection (e.g. the initiative at the Amoco/Yorkton Plant in the US).
- Third, it is difficult for the regulatory process to encourage flexible decision making.

Participation in many of our voluntary programs has been excellent. More than 1300 companies joined our "33/50 Program" and more than 2000 companies joined our Green Lights Program. The Green Lights Program participants are saving substantial electricity (and thus reducing pollution) by switching to more efficient lighting systems.

I want to emphasize that the United States is not abandoning our traditional regulatory approaches – although we are implementing these programs more flexibly. Our regulations and the enforcement of those regulations assure that our basic environmental protections are intact. However, with our current regulations in place and with some modest changes, I see voluntary programs as the best way to achieve rapid risk reduction over the coming years.

Likewise OECD will see the need for concerted action, but increasingly we need to reach out to industry to achieve significant risk reduction actions in the future. I expect to see some of these innovative approaches you will be examining this week used in future OECD risk reduction partnerships.

REPORT OF THE OECD WORKSHOP ON NON-REGULATORY INITIATIVES FOR CHEMICAL RISK MANAGEMENT

Report of the OECD Workshop on Non-Regulatory Initiatives for Chemical Risk Management

Background

In 1995, the Joint Meeting of the OECD's Chemicals Group and Management Committee of the Special Programme on the Control of Chemicals agreed to review its Chemical Risk Reduction Programme in the light of technological advances and lessons learned since the Programme was established in 1990. An Ad Hoc Risk Reduction Working Group met on 6-8 November 1995 and will meet again 26-27 September 1996 to consider future work on risk reduction.

Throughout the discussions on the OECD Risk Reduction Programme, the need to consider a wide range of elements for action, including non-regulatory measures, was emphasized. The participants in the OECD Cadmium[1] Workshop recommended that a workshop be held with all stakeholders to examine voluntary chemical risk management programmes and pollution prevention approaches. Canada and the United States agreed to co-host such a workshop.

The workshop was held in the United States, at Crystal City, Virginia, on 10-12 September 1996. The workshop had two principle goals:

- to provide a forum for government, industry and non-governmental organisations to share experiences on non-regulatory initiatives, and

- to provide guidance to the September meeting of the OECD Ad Hoc Risk Reduction Working Group on the value and promise of non-regulatory measures.

In particular, the primary objectives of the workshop were to:

- increase awareness of the range of approaches that can be used to achieve risk reduction objectives with respect to chemical management;

- identify the cost and benefits of the various approaches;

- identify the factors that contribute to or inhibit the success of case studies;

- identify the incentives for such programmes; and

[1] The OECD Cadmium Workshop, held in Saltsjöbaden, Sweden, from 16-20 October 1995, consisted of two subsidiary workshops: the Sources Workshop, which addresses all sources of cadmium inputs to the environment (with the exception of fertilizers); and the Fertilizer Workshop, which specifically addressed phosphate fertlizers as a source of cadmium inputs in agricultural soil. The proceedings for these two subsidiary workshops have been published and are available from OECD.

- characterize elements generally found in successful programmes and that would be appropriate for an individual country's risk reduction programme[2] and, where appropriate, for co-operative or concerted OECD activities.

Day 1 of the workshop consisted of presentations and panel discussions, in plenary session, of twelve non-regulatory initiatives from various countries and companies. In addition to the presentations on Day 1, a poster session was held on other non-regulatory initiatives.

Day 2 opened in plenary with a presentation from the Conference Board of Canada reviewing the major points made on the previous day and overviewing a range of voluntary, non-regulatory and regulatory alternatives to address risk reduction.

The participants were then assigned to four breakout groups. The primary objective of the breakout sessions was to determine how each programme, or elements of a programme, could be a useful model for a country's national programme and/or the OECD Risk Reduction Programme (now known as the Risk Management Programme). During the breakout sessions, each group used the following questions to guide their discussions:

- How do we measure the success of non-regulatory programmes?
- What are the drivers and barriers for a successful non-regulatory programme?
- What are the benefits and costs of non-regulatory programmes, compared with regulatory/mandatory approaches?
- What suggestions would you make for the OECD, individual countries, industry/companies or NGOs which are interested in exploring non-regulatory programmes?

A final plenary session on Day 3 summarized the reports of the breakout groups. The workshop recognized that significant promotion of chemical risk management could be achieved by working with educational institutions at all levels. Discipline-specific as well as general modules could be developed and distributed to schools and universities to formally incorporate safe chemical management concepts, as well as considerations regarding the environmental design of processes and products to reduce chemical risks, into the curricula. In many disciplines, such as business management, accounting and engineering, information on environmental concerns is not normally part of formal education. Including awareness of means to prevent and minimize chemical risks early in professional educational programmes in the future could provide large sectors of the population with a better understanding of how to manage chemicals safely.

Workshop participants agreed that non-regulatory approaches and programmes offer valuable opportunities for managing risks and should be pursued by OECD Member countries and within the OECD. The following is a report of the workshop findings, including responses to the four questions.

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[2] Workshop participants were asked to bear in mind that risk management situations and needs vary from country to country, and that it may not be possible to duplicate the success of a particular programme in a different situational context.

First steps

Important first steps in developing/initiating a non-regulatory risk management programme are:

1. identifying a problem that needs to be addressed, ensuring a clear understanding of why it needs to be addressed, and also ensuring that it has a high potential for success;

2. ensuring early involvement of stakeholders;

3. developing a joint understanding of, and commitment to, a clear set of goals and objectives for risk management;

4. agreeing on the baselines for measurement of progress and committing to direct or indirect indicators of success;

5. establishing a clear understanding of how the non-regulatory programme will fit into or complement the existing regulatory framework;

6. agreeing on plans and protocols for communicating, as appropriate, with the public.

These steps are critical to the eventual success of the programme, since they help establish trust and credibility among the stakeholders and the public and are essential for maintaining trust and credibility throughout the project.

Discussion with the stakeholders will become an iterative process, as goals are formulated and ways to measure success against the goals are identified. For example, goals may have to be redefined in order to accommodate measurement realities.

How do we measure the success of non-regulatory programmes?

Various parameters have been used to measure success in non-regulatory programmes. For example,

- emission reductions (e.g. the 33/50 programme, ARET);
- reduction in workplace exposures (e.g. from benzidine dyes);
- more efficient use of products (e.g. detergents and cleansing agents);
- level of participation and commitment by stakeholders (e.g. eco-labelling, Responsible Care).

Important characteristics for measuring the success of and designing measurement tools for non-regulatory programmes include:

- agreed-upon measures which are understood by all stakeholders before work begins;
- easy for the public to understand;
- transparency of the process;
- an agreed-upon baseline from which to begin;
- a credible, simple and easy way to keep track of progress;
- interim targets, not just endpoints, are defined;
- applicability to other chemicals or to regional programmes.

In addition to measuring success, it is important to focus on demonstrable ways to recognize and reward success. Various devices that have been successfully applied include the awarding of plaques and certificates, press releases, awards dinners, and recognition by high-level government or political leaders. Experience as identified in the workshop indicates that these devices are highly valued by participants.

What are the drivers of and barriers to a successful non-regulatory programme?

In many cases, depending on how an issue is perceived, the same factor can be seen as a barrier or driver or both. There are some barriers that can limit the success of non-regulatory programmes, and this has caused concern among some stakeholders. However, the successful programmes presented at the workshop showed that, when barriers are appropriately addressed, they can be overcome.

The following is a list of such factors:

Drivers

- all stakeholders agree that a problem exists;
- non-regulatory initiatives could correct conflicting or onerous regulatory regimes and conflicting regulations or forestall their development (e.g. the Major Industrial Accidents Council of Canada, NiCd battery recycling project);
- responding to external or peer pressure (e.g. public perception of a problem; responding to positive image which has accrued to a competitor who has participated in a non-regulatory initiative);
- developing a proactive responsible approach to addressing environmental issues before resolution of problems is imposed externally;
- dialogue with affected stakeholders will improve understanding of risk (e.g. the “Good Health is Good Business” campaign);
- problems can be resolved more rapidly than through regulatory approaches;
- anecdotal evidence indicates less cost to achieve benefits for both governments and industry;
- desire to be, and be seen as, responsible (e.g. Responsible Care);
- more flexibility, creativity and expertise in addressing a problem is likely with a voluntary approach than with regulations (e.g. the Printed Wiring Board project);
- consistency with the concept of continuous improvement that is embraced by responsible companies;
- non-regulatory approaches provide the flexibility needed to develop and apply technological innovations;

- involvement of key stakeholders in problem identification and goal-setting leads to shared ownership of and responsibility for issue (e.g. Trail Community Lead Task Force);

- flexibility, cost and efficiencies associated with non-regulatory initiative enhance competitiveness;

- non-regulatory approaches lead to peer pressure to achieve compliance within a sector;

- strong political support will encourage industry to adopt new approaches (e.g. 33/50 programme);

- having more stakeholders may lead to the definition of additional goals that were not initially considered and helps in setting priorities;

- a strong sponsor, leader or champion helps in setting priorities;

- the more stakeholders are involved, the more likely it may be that consensus will be reached on a higher level of prevention or protection;

- providing funds for some stakeholders (e.g. small and medium-sized enterprises, non-governmental organizations) to participate in process (e.g. travel to meetings, scientific/technical consulting expertise);

- consumers may not be willing to bear any increase in the price of an "environmentally friendly" product (e.g. concentrated powders in the Netherlands) without proper marketing efforts.

Barriers

Some of the barriers to successful non-regulatory programmes will be faced in the initial stages of design, while others will need attention throughout the process:

- the more stakeholders are involved, the more difficult it may be to reach consensus;

- industrial participants do not always have the organisational structure, or access to one, necessary to support and encourage participation (e.g. trade associations);

- stakeholders are more familiar with traditional approaches (e.g. regulations) and may be apprehensive about trying new risk management methods;

- current antagonisms and mistrust between stakeholders who must participate as partners in the development of non-regulatory initiatives hampers progress;

- for a regional or international non-regulatory initiative, agreement can become even more complex and difficult, as cultural and social differences may need to be factored in;

- industry's suspicion that they will be subjected to increasingly higher expectations or targets during the process;

- slow or intermittent progress can destroy momentum needed to move forward in dealing with issues in a proactive way through a non-regulatory initiative;
- irregular or intermittent participation by stakeholders can be disruptive of the process;
- a lack of senior corporate support discourages participation of companies;
- participation by one company may entail costs which are not borne by a competitor;
- environmental groups do not always support those participating in non-regulatory initiatives, and do not always focus attention and publicity on non-performing competitors;
- perception of inequality in the power of one stakeholder versus that of another in the process discourages participation;
- suspicion that industry uses participation in non-regulatory initiative as a tactic to delay regulation rather than to improve performance;
- no clear groundrules on how non-regulatory initiatives are to be developed;
- difficulty in identifying appropriate stakeholders;
- providing government with information that can be used in enforcement proceedings discourages openness and participation;
- different perceptions among stakeholders of risks and different preferences as to how to manage risks;
- problems in obtaining baseline data;
- problems in ensuring adequate public access to information;
- problems in ensuring adequate verification or review.

What are the benefits and costs of non-regulatory programmes?

Benefits/advantages

As with any new venture, perceived and real benefits and costs greatly influence the initiation of, participation rate in, and enthusiasm for non-regulatory initiatives. Different stakeholders have different views of the benefits and costs, with industry most interested in achieving cost-effective ways to reduce risks, while reducing the need for regulatory controls and reaping the benefits of positive public recognition and credibility. These benefits can be greatly enhanced if key stakeholders support the initiative and provide an independent assessment of the value of the approach. Stakeholders that participate in non-regulatory initiatives share ownership of the problem and the solutions. Ideally, all relevant stakeholders will come to share ownership.

In particular, small and medium-sized enterprises are likely to benefit from the potential transfer of technology and the sharing of information that a non-regulatory programme can provide. This would not have been available to individual enterprises with their own limited resources and expertise.

Non-regulatory programmes can confirm that chemical risk management and pollution prevention sometimes pays in reduced costs of production and often in improved market share. Also, non-regulatory programmes can more effectively encourage technological innovations.

Risk management benefits are more quickly seen from the faster response time of industry to non-regulatory initiatives. Moreover, multi-stakeholder support enhances the vital requirement for governments to be seen to serve the needs of all segments of society. Industry leadership through non-regulatory initiatives also allows governments to aim for higher levels of performance by industry in general, and results in lower costs for governments to achieve their environmental objectives.

Another benefit of non-regulatory programmes is the likelihood that businesses may require and help their suppliers and customers to improve their environmental performance, thus promoting risk management throughout the supply chain.

A culture of continuous improvement can be facilitated by the flexibility inherent in non-regulatory initiatives. The multi-stakeholder involvement, when properly developed, adds transparency to the process and can facilitate the transfer of knowledge to local communities and people in general.

Finally, knowledge transfer to other companies in the same industry sector, and to other countries, can be an integral part of a healthy non-regulatory approach to problem-solving.

Costs/disadvantages

If a programme is to be successful, the identified costs/disadvantages are not necessarily insurmountable, but must be addressed in the design and implementation of non-regulatory initiatives.

The most serious costs and disadvantages include concerns about competitive advantages that may accrue to non-participants, as well as the fear of "moving targets" that governments and other stakeholders may insist upon when early successes suggest, for example, the possibility of even greater emission reductions. The moving targets issue is not necessarily bad, since it can fit well with the continuous improvement culture, but it does create uncertainty (which is one of industry's greatest fears).

Like regulatory initiatives, non-regulatory initiatives also involve the commitment of resources and up-front investments of time and money by government and industry. Industry stakeholders have the advantage of hands-on participation in every phase of these initiatives, but at the expense of providing resources for their participation. Some stakeholders, especially non-governmental organizations and small businesses, may lack the resources and expertise to participate effectively in non-regulatory initiatives, and may initially view such initiatives with suspicion if not hostility. The regulatory instrument is viewed as more certain and equitable by many stakeholders, and it can be difficult for companies to convince them that alternative approaches can be more effective and less costly.

When the number of potential stakeholders is large, a non-regulatory initiative can be overwhelmed with the complexity and cost of meaningfully engaging all relevant stakeholders and accommodating the range of interests that they represent.

At the regional and international levels, non-regulatory initiatives may result in the transfer of risks between countries, with attendant concerns related to the loss of competitiveness (this could also occur with regulations). In some cases, it is not clear whether or not leadership on non-regulatory initiatives leads more often to competitive advantages than disadvantages among companies and countries (e.g. in the case of benzidine dyes). More research on this aspect is needed. Non-regulatory initiatives will usually not have 100 per cent participation. In some circumstances, partial participation may be adequate to meet or exceed environmental goals. In other circumstances, partial participation may lead to inadequate environmental protection or to competitiveness problems. Governments may then need to take regulatory action. As with non-regulatory initiatives, even enforced regulations rarely achieve 100 per cent compliance, but regulations usually contain enforcement mechanisms which can coerce compliance by the serious contributors to risk.

As a closing comment, it is noted that hard information on the costs and benefits of regulatory versus non-regulatory initiatives is lacking and objective estimates can be very difficult to obtain. While it is recognized that more research is needed to substantiate any claims being made that non-regulatory initiatives are more cost-effective, the general view is that this is the case.

What suggestions would you make for the OECD, individual countries, industry/companies, or non-governmental organizations who are interested in exploring non-regulatory programmes?

1. It is recommended that the Ad Hoc Risk Reduction Working Group incorporate a mix of regulatory and non-regulatory approaches (e.g. Japan's Direction and Promotion of Comprehensive Chemical Safety Management) in the Risk Management Programme.

2. It is recommended that the OECD publish the workshop proceedings (including the posters, as an annex) as a General Distribution document to aid in establishing effective co-ordination mechanisms with other programmes and activities related to non-regulatory initiatives throughout the OECD.

3. The OECD should identify non-regulatory opportunities which could be considered for implementation internationally, regionally, or by Member countries.

4. It is recommended that the OECD provide a forum for expanding ongoing non-regulatory initiatives: for example, NiCd battery recycling programmes that have been or are being implemented in Canada, Japan and the United States and may be applicable to other countries.

5. As follow-up to this workshop, it is recommended that the OECD consider a project devoted to collecting examples of meaningful measurement criteria used in existing programmes such as recycle rates and emission reductions. This would aid in promoting success in other countries or industrial sectors.

6. Based on the example of the US EPA’s Printed Wiring Board project, it is suggested that in order to assist small and medium-sized enterprises (SMEs) to better participate in non-regulatory initiatives, the OECD, in co-operation with BIAC, could promote liaison activities between industry associations and chambers of commerce and the sharing of tools between SMEs.

7. The workshop recognized that, in order to increase the efficiency of risk reduction initiatives, it may be necessary to consider action at various stages in the supply chain of a chemical (e.g. the Major Industrial Accidents Co-ordinating Committee).

8. It is recommended that the OECD act as a clearing house for information on non-regulatory initiatives. Some specific suggestions are that the OECD can facilitate information-sharing in "weak" areas such as measurement and monitoring.

POSTERS

Risk Reduction through Risk Communication: A Case from Hungary

Zsuzsanna Füzesi and Charles Levenstein

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In spite of its decreasing volume, lead contamination has been one of the most important environmental health hazards in Hungary.[1] The most endangered group includes people living in areas where there is heavy traffic or near lead processing plants, and workers working with lead.[2] Children are especially at risk: according to estimates by scientific authorities, 8-13 per cent of schoolchildren have blood lead levels above 10 µg/dl.[3]

The objective of a two-year Hungarian-American joint project was to elaborate and test a comprehensive approach to environmental health through the example of lead poisoning prevention. The first phase of the project was supported by a grant from the U.S. Environmental Protection Agency to Tufts University (Boston, Massacusetts) and the second phase by a grant from the Social Insurance Fund of Hungary. The project was co-ordinated by the Fact Foundation (Pecs, Hungary).

A complex approach and multi-sectoral participation were characteristics of the elaboration and execution of the program. Thus, besides the traditional assessment of the seriousness of the lead issue (main sources of lead pollution, extent of pollution in the environmental elements and in the human body, ways of exposure, etc.), sociological surveys were conducted in relevant sectors of society, among decision makers as well as endangered community residents and worker groups, about their knowledge, attitudes and means of individual and community protection. Based on this interdisciplinary assessment, we have developed and carried out a complex risk communication model (including training programs and a media campaign) with the aim of changing the behaviour of those involved at the community, workplace and policy levels.

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[1] Although traffic lead emissions continuously decrease in volume, in 1994 108 tonnes of lead was emitted into the air (637 tonnes in 1980, and 387 tonnes in 1991) (Sources: Ministry for Environment and Regional Policy and Traffic Science Institute). Of the sources of lead pollution, transportation is the most important (about 80 per cent of total emissions is related to transportation). Additional sources include industry (e.g. glass manufacturing, battery production) and hazardous waste (e.g. lack of appropriate management of batteries and paints).

[2] Among the 10,000 workers who work with lead, 400-600 acute cases of lead poisoning occur each year.

[3] Studies of P. Rudnai, A. Horvath and M. Groszmann, A. Hudak, M. Naray in: From Science to Action: the Lead Hazard in Hungary. A Fact Report (Ed.: Zs. Füzesi, B. Levy, C. Levenstein). Fact Foundation, 1997.

The project demonstrated that information and methodology from both the social sciences and physical sciences are essential in establishing a strong foundation for public policy on environmental health issues.

Although this project focused on addressing one environmental health problem in one country, it has broader applicability. The model can be adapted to various social, cultural and political realities, and numbers and types of participants ("actors"), and to the specific environmental issues involved in the nations of central and eastern Europe.

A Process to Reach Agreement: Voluntary Initiative versus Rulemaking

R.S. Sayad[1] and L.R. Harris[2]

Most regulatory initiatives undertaken by U.S. federal agencies involve hundreds of pages of text in the *Federal Register* referencing thousands of pages of support documents followed by tens of thousands of pages of written testimony, resulting in lengthy and complex judicial decisions interpreting the agencies' actions. When the U.S. Environmental Protection Agency (EPA) proposed a Test Rule under Section 4 of the Toxic Substances Control Act (TSCA) for "Glycidol and Its Derivatives" (Test Rule) in November 1991,[3] it appeared that the Test Rule would follow a similar tortuous path. Fortunately, due to the vision of the members of The Society of the Plastics Industry, Inc. (SPI) Epoxy Resin Systems Task Group[4] and the creativity of key staff within EPA's Office of Pollution Prevention and Toxics, a new approach was taken, resulting in an innovative, effective approach for protecting health and the environment. Rather than rely upon cumbersome regulatory language in the U.S. Code of Federal Regulations, the Task Group and EPA publicly negotiated written agreements that met the objectives of the proposed Test Rule without the attendant burdens and costs to EPA and the regulated industry.

EPA's 1991 proposed Test Rule covered 66 substances and mandated a variety of toxicity tests, from two-year cancer bioassays to sophisticated developmental, reproductive and neurotoxic tests, estimated to cost industry over $20 million.[5] It was the largest and most complex TSCA Section 4 Test Rule ever proposed by EPA. In its written comments on the Proposed Rule, the Task Group suggested focusing on the highest production volume members of the category "Glycidol and Its Derivatives" and targeting toxicity endpoints for which additional data might be helpful in assuring safety and health. The Task Group also opened a dialogue with key OPPT staff, exploring innovative alternatives to a final Test Rule.

In July 1992, EPA established an "open season" to allow industry and other interested parties to submit testing consent agreement proposals for substances that are the subject of proposed Test Rules.[6] The Task Group submitted proposals for testing agreements on the diglycidyl ether of bisphenol A (DGEBPA or BADGEO) and alkyl C_{12} - C_{14} glycidyl ether, the two largest volume chemicals in the "Glycidol and Its Derivatives" category. Along with a testing program for these specific substances, the Task Group outlined a Product Stewardship Program designed to make health, safety and environmental protection an integral part of the life cycles of epoxy resins and modifiers in general, as a means to control potential exposures as an alternative to toxicology testing.

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[1] The Dow Chemical Company. Chairman of the Society of the Plastics Industry, Inc. Epoxy Resin Systems Task Group and Global Manager, Product Stewardship, Dow Plastics.

[2] Staff Director, Epoxy Resin Systems Task Group and Technical Director, Society of the Plastics Industry, Inc. (SPI) and Staff Director, SPI Epoxy Resin Systems Task Group.

[3] *Fed.Reg*. 57144 *et seq.* (November 7, 1991).

[4] The Task Group comprises the major manufacturers of epoxy resins, epoxy modifiers, and glycidyl functional intermediates. Member companies are Air Products and Chemicals, Callaway Chemical Company, Ciba-Geigy Corporation, CVC Specialty Chemicals, The Dow Chemical Company, and Shell Chemical Company.

[5] See "Comments of the Epoxy Resin Systems Task Group of The Society of the Plastics Industry, Inc.," page 36 (April 6, 1992), EPA Docket No. OPTS-42051A.

[6] 57 *Fed. Reg*. 31714 *et seq.* (July 17, 1992).

In March 1993, EPA selected DGEBPA as a priority candidate for negotiating a consent agreement between the agency and interested parties. Through SPI, Ciba-Geigy Corporation, The Dow Chemical Company, and Shell Company identified themselves as interested parties and participated in a series of public meetings to fashion a testing plan for characterising the potential of DGEBPA for oncogenicity, neurotoxicity and developmental toxicity. In addition, SPI offered to undertake a glove permeation study and to implement a product stewardship program as a means of assessing and reducing worker exposure to DGEBPA.

The testing programs for these two substances were formalised in enforceable consent agreements that contained specified testing protocols, timetables for completion of testing, and reporting requirements. In addition, the companies signed voluntary agreements, in the form of Memoranda of Understanding, setting forth the elements of the respective Product Stewardship Programs for the two substances. Although very similar in content, the Memorandum of Understanding (MOU) for DGEBPA applies solely to that substance, whereas the MOU for alky C_{12}-C_{14} glycidyl ethers applies to seven alkyl glycidyl ethers.

Each MOU includes provisions for pollution prevention, waste minimisation, exposure reduction and hazard communication activities. In addition, the MOU includes a means for measuring improvement in implementing these various elements and reporting progress to EPA.

Testing of DGEBPA is now underway, and testing of AGE will commence shortly. Task Group member companies are actively involved in implementing the various elements of the respective MOUs. EPA's Assistant Administrator Lynn Goldman, head of the Office of Prevention, Pesticides, and Toxic Substances, recently commended Task Group members for their "leadership, foresight, and commitment" in fashioning these voluntary agreements. Although the companies signing the DGEBPA and AGE MOUs represent over 98 per cent of the US production volume of these substances, there are several companies that produce, import, process and/or distribute such materials that are not signatories to the MOUs. Lynn Goldman strongly urged such non-participating companies to support the Task Group's efforts.

Benefits have accrued to both EPA and the Task Group because of this innovative approach to regulation. EPA avoided the costly and time-consuming formal rulemaking process and likely subsequent judicial review and received written agreement from an entire industry segment as to an appropriate product stewardship program for an important group of chemicals. The Task Group avoided a complex rule mandated by EPA. It should be noted, however, that testing under the enforceable consent agreements will exceed $3 million and the costs of the Product Stewardship Programs, especially in personnel and recordkeeping, are not insignificant. Still, such costs are outweighed by the benefits to the Task Group member companies. In addition to the cost benefits, the Task Group has received widespread publicity for its efforts and solidified its credibility and reputation with EPA. Moreover, the increased emphasis on improving workplace health and safety, especially among downstream users of DGEBPA and AGEs, will reap benefits for many years to come.

Canada's Advantage

Mark Egener
Major Industrial Accidents Council of Canada

The Major Industrial Accidents Council of Canada (MIACC) is a unique, not-for-profit organisation that aims, through a voluntary, consultative and consensus-building process, to promote comprehensive and uniform safety practices and standards within industry and government to deal with major industrial accidents, and thus reduce the frequency and severity of such accidents over the long term.

MIACC was established in 1987. In Phase I of its evolution, the Council focused on the development of products and services (tools) to assist both industry and government to prevent, prepare and respond to major industrial accidents. In Phase II, MIACC is concentrating on the distribution of products and the implementation of a strategy for prevention, preparedness and response (PPR) at the community level.

Background

In its quest to quantify the value of the MIACC process, the Board was assisted by Industry Canada in researching and evaluating the effectiveness of the MIACC approach – both in terms of improving Canadian PPR capabilities and in comparison with a more regulatory approach. The end result was a report and recommendations for increasing the strengths of the process, published under the title *Canada's Advantage.*

Report overview

The report recognises MIACC's effectiveness and its innovative approach to improving Canadian PPR capabilities. It concludes that the state-of-the-art tools that are developed through the process are not only high quality and low cost, but they are practical and acceptable to industry and governments alike.

As well, the report indicates that the co-operative approach to environmental protection in Canada provides the same or better results than prescriptive regulatory measures alone.

Through its commitment to the MIACC process, industry retains the flexibility necessary to be innovative and to select the most cost-effective approach in solving complex public safety and environmental risk management problems.

Governments find the financial savings realised through the MIACC process notable. In the United States, the cost of legislating compliance is very high. In comparison, Canada is achieving high levels of public safety and environmental protection at much lower costs. As well, governments are deriving benefits from having relatively easy access to industry's considerable technical expertise.

Report highlights

- The value of voluntary commitment to MIACC activities is substantial:

In 1990, during Phase 1 of the MIACC workplan, the total value of the voluntary commitment from members and stakeholders was conservatively estimated at $1,615,000.

This estimate indicates that **MIACC was able to lever six dollars of voluntary expertise for every dollar invested**. (It is anticipated that the averaging ratio will be much higher when more communities are involved.)

- Since its inception, MIACC has developed valuable tools and has built a solid network of PPR professionals. These tools, in the form of products and services, have made significant contributions in cost savings to both industry and governments.

For example, **Z731**, which enables companies to develop an emergency response plan, **has already generated an estimated $10 million per year in cost savings**. This amount underestimates the true value of the product, as it does not include the costs saved in reducing risk.

- Since 1987, **there has been a sharp downward trend in the average insurance payout per accident, and in the Canadian share of world losses** associated with major industrial accidents.

Accident loss data obtained from Swiss Reinsurance Co. (Zurich, Switzerland) show that in the oil and gas, chemical and petrochemical sectors, average total insurance payouts for an accident in Canada today are significantly lower than ten years ago. In contrast, the insurance payout averages for both the U.S. and the rest of the world are higher:

year	Canada	U.S.	rest of world
average 1981-87	US$ 26,430,000	US$ 26,380,000	US$ 7,140,000
average 1988-92	US$ 6,870,000	US$ 37,630,000	US$ 17,990,000

As well, the Canadian share of total world insurance payouts has dropped in the same time periods while the U.S. share has increased. The rest of the world's share has remained approximately the same:

year	Canadian share	U.S. share	rest of world
average 1981-87	10.9%	29.5%	59.6%
average 1988-92	1.9%	43.6%	54.5%

Report recommendations

The report's author separately recommends that with the implementation of the following activities, MIACC will become even more effective in minimising the risk to Canadians from major industrial accidents:

- greater efforts should be made to **educate industry and governments at all levels** (federal, provincial and municipal) about the benefits of participating in the MIACC process and using MIACC tools:

- **all provincial governments should be encouraged to support and participate in the MIACC process** to facilitate harmonisation and comprehensive, uniform implementation of PPR programmes across Canada;

- more **MIACC products should be published as standards** to facilitate the cost-effective harmonisation of legislation by referencing PPR standards to avoid unnecessary duplication;

- a **voluntary registry of companies using hazardous chemicals** should be created to provide information about the risks associated with hazardous substances and the efforts being made to minimise them;

- **national standard criteria should be established for accident reporting** to determine if the overall situation is improving or if further work is required to prevent future accidents; at the present time, there is no national database which can be used to identify trends, prioritise future prevention and preparedness activities, or calculate the probabilities of future accidents;

- all **government departments** with a mandate for protecting the public and the environment, and the **companies and industry associations** that derive benefits from the MIACC process and information products, **should prove additional and continuing support for MIACC.**

Conclusion

- The more Canada relies on voluntary processes like MIACC, the report concludes, the better the environment and the public will be served and the more a **competitive advantage** will be enjoyed by Canadian industry. By supporting MIACC, Canada promotes **innovation and growth in the national economy** which encourages a favourable investment climate.

Unique Dioxin Issue Addressed by British Columbia Industry

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In 1992 Environment Canada established a partnership with Fletcher Challenge Canada Ltd. to determine whether the incineration of sludge from wastewater treatment facilities associated with pulp and paper mills would result in an air pollution problem. Staff from Environment Canada, Pacific and Yukon Region, worked with staff from the Fletcher Challenge mill in Elk Falls, B.C. to design and conduct this major study, which had a budget of close to $1 million. A series of controlled samples were collected from the #5 power boiler at Elk Falls, in order to compare combustion of hog fuel with that of mixtures of hog fuel and effluent treatment plant sludge.

An unexpected result of this experiment was the discovery that elevated emissions of dioxins and furans were associated with the combustion of salty hog fuel, originating from logs stored in the marine environment. These stack dioxin emissions are very high in terms of concentration and mass loading when compared to other known sources such as municipal solid waste incinerators.

Upon receiving this information Environment Canada, backed by a multi-stakeholder team with representatives from industry, and provincial and federal representatives of environment and health agencies, commissioned a study to determine the potential health effects from these dioxin emissions.

Results from the stack testing study were released to the press simultaneously with results from the health assessment study, which predicted a low likelihood of effects to the local population from dioxin and furan emissions.

Recognizing the importance of reducing the dioxin emissions which are released to varying degrees by all coastal pulp mills burning salty hog fuel, PAPRICAN initiated follow-up studies to develop mitigation measures to reduce the formation of dioxins. The program, estimated to cost in excess of $2 million, is moving into the third year of research and development. Possible approaches which are being explored include modification of chloride:sulphur ratios, elevated combustion temperature, chloride leaching through hog fuel washing, or a combination of these measures.

To date the co-operative work with industry has proceeded in the absence of any regulatory framework, and has depended on the good working relations among the participants. Advantages include a lower transaction cost to government, and an “ownership” of the problem by industry which provides motivation to continue to seek a solution.

The co-operative program has been a significant success in that a major, previously unidentified source to the environment of a toxic, persistent substance has been identified. The challenge for the future will be to find a solution which will significantly reduce dioxin/furan emissions to the environment, within the context of regional economic constraints.

A meeting between Federal and Provincial environmental agencies and the B.C. Council of Forest Industries is planned for September to discuss the next steps. At a meeting between Environment Canada and the British Columbia coastal pulp mills in September, 1996, a status report was presented on the companies' collective R&D support to investigations on dioxin mitigation measures. Potential full scale demonstration projects will be considered over the next two years to examine ammonia injection and sulfur injection into wood waste fired boilers as means of preventing dioxin synthesis in the combustion zone. Environment Canada committed to developing an inventory of dioxin emissions from the 10 coastal pulp mills based on a combination of actual stack test data and emission factor methodology. Environment Canada also presented the challenge to the industry in working towards the goal of the government's Toxic Substances Management Policy which is to virtually eliminate persistent bioaccumulative substances such as dioxins and furans.

Industry Acts to Recycle Gasoline Vapours

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In 1990, the Canadian Council of Ministers of the Environment endorsed a national management plan that outlined NO_x and VOC reduction measures necessary to meet ambient air quality goals for ground level ozone. In response to this plan, Environment Canada proposed a joint government-industry task group with representation from petroleum producers in western Canada to address the technical and economic feasibility of Stage 1 gasoline vapor recovery in the Vancouver area of British Columbia.

About 4000 tonnes of VOC were emitted in 1990 from gasoline transfer operations within the so-called Stage 1 portion of the fuel distribution network that includes fuel transfers from the refineries up to and including the filling of underground storage tanks at retail outlets. This quantity represents about 4.7 per cent of the total VOC emissions within the Vancouver area, an airshed that encompasses a population of 1.8 million people and one million cars. Ambient ozone levels exceed the Canadian one-hour Maximum Acceptable air quality objective of 82 ppb up to 15 days annually.

Following the completion of technical and economic feasibility studies of the industry-government working group in 1990, the western Canada representatives of the Canadian Petroleum Products Institute voluntarily committed to the implementation of Stage 1 vapor recovery as a pilot project in Canada. The technology involved the installation of carbon adsorption vapor recovery units at each of the four main terminals, fixed roof tanks with vapor balancing at bulk terminals, vapor balance systems on truck fleets, and vapor balance systems on underground storage tanks at some 500 retail outlets. Total capital investment was approximately $15 million. Overall emissions were estimated to be reduced to 1680 tonnes annually at an overall net unit cost of $234 per tonne.

The management approach for this project was quite informal. Industry participants made their voluntary commitments verbally without any suggestion of any formal written agreement. News media coverage during program implementation reflected positive public support, and no doubt this helped to enhance industry's image in this regard.

Container Management Program
1995 Report

Crop Protection Institute

Executive Summary

The Crop Protection Institute operates and supports a Canada-wide program to collect and recycle used pesticide containers. As a common service to members and customers the Container Management Program, through funding and direction from the Crop Protection Institute members and operational support from local stakeholders, manages the collection and direction of one-way plastic and metal "Agricultural" and "Commercial" pesticide containers, up to 23 litres capacity, to approved safe end uses in order to protect our environment and meet the expectations of Canadian society.

Implementation of the new strategic plan, approved by the Crop Protection Institute Board of Directors on June 15, 1994, which amended the Container Management Program (CMP) to make it more effective and efficient and to set specific goals, was the main thrust of the 1995 activities. The goals for this industry-regulated stewardship program included: 70 per cent recovery of containers by 1997; 90 per cent recovery by 2000; annual recycling of 100 per cent of materials collected; safe end uses for collected materials; 25 per cent cost reduction over five years; and development of national policy and standards.

The CMP is fully operational in nine provinces. Ten CMP committees co-operated in the conduct of the programs. To date the program has removed more than 17 million empty pesticide containers from the Canadian environment. The 1995 container collection operations were completed in all provinces, with collections being made at 763 sites. A total of 3,525,632 units were collected, consisting of 3,449,914 plastic and 75,718 metal containers. The percentage increase in the number of plastic containers collected per province ranged from 8.6 per cent to 570 per cent, with an average increase of 21.9 per cent over 1994. The number of metal containers collected continued to decrease, with an overall reduction of 18.1 per cent since 1994. The total number of containers collected in 1995 was 20.6 per cent greater than in 1994 and 53 per cent greater than in 1993.

In 1995 the industry shipped 5,500,180 containers, an increase of 11 per cent over 1994. The containers collected in 1995 represented 64.1 per cent of those shipped. The comparable recovery rates were 59.1 per cent for 1994 and 51.6 per cent for 1993.

Total program costs were equivalent to $1.14 per container collected in 1995, $.19 per container less than for the previous year, representing a cost saving of 14 per cent.

Five contractors, under formal Container Processing Agreements with CPIC, collected and shredded the containers returned to depots in the nine provinces in 1995. Plastic shreds were used for their energy value or manufactured into fence posts for use on farms.

Memoranda of Agreement between CPIC and the respective Committees have been signed or approved for signing with eight provincial groups. Two others are in the final stages of development.

Recycling of the processed plastic and metal continues to be the major challenge for the CMP, and several research projects are underway to evaluate potential options.

The Container Management Program continues to be a co-operative venture between those with an interest in pesticides and the crop protection industry. The advantages of ongoing input from local committees are recognized, and CPIC welcomes their involvement for continuous enhancement of the Program. The Memoranda of Agreement developed with the provincial committees and CPIC form a businesslike relationship between the parties and delineate responsibilities.

Success of the program is credited to the joint participation and co-operation of farmers, provincial committee members, provincial government personnel and departments of Environment, Agriculture and Health (at the province level), municipalities, pesticide dealers, processing and recycling contractors, and members of the Crop Protection Institute who fund it.

Environmental Risk Assessment of Detergent Chemicals

A co-operative risk assessment of detergent surfactants by industry and the Dutch Ministry of Housing, Spatial Planning and Environment (VROM) and the Dutch National Institute of Public Health and the Environment (RIVM).

On Behalf of ERASM - by S D Baird, LDC, Lever Bros Ltd PO Box 69, Port Sunlight, UK

BACKGROUND

1. Surfactants were a cause for environmental concern in NL in late 1980s

- inherently toxic to aquatic life
- high tonnages (23 kg/person/year in NL)
- wide dispersive use.

2. Voluntary Plan of Action agreed (1990) between NVZ and VROM for detergents and the environment.

3. Previous Voluntary agreements included phasing out the use of

- alkylphenol ethoxylates (APE)
- tetrapropylene benzene sulphonate (TPBS)
- dihardened tallow dimethyl ammonium chloride (DHTDMAC).

Voluntary Plan of Action

1. Reviewed the use of detergents in the Netherlands and the hazard of ingredients.

2. Identified priority detergent ingredients (>100 tonnes/year), based on predicted removal and toxicity,

- linear alkylbenzene sulphonate (LAS)
- alcohol ethoxylates (AE)
- alcohol ethoxylated sulphates (AES)
- soap

3. Established environmental monitoring methods for surfactant.

ERASM commissioned a joint industry task force of AISE/CESIO to develop and apply specific methodology for the environmental monitoring of surfactants. Removal, effluent concentration and sludge concentrations of LAS, AE, AES and soap were measured in 7 different waste water treatment plants in order to establish environmental concentrations. This study was preceded by five national pilot studies on LAS [1]. In addition, work was undertaken to establish no effect concentrations for each surfactant. Existing effects data on a variety of surfactant structures were normalised to the structures found in the environment, using structure activity models. The normalised data were used, in addition to effects data from model ecosystem studies, to derive a PNEC for each substance.

Principles of the Assessment

A step sequence was followed, based on the progressive generation of data. Each level of data supersedes the previous data. At each tier the environmental concentration is predicted (PEC) and compared with the predicted no effect concentration (PNEC). The PNEC contains an application factor (AF) which reflects the degree of confidence in the data - as more data are generated, confidence increases and the AF decreases.

TIER 1 SCREENING (AF = 1000) PEC - Waste water treatment plant (WWTP) model PNEC - Acute laboratory studies

TIER 2 CONFIRMATORY (AF = 10) PEC - WWTP simulation studies PNEC - Chronic laboratory studies

TIER 3 INVESTIGATIVE (AF = 1) PEC - WWTP monitoring studies PNEC - Ecosystem studies

Predicted No-Effect Concentration (PNEC)

Many of the existing effects data could not be used directly as they were derived from a huge variety of different surfactant structures. Many were from tests with materials whose structures were not the same as those found in the environment. As the structure of surfactants influences their toxicity, structure activity models were needed to normalise the effects data to environmentally realistic structures. The normalised data was used, in addition to effects data from model ecosystem studies, to derive a PNEC for each substance. The final PNEC for C11.6 LAS was 250 µg/l, for AE C13.3 EO8.2 it was 110 µg/l, and for AES C12.5 EO3.4 the PNEC was 400 µg/l. For soap, the PNEC was 27 µg/l, a low value reflecting the lack of chronic data.

Predicted Environmental Concentration (PEC)

ERASM programme to predict and then measure removal of LAS, AE, AES and Soap during sewage treatment

Surfactant	**Predicted Removal SIMPLETREAT***	**Predicted Removal WWTREAT***	**% Removal (derived from mean measured levels)**
LAS	97.9	98.0 ± 1.7	99.2
AE	97.6	98.0 ± 1.2	99.8
AES	97.5	98.0 ± 1.2	99.6
Soap	97.9	98.0 ± 0.8	99.1**
* Computer Models ** 6 out of 7 plants			

These data confirmed the effective removal/degradation of the surfactants during sewage treatment, which was predicted previously as 98-99% by two mathematical models (SIMPLETREAT and WWTREAT). The monitoring data indicated that the model predictions were too conservative.

PEC/PNEC ratios for LAS, AE, AES and Soap based on 3 in-stream removal rates

In-stream removal rate (day-1)	LAS	AE	AES	soap
K=0	0.04	0.01	<0/01	1/0
K=0.14	0.03	0.01	<0.01	1.3
K=0.7*	0.02	<0.01	<0.01	0.74

* An in-stream loss rate of 0.7 day^{-1} for surfactants is similar to in-stream BOD removal rates and, based on expert judgement, is the most appropriate.

PEC/PNEC ratios gave safety margins of approximately 100 for LAS, AE and AES. Environmental concentrations for soap were close to or above the PNEC. (The paucity of effects data on soap is largely responsible for this apparently greater risk of environmental effects.)

CONCLUSIONS

1. Based on the results of the risk characterisation VROM concluded in NL that in proper functioning waste-water treatment plants the risks for LAS, AE and AES for the aquatic compartment are low. Since the preliminary chronic toxicity data for soap demonstrate that it is not more toxic than the other three surfactants, no further action is needed.
2. Since the high priority surfactants were safe, VROM concluded that the other components of detergents would not need such a detailed assessment. However, some substance such as optical brighteners, zeolites or polycarboxylates, will still receive some attention, mainly due to lack of data on their biodegradation or ecotoxicological profile.

KEY FEATURES OF THE APPROACH

Objective

1. Establish consensus on objective risk assessment methods.

2. Establish the risk presented by the priority detergent ingredients.

Participation

Academia, industry and government invited to a series of consultations and workshops where knowledge and experience were combined and developed. Methodology, results and conclusions were debated and consensus developed during a series of workshops [2-4].

These were used to build a scientifically based consensus for environmental risk assessment of the principal domestic detergent products, and identification of where further research and debate was needed.

Measuring success

1. NL exercise was successful. VROM concluded in NL that in proper functioning waste-water treatment plants the risks for LAS, AE and AES for the aquatic compartment are low.

2. Extrapolation to other countries and geographical areas was not entirely successful. However, there should be no need to repeat the exercise in the same level of detail as applied in NL. This exercise emphasised the need for further work. The GREAT-ER project will lead to a more accurate prediction of the risk of environmental effects at specific European locations.

Advantages of the approach

- Joint funding and ownership of the programme led to acceptance of the results and conclusions.
- Builds trust, understanding and respect and a basis for future dialogue.
- Ensures acceptance and ownership of the conclusions of the programme.
- Avoids inappropriate regulatory restrictions.
- Avoids inappropriate risk assessment of low priority chemicals.
- Demonstrates commitment by industry to support environmental initiatives.

Disadvantages of the approach

- Lengthy, complex and expensive.
    - Monitoring programme (500 000 ECU) three years.
    - Model validation study (110 000 ECU) two years.
    - Consulting/Workshops (200 000 ECU).
    - Problems gaining acceptance by those who were not involved.

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ABBREVIATIONS

VROM	Dutch Ministry of Housing, Spatial Planning and Environment.
RIVM	Dutch National Institute of Public Health and the Environment.
AISE	Association Internationale de la Savonnerie, de la Détergence et des Produits d'Entretien.
CESIO	Comité Européen des Agents de Surface et Intermédiares Organiques.
ERASM	The Environmental Risk Assessment Steering Committee of AISE and CESIO.
GREAT-ER	Geographically-referenced Regional Exposure Assessment Tool for European Rivers.
NVZ	Dutch Soap Association.

Industry Initiatives for Risk Reduction in Germany
by Arno W. Lange

The regulation of a chemical which is dangerous for the environment is necessary,
- if the expected (predicted) environmental concentration is of the same magnitude as, or higher than the concentration at which harmful effects occur, and
- if there is no other legal provision to avoid exposure (e.g. in clear air or waste management legislation), and
- if labelling is not sufficient.

A regulation based on the Chemicals Law can be avoided if the manufacturer or importer takes an initiative to reduce the risk. The first step is done by the assessment authority Umweltbundesamt (Federal Environmental Agency) when the final assessment leads to the result: the expected environmental concentration is higher than the effects concentration. Then the notifier is asked to submit to the Umweltbundesamt proposals how the risk posed by the use of the chemical can be reduced to an acceptable order of magnitude. The notifier is informed that otherwise the Umweltbundesamt would recommend to the Federal Government via the Ministry for the Environment to prohibit the chemical.

The next step is normally an expert discussion on the details of possible risk reduction measures.
As a result of the risk assessment of notified New Substances, 31 of them have been considered for regulation.
After discussion with the notifier and a refined assessment, as a consequence 6 substances were decided to be less dangerous.
2 substances were banned or severely restricted, because no other measure for risk reduction could be found.
9 substances were voluntarily withdrawn by the notifier, resp. the producer.
For one substance risk could be reduced to an acceptable magnitude by self-commitment of the producer (see below).
13 substances are still under discussion, resp. ready for decisions by the Federal Government

The self-commitment by the company Pfersee GmbH concerning a fungicide which is marketed under the trade names FUNGITEX and PERPREGNOL in two different preparations is a good example for a *non-regulatory risk reduction*. It secures on one hand the necessary protection for the environment and on the other hand the commercial demands of the producer. The text of the commitment is as follows:

Commitment

This commitment includes mixtures of esters of compound *X* as alcoholic component and *Y* fatty acid and acetic acid as acid components. Furthermore it includes also chemical products which contain such mixtures of esters.

The Company PFERSEE GmbH commits itself to the following:
1. To inform all customers in Germany and abroad to whom mixtures or products are delivered about the danger which may be posed especially to the environment during use or disposal of the substances.

2. To submit to the customers recommendations about the safe handling and disposal.

3. To supply in Germany only those customers with the above mentioned mixtures and products who commit themselves by letter to the Company PFERSEE that they use the mixtures and products only according to the technical recommendations and that residues are only disposed under the rules for special dangerous wastes.

4. To inform customers from abroad that they must not reimport the mixtures and chemical products without the permission of PFERSEE.

5. To submit to the German authorities copies of the technical recommendations the customers are provided with.

6. To submit to the German authorities a list of the customers to whom the mixtures and chemical products have been delivered.

With regard to this non-regulatory risk reduction initiative the Minister for the Environment Dr. Angela Merkel informed the public via the press:

"This commitment is again an example of the *principle of co-operation*. Only in a dialogue with industry is it possible to obtain optimal solutions for the protection of our environment. The principle of *deregulation* has again been proved to be practicable. With this commitment which is effective across the German borders a level of protection will be reached which would not be obtainable with a mere national regulation."

The *stimulus* of the initiative is to protect the environment without restricting the marketing of the chemical more than necessary.

It was sometimes *disappointing* that companies often were less co-operative. So it needed in some cases years to reach a final decision on whether a regulation by a statutory ordinance is necessary or not because an agreement with the producer could be signed.

The lesson is:

Without the threat of a possible restrictive regulation a voluntary risk reduction initiative by the producer is rather unlikely.

Federal Environmental Agency Berlin, Germany

Information Sheet on the "Environmental Label"

Current Facts and Figures
Status: August 1996

I. Foundation and Criteria

Upon the initiative of the Minister of the Interior, the Environmental Ministers of the Federation and the Federal States decided in 1977 to introduce an Environmental Label. In 1986, the responsibility for the Environmental Label was transferred to the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. Products that are especially environmentally compatible can be awarded the Environmental Label.

An award may be given for products which,

- compared with other products fulfilling the same function and
- considered in their entirety, taking into account all aspects of environmental protection (including the use of raw materials), are, as a whole,
- characterized by a particularly high degree of environmental soundness
- without thereby significantly reducing their fitness for use and impairing their safety.

The Environmental Label is made up of the environmental sign of the United Nations ("Blue Angel"). In the outer circle there are references to the special environmental attributes of the product.

II. Institutions involved

The Environmental Label is jointly sponsored by

- the Jury Umweltzeichen - an independent panel with representatives from the scientific, business and environmental communities and from consumer organizations,
- the German Institute for Quality Assurance and Labelling (Deutsches Institut für Gütesicherung und Kennzeichnung e.V. - RAL), Siegburger Straße 39, 53757 St. Augustin, Tel.: 02241/1605-23, -36 and
- the Federal Environmental Agency (Umweltbundesamt), Postfach 33 00 22, 14191 Berlin, Tel.: 030/23145-705, -678.

III. Decision-making process (see flow chart below)

The decision-making process comprises the following two steps:

Step 1:

- new proposals are collected and commented by the Umweltbundesamt,
- the Jury Umweltzeichen twice a year makes a pre-selection of those product groups warranting closer scrutiny,
- preparation of a preliminary draft of the criteria by the Umweltbundesamt,
- organization of expert hearings by the Deutsches Institut für Gütesicherung und Kennzeichnung e.V. (RAL) for the preparation of the final decision by the Jury Umweltzeichen,

- decisions by the Jury Umweltzeichen on the product groups and the criteria that may be given the Environmental Label (twice a year),
- announcement of the decision to the media.

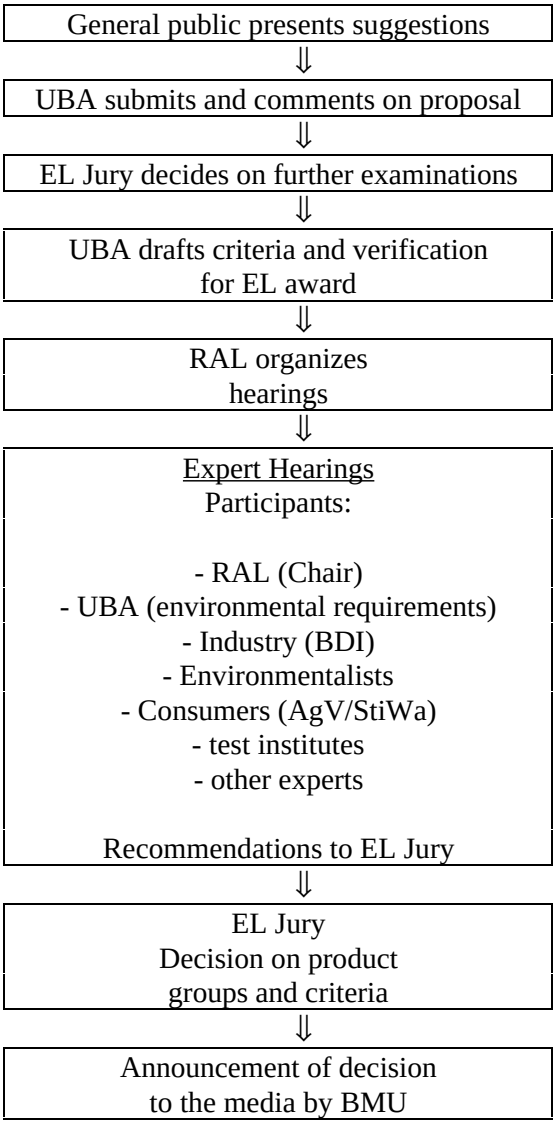
Step 2:

- submission of applications to RAL by the interested manufacturers,
- case-by-case study by RAL with the participation of the Umweltbundesamt and the Federal State in which the manufacturer is located,
- signing of a contract on the use of the Environmental Label between RAL and the manufacturer.

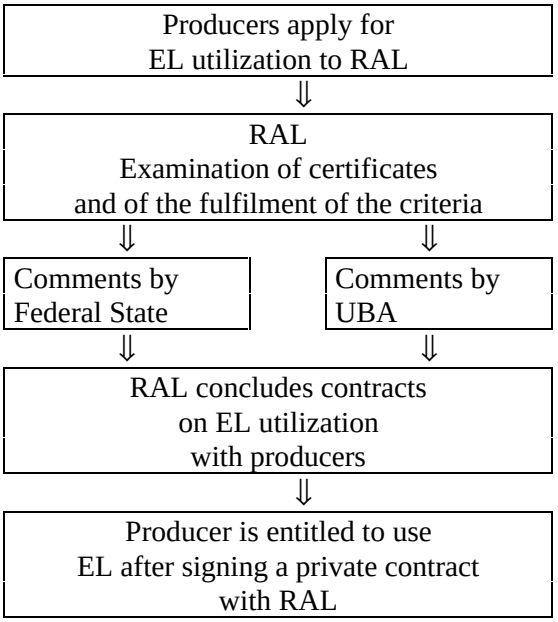
Published by:	Umweltbundesamt (Federal Environmental Agency) Mauerstr. 52, 10117 Berlin (Postanschrift: 33 00 22, 14191 Berlin) Section III 1.3 "Methods of Product Valuation, Environmental Labelling" Phone: 030/23145-705, -678, -706, -675, -699

IV. Environmental Label Process

Step 1: Development of Criteria



Step 2: Applications by Manufacturers



Explanation of abbreviations:

RAL	German Institute for Quality Assurance and Labelling	UBA	Federal Environmental Agency
AgV	Consumers' Association	BMU	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BDI	Federation of German Industries Agency	EL	Environmental Label
StiWa	"Stiftung Warentest" Foundation		

V. "Award criteria" effective at present (February 1996)

At present, contracts on the use of the Environmental Label with RAL can be concluded for individual products within the following product groups:

		Decision taken in	Valid* through	Number of EL products	Number of manufacturers
RAL-UZ 1	retreaded tires	1978	1998	5	4
RAL-UZ 2	returnable bottles	1978	1997	90	47
RAL-UZ 3	low waste hairsprays, deodorants and shaving foams	1989	1999	-	-
RAL-UZ 5	sanitary paper made from recycled paper	1978	1997	86	8
RAL-UZ 9	low-emission oil burners	1979	1997	69	22
RAL-UZ 12 a	low-pollutant paints	1980	1997	1,205	102
RAL-UZ 12 b	powder paints	1981	1998	-	-
RAL-UZ 13	salt-free blunting spreading material	1981	1997	46	39
RAL-UZ 14	recycled paper	1981	1997	153	52

* The period of validity can be prolonged by the Environmental Label Jury.

		Decision taken in	Valid* through	Number of EL pro-ducts	Number of manufac-turers
RAL-UZ 16	zinc-air batteries	1981	1997	16	3
RAL-UZ 17	potting containers and similar mould parts made from recycled material	1982	1997	4	4
RAL-UZ 21	sound-proofed glass collection bins for noise-sensitive areas	1982	1997	11	7
RAL-UZ 23	waste water-poor car-washing plants	1983	2000	15	9
RAL-UZ 24	environmentally sound pipe cleaners	1983	1997	14	8
RAL-UZ 26	reusable packings for food production	1983	1996	1	1
RAL-UZ 27	reusable packings for transportation	1984	2000	18	18
RAL-UZ 30 a	products made from recycled plastics	1990	1997	32	16
RAL-UZ 30 b	products made from waste rubber	1990	1998	14	4
RAL-UZ 32	water-saving flushing cisterns	1984	2000	45	8
RAL-UZ 33	electronically operated shower facilities	1984	2000	7	2
RAL-UZ 34	products free from insecticides for indoor pest control and prevention	1985	2000	22	10
RAL-UZ 35 a	wall paper and ingrain wall covering made from recycled paper	1985	1997	42	3
RAL-UZ 35 b	wall paper covering paper and plastic materials	1994	1997	1	1
RAL-UZ 36	building materials made from recycled paper	1985	1998	5	3
RAL-UZ 37	halogen-free cooling and insulating liquids for electrical equipment	1985	1997	3	2
RAL-UZ 38	low-formaldehyde products from wooden materials (for indoor use)	1986	1998	89	33
RAL-UZ 39	low-emission gas burners	1986	1997	75	28
RAL-UZ 40	combination boilers and circulating water boilers for gaseous fuels	1986	1997	22	6
RAL-UZ 41	combined burner/boiler units with gas blast burner	1986	1997	17	7
RAL-UZ 42	low-noise mopeds	1986	1999	2	1
RAL-UZ 43	water-saving flow restrictors	1986	1999	31	2
RAL-UZ 44	water-saving flushing valves	1986	1999	4	4
RAL-UZ 45	soil meliorators and soil adjuvants made from compost	1986	1997	13	12
RAL-UZ 46	combined oil burner/boiler units	1987	1997	41	24
RAL-UZ 47	solar-energy products and mechanical watches	1987	2000	27	9
RAL-UZ 48	rapidly biodegradable chain lubricants for power saws	1987	1997	86	7
RAL-UZ 49	building materials predominantly made of waste glass	1987	1999	6	3
RAL-UZ 50	lithium batteries free of mercury and cadmium	1987	1997	-	-
RAL-UZ 51	environment ticket in public transport	1988	1997	20	13
RAL-UZ 52	highly heat-insulating multi-layer window glass	1988	2000	12	9
RAL-UZ 53	low-noise construction machines	1988	1999	159	38
RAL-UZ 54	low-noise compost choppers	1988	1997	38	9

* The period of validity can be prolonged by the Environmental Label Jury.

		Decision taken in	Valid* through	Number of EL pro-ducts	Number of manufac-turers
RAL-UZ 55 a	reusable ribbon cassettes and refillable toner cartridges	1988	1997	40	23
RAL-UZ 55 b	photoconductor drums for laser printers	1991	1997	2	2
RAL-UZ 56	recycled cardboard	1989	1997	272	32
RAL-UZ 57	thermal techniques (hot air) for pest control of ligniperdous insects	1989	1999	7	7
RAL-UZ 59 a	low-noise and low-soot municipal vehicles with diesel drive	1990	1999	8	4
RAL-UZ 59 b	low-noise and low-soot municipal vehicles with gas drive	1995	1999		
RAL-UZ 60	building materials and gypsum made from recycled materials	1990	2000	-	-
RAL-UZ 61	low-emission and energy-saving gas-fired condensing boilers	1990	1997	44	21
RAL-UZ 62	low-emission and waste-reducing copiers	1990	1998	102	16
RAL-UZ 64	rapidly biodegradable lubricants and forming oils	1990	1997	26	9
RAL-UZ 65	unbleached hot-filter paper	1990	2000	17	5
RAL-UZ 66	low-pollutant fire extinguishers	1990	1999	-	-
RAL-UZ 67	lead-free seals	1991	1997	2	2
RAL-UZ 68	cadmium-free hard-solder	1991	1997	7	2
RAL-UZ 69	low-waste, resource-saving text marker	1991	1997	5	3
RAL-UZ 70	component-system detergents	1991	1999	1	1
RAL-UZ 71	independent burning gas heaters and fluid-bed built-in appliances with atmospheric burners	1991	1997	22	9
RAL-UZ 72	newspaper printing paper (consisting predominantly of recycled paper and bleached without chlorine)	1991	1997	22	14
RAL-UZ 73	solar collectors	1991	1997	13	8
RAL-UZ 74	low-pollutant nail varnishes	1992	1999	-	-
RAL-UZ 75	CFC-free and energy-saving refrigerators and freezers	1992	1999	-	-
RAL-UZ 76	low-emission chipboard	1993	1999	-	-
RAL-UZ 77	low-waste and low-water pollutant towels in dispensers	1994	1996	21	5
RAL-UZ 78	computer	1994	1998	34	8
RAL-UZ 79	rapidly biodegradable hydraulic fluids	1994	1997	-	-
RAL-UZ 80	low-emission gas burners	1994	1997	2	2
RAL-UZ 81	electronic ballasts for fluorescent lamps	1994	1997	5	1
RAL-UZ 82	tooth brush with exchangeable head	1995	1999	6	1
RAL-UZ 83	low-noise and low-emission chain saws	1995	1998	2	1
RAL-UZ 84	sewage plant-compatible sanitary additives	1995	1999	-	-
RAL-UZ 85	printers	1996	1999		
RAL-UZ 86	recyclable video and audio cassettes	1996	1999		
SUM				3,206	754

* The period of validity can be prolonged by the Environmental Label Jury.

VI. Test orders

The Environmental Label Jury has awarded the Umweltbundesamt test orders for numerous other product groups. The life cycle of a product (manufacture, use and consumption, disposal) affects in most cases several environment-related aspects. An overview of the test orders is provided in the following:

1. Electrical appliances and products

- rechargeable consumer batteries
- halogen-free electric cables and wires
- mercury-free electronic temperature sensors
- cadmium-free infrared lamps
- television sets
- coffee machines
- mobile sound-reproduction sets with headphones (Walkman)
- commercial refrigerators and freezers

2. Products for do-it-yourselfers and the handicraft

- low-solvent special coatings
- dispersion paints in returnable containers
- graffiti cleaners
- construction materials made of recycled material for use in building construction
- low-emission paint-spraying guns
- heat insulation materials made of renewable resources

3. Household chemicals and alternatives

- biological pest control agents
- disinfectants
- technical devices as an alternative to sanitary additives
- biodegradable motor oil for two stroke engines

4. Heating technology

- electronically controlled circulating pumps
- heat cost distributor/heat quantity meter

5. Other consumer products

- products made of jute
- products made of rattan
- tubular plastic containers for non-beverage uses

If the Environmental Label Jury should decide on the award of the environmental label for these product groups the corresponding manufacturers may as well conclude agreements on the use of the Label with the RAL. Beforehand, it is neither allowed to employ the Environmental Label as such in advertising nor to include indications on current test orders due to proposals submitted by the manufacturers in advertising. Proposals on new environment-friendly products should be submitted to the Umweltbundesamt from all sections of the public. Sufficient information on the special environmental soundness of the product must be provided to allow an expert assessment.

VII. Foreign Contractors of the Environmental Label

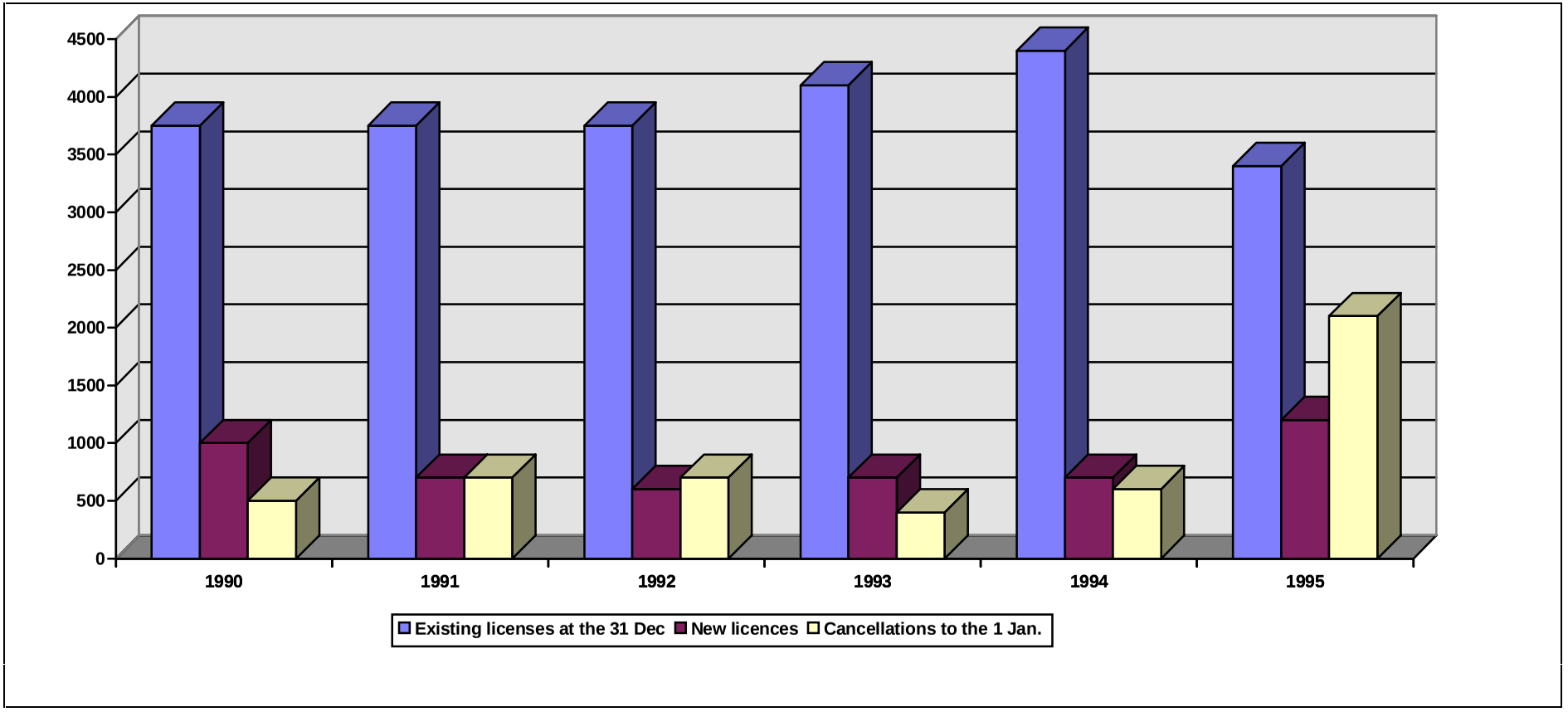
The Environmental Label can be used both by foreign manufacturers and by German companies.

The following list shows the number of foreign companies with which contracts have been signed for the use of the Environmental Label. The list does not reflect the large number of foreign manufacturers, e.g. manufacturers of computers and copying machines, who have concluded contracts for use of the label in the name of their German importers.

	Products	Contracts
Austria	32	9
Belgium	8	3
Denmark	50	9
France	48	18
Great Britain	49	11
Italy	41	15
Liechtenstein	8	3
Netherlands	54	15
Norway	2	1
Slovenia	3	2
Sweden	11	4
Switzerland	60	16
Spain	1	1
SUM:	367	107

These are approx. 14 per cent of all parties awarded the label and about 11 per cent of all domestic and foreign products.

Number of Products with the “Blue Angel”



Sources: RAL, Umweltbundesamt

German Program for Existing Chemicals

The German Chemicals Act of September 1980 is aimed at protecting man and the environment from harmful effects of hazardous chemicals. A general screening and registration requirement exists only for chemicals marketed for the first time in the European Community countries after September 18, 1981 (new substances), but not for chemicals marketed prior to this date (existing chemicals).
The Federal government of Germany developed a concept for the systematic listing and evaluation of existing chemicals which is based on the selection an evaluation of chemicals for which data are lacking.

In the view of the German federal government a systematic assessment of the risk potential of existing chemicals requires comprehensive scientific knowledge on the part of industry and the responsible authorities. Therefore, the Advisory Committee on Existing Chemicals (BUA) of the German Chemical Society (GDCh) was established in co-operation between the Federal Government and industry. Its task is to identify priority substances and to compile reports providing the basis for evaluation by the responsible authorities. It consists of experts from universities, the government and the chemical industry. The systematic approach includes the following procedures:

1. Selection of the priority chemicals
2. Preparation of detailed reviews of all relevant data reported in the literature and industry files or from the authorities
3. Proposals to further testing - if necessary - to eliminate data gaps which would compromise safety evaluation

1. Priority setting

The priority setting procedure depends on a compilation of the available data with respect to toxicology, ecotoxicology, exposure and potential environmental release. So-called “Substance Data Sets” have been published for all high volume production chemicals (> 1000 tons/year) in Germany. The compilation is the result of a voluntary program agreed upon by the German government and the chemical industry to systematically collect literature and industry in-house data. The program will be extended to smaller production volume chemicals later on. The rational procedure of the BUA priority setting has been published.

2. Preparation of detailed reviews

Detailed reviews comprising all relevant data reported in literature and in the files of industry or authorities are prepared on the chemicals identified to be potentially hazardous. The reviews are published as mentioned in the annex. The German and English version of the BUA-reports are published by the S. Hirzel Verlag, Stuttgart.

3. Proposals for further testing

In the cases of many chemicals the activities outlined above will finally lead to the conclusion that further testing is necessary.

The investigations recommended by BUA relating to toxicology or ecotoxicology are financed and sponsored by the chemical industry. Investigations relating to environmental monitoring are especially

marked in this publication, because for such activities state authorities are responsible. It is desirable to co-ordinate such testing activities. This publication can serve this purpose, because it summarises the comprehensive testing program in Germany.

References

1. GDCh-Advisory Committee on Existing Chemicals of Environmental Relevance (BUA): Existing Chemicals of Environmental Relevance Criteria and List of Chemicals. VCH; Weinheim (1989)

2. GDCh-Advisory Committee on Existing Chemicals of Environmental Relevance (BUA) Existing Chemicals of Environmental Relevance II. Selection Criteria and Second Priority List. VCH; Weinheim (1989)

3. GDCh-Advisory Committee on Existing Chemicals of Environmental Relevance Existing Chemicals of Environmental Relevance III: Priority Setting and Classified Existing Chemicals of the Third Priority List; S. Hirzel Verlag, Stuttgart, 1996

BUA Address for further information:

BUA-Büro Tübingen **Phone (49) 7071 75136**
Derendingerstraße 40 **Fax (49) 7071 76412**
D-72072 Tübingen

BUA Publications

Edited by BUA, the German Chemical Society Advisory Committee on Existing Chemicals of Environmental Relevance
Softcover. ISSN 0938–9393 (SHV). Individual reports see following table:

Vol.	Title	CAS-No.	Year	Size	Price	ISBN	[DM]	3-7776-
	Existing Chemicals of Environmental Relevance I: Criteria and List of Chemicals		1989	218pp.			98,-	0689-8
	Existing Chemicals of Environmental Relevance II: Selection Criteria and Secand Priority List		1989	vii, 76pp.			58,-	0689-8
	Existing Chemicals of Environmental Relevance III: Priority Setting and Classified Existing Chemicals of the Third Priority List		1995	128pp.			72,-/58,-*	0689-8

Individual Substances Reports

Vol.	Title	CAS-No.	Year	Size	Price	ISBN	[DM]	3-7776-
1:	**Chloroform**	67-66-3	1993	xii, 75 pp.			48,-/38,-*	0545-X
3:	**Pentachlorophenol**	87-86-5	1993	138 pp.			72,-/58,-*	0543-3
5:	**Nitrilotriacetic-Acid** (Trisodiumsalt)	139-13-9	1993	xiv, 32 pp.		5064-31-3	32,-/25,-*	0532-8
8:	**m-Dichlorobenzene**	541-73-1	1993	xii, 66 pp.			48,-/38,-*	0546-8
9:	**o-Nitroanisole**	91-23-6	1993	xi, 26 pp.			32,-/25,-*	0533-6
10:	**p-Nitroanisole**	100-17-4	1993	xii, 36 pp.			32,-/25,-*	0547-6
19:	**p-Nitroaniline** (4-Nitrobenzeneamine)	100-01-6	1995	103 pp.			72,-/58,-*	0676-6
22:	**Dibutylphthalate**	84-74-2	1993	xiv, 52 pp.			48,-/38,-*	0539-5
23:	**Tributylamine**	102-82-9	1993	xii, 41 pp.			48,-/38,-*	0534-4
25:	**Hexachlorocyclopentadiene**	77-47-4	1994	164 pp.			88,-/72,-*	0576-X
34:	**Hexachloroethane**	67-72-1	1993	xiv, 53 pp.			48,-/38,-*	0535-2
36:	**Tributyltin oxide** (Bis[tri-n-butyltin]-oxide)	56-35-9	1994	88 pp.			48,-/38,-*	0566-2
43:	**2-Chloro-4-nitroaniline**	121-87-9	1993	xii, 22 pp.			32,-/25,-*	0536-0
45:	**Tetrachloromethane**	56-23-5	1993	xvi, 80 pp.			48,-/38,-*	0537-9
53:	**o-Dichlorobenzene**	95-50-1	1993	xx, 184 pp.			88,-/72,-*	0540-9
54:	**Chlorobenzene**	108-90-7	1993	xx, 180 pp.			88,-/72,-*	0538-7
56:	**Morpholine**	110-91-8	1993	xx, 152 pp.			88,-/72,-*	0548-4
57:	**o-Chloroaniline, m-Chloroaniline**	95-51-2 108-42-9	1994	280 pp.			102,-/82,-*	0599-9
58:	**Butylated Hydroxytoluene** (2,6-Bis[1,1-dimethyl-ethyl]-4-methylphenol)	128-37-0	1994	136 pp.			72,-/58,-*	0574-3
59:	**Nitrobenzene**	98-95-3	1994	117 pp.			72,-/58,-*	0614-6
60:	**Chloroethane**	75-00-3	1993	xvi, 48 pp.			48,-/38.-*	0549-2
61:	**1-Chloro-2-methyl-3-nitrobenzene**	83-42-1	1993	xvi, 45 pp.			48,-/38,-*	0550-6
62:	**Hexachlorobutadiene**	87-68-3	1993	xx, 94 pp.			72,-/58,-*	0541-7
63:	**p-Toluene Sulphonic Acid**	104-15-4	1993	xvi, 80 pp.			48,-/38,-*	0551-4
64:	**1,3-Dichloro-4-nitrobenzene**	611-06-3	1993	xiv, 55 pp.			48,-/38,-*	0552-2
65:	**1,4-Dichloro-2-nitrobenzene**	89-61-2	1993	xvi, 53 pp.			48,-/38,-*	0553-0
67:	**Diethylene Glycol Dimethyl Ether** (Bis(2-mehoxyethyl)-ether).	111-96-6.	1993	80 pp.			48,-/38,-*	0557-3
68-	**70: Adipic acid**	124-04-9						
	Terephtalicacid	100-21-0						
	Acetic anhydride	108-24-7	1994	137 pp.			72,-/58,-*	0615-4
75:	**2-Nitrophenol**	88-75-5						
	4-Nitrophenol	100-02-7	1993	192 pp.			88,-/72,-*	0554-9
76-	**79: Urea**	57-13-6						
	Isobutylidene diurea	6104-30-9						
	Potassium amylxanthate	2720-73-2						
	Potassium isobutyl-xanthate	13001-46-2	1995	132 pp.			72,-/58,-*	0646-4
80:	**1,4-Dioxane**	123-91-1	1994	xx, 96 pp.			72,-/58,-*	0600-6
81-	**82:**							
	81: Formic acid, formates	64-18-6	1995					
	82: Diethylene glycol bis(chloroformate)	106-75-2	1995	118pp.			72,-/58,-*	0685-5
83:	**Carbon Disulfide**	75-15-0	1993	180 pp.			88,-/72,-*	0558-1
84:	**N,N-Dimethylformamide**	68-12-2	1994	100 pp.			48,-/38,-*	0577-8
85:	**Chloranil**	118-75-2	1993	xx, 58 pp.			48,-/38,-*	0542-5
86:	**Tetrachlorobenzene.**	95-94-3	1994	xx, 168 pp.			88,-/72,-*	0601-4
87:	**Chloroprene** (2-Chloro-1,3-butadiene)	126-99-8	1995	168 pp.			88,-/72,-*	0666-9
88:	**2-Ethylhexylacrylate**	103-11-7	1994	xvi, 58 pp.			48,-/38,-*	0602-2
89:	**Triethylenetetramine**	112-24-3	1995	98 pp.			48,-/38,-*	0603-0
90:	**Epichlorohydrin**	106-89-8	1993	150 pp.			88,-/72,-*	0555-7
91:	**N,N - Dimethylaniline**	121-69-7	1995	92 pp.			48,-/38,-*	0667-7
92:	**Ethylene glycol**	107-21-1	1994	160 pp.			88,-/72,-*	0616-2
93:	**Chlorinated paraffins**	63449-39-8	1995	240 pp.			96,-/76,-*	0694-4
94:	**1,2-Propylene oxide**	75-56-9	1994	144 pp.			72,-/58,-*	0578-6
95:	**Trichloroethene**	79-01-6	1994	368 pp.			120,-/98,-*	0571-9
96:	**N,N'-Diphenylguanidine**	102-06-7	1994	112 pp.			72,-/58,-*	0565-4
97:	**Phenylenediamines** (1,2-Diaminobenzene, 1,3-Diaminobenzene, 1,4-Diaminobenzene)	95-54-5 108-45-2 106-50-3	1995	281 pp.			102,-/82,-*	0647-2
98:	**Crotonaldehyde**	4170-30-3	1994	153 pp.			88,-/72,-*	0617-0
99:	**Resorcinol**	108-46-3	1993	xii, 108 pp.			72,-/58,-*	0522-0
100:	**OH-Radicals in the Troposphere**	3352-57-6	1995	180 pp.			88,-/72,-*	0648-0
101:	**Tetrahydronaphthalene**	119-64-2	1994	100 pp.			48,-/38,-*	0621-9
102:	**1,3-Dinitrobenzene**	99-65-0	1994	104 pp.			72,-/58,-*	0622-7
103:	**Acrylamide**	79-06-1	1995	168 pp.			88,-/72,-*	0649-9
104:	**Diethyl phthalate**	84-66-2	1994	148 pp.			72,-/58,-*	0623-5
105-	**108:**							
	105: Melamine	108-78-1						
	106: Diisopropanolamine	110-97-4						
	107: 1,6-Hexanediol	629-11-8						
	108: Tri-/Dibutylphosphate	126-73-8 107-66-4	1995	236 pp.			96,-/76,-*	0662-6
109:	**Methallylchloride**	563-47-3	1995	xvi, 43 pp.			48,-/38,-*	0650-2
110-	**111: 2,3-Dichlorophenol;**	576-24-9						
	2,4,5-Trichlorophenol	95-95-4	1994	112 pp.			72,-/58,-*	0625-1
113:	**N-Phenyl-1-naphthylamine**	90-30-2	1994	90 pp.			48,-/38,-*	0624-3
114:	**Supplementary Reports I Di(2-ethylhexyl)phthalate (No. 4) Chloromethane (No. 7) o-Nitroanisol (No. 9) p-Nitroanisol (No. 10) m-/p- Chloronitrobenzene (No. 11) Dinitrotoluene (No. 12) Diphenylamine (No. 15) Dibutylphthalate (No. 22) Chlorotoluene (No. 38) N-Ethylaniline (No. 51) Dioxane (No. 80)**		1996	250 pp.			96,-/76,-*	0717-7
115:	**1,5-Naphthylenediamine**	2243-62-1	1995	69 pp.			48,-/38,-*	0663-4
116:	**Vinylacetate**	108-05-4	1994	104 pp.			72,-/58,-*	0626-X
117:	**Processing of Measurement Data on the Environmental Occurrence of Industrial Chemicals**		1994	130 pp.			72,-/58,-*	0627-8
118:	**Aminofen** (2,4-Dichlorophenyl - 4-aminophenylether)	14861-17-7	1995	68 pp.			48,-/38,-*	0690-1
119:	**Hexachlorobenzene**	118-74-1	1994	280 pp.			102,-/82,-*	0628-6
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	1,4-Dimethoxybenzene	150-78-7						
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	Pigment Red 53:1.	5160-02-1	1995	154 pp.			88,-/72,-*	0677-4
125:	**Cyanuric chloride** (2,4,6-Trichloro-1,3,5-triazine)	108-77-0	1995	112 pp.			72,-/58,-*	0668-5
126:	**2,2'-Dithio-bis-benzothiazole**	120-78-5	1995	82 pp.			48,-/38,-*	0651-0
127:	**Monochloroacetic acid;** **sodium monochloroacetate**	79-11-8 3926-62-3	1996	140 pp.			72,-/58,-*	0705-3
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	n-Butylacrylate	141-32-2	1995	195 pp.			88,-/72,-*	0664-2
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Office of Prevention, Pesticides, and Toxic Substances

EPA742-F-96-001
September 1996

MC7409

Environmental Accounting Project

Quick Reference Fact Sheet

Goal: To encourage and motivate businesses to understand the full spectrum of their environmental costs, and integrate these costs into strategic decision making.

Background: Environmental and economic benefits of practicing pollution prevention can be difficult to measure using traditional methods of accounting. As a consequence, industrial managers often may not adopt pollution prevention even when it might be in the best interest of a facility or company to do so.

Description: EPA initiated the Environmental Accounting Project in 1992 to encourage businesses to incorporate environmental costs into managerial accounting and capital budgeting practices. Implementing environmental accounting will make environmental costs more visible to company managers, thus making these costs more manageable and easier to reduce. Environmental accounting should help companies significantly reduce or eliminate environmental costs, improve environmental performance and gain competitive advantage.

The Project's Action Agenda incorporates recommendations from the business community, accounting and professional societies, the academic and research community, small businesses, and government on what needs to be done by various stakeholder groups to increase the use of environmental accounting. Major issues addressed by the Action Agenda include:

- Terms, concepts, and roles,
- Management incentives,
- Education, guidance, and outreach, and
- Tools, methods, and systems.

The Environmental Accounting Project maintains a Network Directory of some 680 members who are actively participating or are interested in the issue.

Examples of Accomplishments to Date:

- ✔ Developed an environmental accounting primer that covers the basic terms and concepts and discusses application options
- ✔ Completed a status report on the extent to which the nation's manufacturing firms consider environmental costs in investment decisions
- ✔ Published case studies on environmental accounting initiatives at AT&T and at Ontario Hydro (a Canadian utility)
- ✔ Trained state technical assistance providers and permitters on the environmental accounting concept in several regions
- ✔ Hosted workshops for industry and government creating dialogue on environmental accounting
- ✔ Developed a software tool to help companies incorporate environmental costs into their capital budgeting decisions
- ✔ Published resource guide on tools and software that account for environmental costs

Projects Underway Include:

- Best Practices report of chemical companies' environmental accounting efforts
- Analysis of how environmental accounting applies to the metal finishing industry
- Documentation of available techniques for estimating potential environmental liabilities
- Continued outreach and exploration of ways to simplify implementation of environmental accounting

For further information: See the Project's Website @ http://es.inel.gov/partners/acctg, or Contact EPA's Pollution Prevention Information Clearinghouse: 202/260-1023, fax 202/260-0178, or Internet: ppic@epamail.epa.gov

Voluntary Agreements in Austria

Mr. Martin Kind
Ministry of Environment, Youth and Family Affairs
Stubenbastei 5
1010 Vienna

Statement for OECD Workshop on Non-Regulatory Initiatives
(10th-12th September 1996)

The use of agreements has recently attracted increasing attention at the European level as well as at the OECD level. Whereas the OECD's workshop uses the term "non-regulatory initiatives", the present drafts in Austria and within the EU Commission refer to "negotiated agreements" and "environmental agreements". Agreements in Austria mean any contracts between the competent public authorities and the economic sectors concerned.

The aim is to render environmental policy ever more efficient. The reason for this new strategy orientation is that after more than twenty-five years of legislative action in the field of environment, the Austrian government has explicitly recognised the need to broaden the range of instruments and to involve all levels of society in a spirit of shared responsibility. Legislative measures alone will not -- and cannot -- bring about substantial changes in current trends and practices. Today, the growing number of acts is more part of the (environmental) problem than part of the solution to make development sustainable.

A new line of co-operative efforts with industry must be developed. Previous environmental measures tended to be prescriptive in character with emphasis on the "thou shalt not" approach. A new strategy should instead be characterised as a "let's work together" approach. If voluntary agreements are a form of self-regulation, they should be developed as a matter of priority.

However, broadening the range of instruments is -- especially in Austria -- more difficult than expected. That is why we need a "step by step" strategy to introduce this new instrument in our legal system. At the beginning negotiated agreements with the industry might complement legislation; after a qualifying period agreements might limit the detail of legislation -- and at the end agreements might prevent the need for legislation while ensuring an equivalent level of protection. Enforcement measures and costs might also be reduced. Of course, legislation will remain the necessary backbone of Austrian environmental policy; abstract and generally binding legislation might be necessary, if acute health hazards are involved. It is therefore not primarily a question of deregulation but one of finding the right "mix of instruments".

At the moment, the Austrian Ministry of Environment, Youth and Family Affairs is investigating to what extent voluntary agreements can be used as a complementary instrument in environmental policy. While voluntary agreements have already been applied in Austria, the extent to which this has happened varies widely. Currently 28 voluntary agreements in the field of

- waste management (e.g. batteries, paper, packaging, end of life vehicles, refrigerators)
- the phasing out of specific substances (substances in detergents, PVC products) and
- discharge of dangerous substances into the water

are in force in addition to existing legal standards to facilitate a quick compliance with these standards in a non-bureaucratic way. In the future Austria should improve this -- still scarcely used -- instrument; e.g. by concluding an agreement with industry, trade and commerce associations covering a range of general issues such as participation of companies in the eco-management and audit scheme, waste reduction, energy efficiency and an increased use of railways as a means of transport. A main feature of agreements could also be their combination with economic incentives such as tax reductions with deposit funds.

Contrary to Germany, public authorities are formally involved in these agreements in our country. The agreements in Austria are the outcome of intensive discussions with the responsible ministries. In other words, the parties to the agreements are usually the Ministry of Environment, Youth and Family Affairs or the Ministry for Economic Affairs and the industry sectors concerned (companies or their organisations).

This brief survey of the Austrian experience intends to clarify the potential of this policy tool at a national and -- potentially -- at an international level. Moreover, the first objective of the OECD initiative is to set up a framework for this form of action. To that end, criteria should be agreed upon to ensure the transparency, credibility and reliability of the agreements. The key elements in this respect are the setting of

- quantified objectives,
- a staged approach providing for intermediate objectives,
- the publication of the agreements,
- the monitoring of and
- reporting on the results.

A particular objective of Austria is to make the debate on characteristics of agreements and the factors leading to their success applicable to agreements with central and eastern European countries.

After all, the potential benefits of voluntary agreements lie in the encouragement of an active approach of the industry, in cost effectiveness and in a faster achievement of objectives, while paying due heed to certain risks. Another important benefit of these agreements is the fact that they leave greater freedom to the industry at a company or a sectorial level to decide on how to reach the environmental targets whereas standard legislation often prescribes or implies, for example, the use of a certain technology (which is sometimes already outdated). This flexibility also encourages creative solutions and technological innovations which might not only reduce compliance costs but also entail spin-off benefits due to innovative solutions involving competitive advantages.

Negotiating such agreements needs as a pre-condition a clear commitment and determination by the authorities to pursue well-defined environmental objectives. Transparency and public information on the matter of envisaged agreements must be guaranteed. A further crucial issue is the possibility to enforce an agreement and to sanction possible non-compliance. Although the character of this instrument rules out sanctions such as fines or other penalties, agreements should nevertheless involve a number of additional credible mechanisms, to discourage non-compliance, like public pressure or competition methods for instance to exert effective pressure (e.g. labelling). These possibilities must compensate for the fact that individuals may not enforce negotiated agreements by way of administrative or judicial review. Beyond doubt such a flanking policy has to correspond to an access to information (Environmental Information Act 1993). Finally, agreements must avoid “free-riders”, who profit from the costs which their competitors are paying. If agreements offer unilateral benefits for those who do not participate, legislation containing the essential elements of the agreement has to be adopted.

There are many general fields of application for agreements. For instance, agreements can supplement legislation and they also can be used as a transitory complement to an environmental tax. A further field of application is the use of agreements to implement comprehensive, long-term objectives concerning global emission targets (e.g. NO_x), waste reduction, recovery or recycling targets, energy efficiency, collection of data (in view of emissions inventories), etc. Perhaps agreements might also anticipate future legislation; they can serve as a "stop-gap" measure, when knowledge is insufficient for the legislator to intervene (e.g. if causal links between the use of a substance and risks to human health or the environment are unknown).

Negotiations are likely to be successful if the number of concluding parties is limited. The free-rider incentives are less significant if the companies concerned are well organised at branch level and the costs of the agreed environmental target/measure are low. Moreover, agreements are appropriate when a few players have control over most of the issues covered by the agreement. Public authorities must be able to clearly define their position as regards the objectives. Furthermore, consumer behaviour must be taken into account. Public awareness of the problem to be solved motivates both sides to take action and provides a driving force for compliance.

The preceding paragraphs point out the necessary requirements as guidelines for designing and concluding an agreement:

- If the legal status of agreements is an important element for their success, contracts, as a well-known and generally accepted legal instrument, have to be used. The contractual form provides a clear framework for the parties (which may include sanctions in case of non-compliance and may be enforced through Court decisions).

- The objectives have to be quantified in absolute figures (e.g. a maximum amount of emissions) as opposed to best effort clauses.

- Intermediate objectives (e.g. by a timetable) related to targets should be set to get a clear picture of whether the agreement is effective or not.

- The results have to be monitored to ensure complete, comparable and objective data.

- To achieve transparency, the agreement must be published in the official journal and periodic reporting by the participants to the competent authority about the results has to take place.

- Public information should include at least a description of the measures taken, the measures to take next, the results achieved so far, and a non-technical explanation of how they have been achieved.

- In cases where the measuring methods differ or where the disclosure of business secrets has to be avoided, it might be appropriate to set up a committee or an independent body charged with collecting, evaluating or verifying the results.

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Brominated Flame Retardants
Industry Panel News -- Special Edition

August 1995

The Brominated Flame Retardant Industry Panel (BFRIP), formed in 1985 under the auspices of the Fire Retardant Chemicals Associations, became a Chemical Manufacturers Association CHEMSTAR Panel in 1990. Panel member companies are Albemarle Corporation (previously a portion of Ethyl Corporation), Ameribrom, Inc (a wholly-owned subsidiary of Dead Sea Bromine, Ltd.), and Great Lakes Chemical Corporation. AKZO Chemicals, Inc. is affiliated with the Panel as an interested company. These companies are the major U.S. manufacturers and importers of brominated flame retardant products,

For the past several years, BFRIP has published an annual Newsletter to provide current information on brominated flame retardants to customers, users, and others with an interest in these products. The articles in the newsletter are written by representatives from BFRIP member companies and are based on the latest factual information available at the time of publication.

OECD - Voluntary Industry Commitment

ABSTRACT

The organisation for Economic Co-operation and Development (OECD) Paris, France, established a pilot programme in 1990 aimed at reducing risks from chemicals. Five chemicals were nominated for study; the group called "selected brominated flame retardants" - polybrominated biphenyls (PBB), polybrominated diphenyl oxides (PBDPO), and tetrabromobisphenol A (TBBPA) - is one of the five. Wishing to act responsibly and address OECD member country concerns on the PBBs and PBDPOs, we proposed a voluntary industry commitment to OECD. OECD honoured us with an invitation to attend and present our voluntary commitment to the OECD Joint Meeting in Paris on June 22, 1995. Our proposal was accepted at that meeting and represents the first time OECD has entered into an agreement with industry. Our voluntary commitment is mutually beneficial to OECD, OECD member countries, industry and our customers by providing OECD with a successful outcome in its pilot Risk Reduction Programme, addressing OECD member country concerns, and providing assurance to industry and our customers regarding our products' future. Industry's commitment does not include a ban, phase out, limitation on use, or substitution of the PBDPOs or TBBPA. Industry's commitment does include addressing environmental exposure, product composition, and nonproduction of the PBBs (with the exception of decabromobiphenyl in Europe) and non-commercial PBDPO congeners. No specific risk management efforts were directed towards TBBPA.

The international Organisation for Economic Co-operation and Development (OECD) based in Paris, France, established a pilot programme in 1990 aimed a reducing risks from chemicals. Five chemicals were nominated for study. One of the five chemicals nominated for inclusion in the programme is known as "selected brominated flame retardants." The selected brominated flame retardants are polybrominated biphenyls (PBB), polybrominated diphenyl oxides (PBDPO), and tetrabromobisphenol (TBBPA).

CMA's Brominated Flame Retardant Industry Panel (BFRIP) and CEFIC's European Brominated Flame Retardant Industry Panel (EBFRIP) participated in the pilot Risk Reduction Programme on Selected Brominated Flame Retardants process through OECD's Business and Industry Advisory Committee. We provided comments on draft OECD documents, addressed member country concerns through our participation at three workshops, and in November 1994, proposed the concept of a voluntary commitment from industry regarding these selected flame retardants. We made this proposal because we wish to act responsibly after having listened to, and heard, the concerns expressed by OECD member countries regarding the PBBs and the PBDPOs. The primary concerns expressed by OECD member countries relate to the possible resurgence in use of the PBBs and environmental release of the PBDPOs, particularly pentabromodiphenyl oxide.

Our proposal represents the first time OECD considered entering into an agreement with industry. We were honoured by OECD with an invitation to attend and present our voluntary commitment to the OECD Joint Meeting in Paris on June 22, 1995. We are gratified that our proposal was accepted by OECD at the Joint Meeting. Member countries attending the Joint Meeting were uniformly in favour of and welcomed, the agreement.

We believe our voluntary commitment is mutually beneficial to OECD, OECD member countries, industry and our customers. Industry's commitment provides OECD with a successful outcome in its pilot Risk Reduction Programme, addresses OECD member country concerns about the PBB's and the PBDPOs, and provides assurance to industry and our customers regarding our products' future. Industry's commitment does not include a ban, phase out or limitation on use or substitution of the PBDPOs or TBBPA.

The key points of industry's voluntary commitment to OECD are as follows:

- The commitment is made by the major global brominated flame retardant manufacturers through CMA's Brominated Flame Retardant Industry Panel (BFRIP) and CEFIC's European Brominated Flame Retardant Industry Panel (EBFRIP).

- Our commitment reaches out to our customers through our Responsible Care® Product Stewardship initiative. We will work to inform and educate our customers on the proper handling, use, recycling and disposal of our products. By doing this, we reach the major points in these products' life cycle where there is any significant potential for exposure to man or the environment, because the flame retardants are incorporated in a polymer matrix and no longer exist as free flame retardants after leaving our customers.

- The major global flame retardant manufacturers commit to not producing or import/exporting the PBBs. This commitment was made to address the concerns of some OECD member countries that PBB's might be re-introduced into the marketplace as an "alternative" to the PBDPOs. Only one exception is included in our agreement and this is the continued manufacture in Europe of decabromobiphenyl by one company. Decabromobiphenyl is the only PBB remaining in production today. The decabromobiphenyl exception will be reviewed in the year 2000. All other BFRIP and EBFRIP brominated flame retardant manufacturers commit to not manufacturing the PBBs, including decabromobiphenyl. This is a world-wide commitment achieved without numerous international regulations!

- The major global flame retardant manufacturers commit to not manufacturing the non-commercial PBDPO congeners as individual flame retardants except when present as part of the commercial decabromodiphenyl

oxide, octabromodiphenyl oxide and pentabromo-diphenyl oxide products. This commitment was made to address the concerns of some OECD member countries that lower brominated diphenyl oxide congeners (i.e. - tribromodephenyl oxide), which may have potential for bioaccumulation, might be put into commercial production as flame retardants. (These non-commercial congeners are not sold today as individual flame retardants.) This is a worldwide commitment achieved without numerous international regulations!

- The major global flame retardant manufacturers commit to an average purity of 97 per cent or greater for decabromodiphenyl oxide and minimising levels of hexa-and lower brominated diphenyl oxide congeners in commercial octabromodiphenyl oxide. Manufacturers will evaluate within one year of the agreement ways in which these congeners can be minimised in octabromodiphenyl oxide. These commitments were based on 1) toxicology studies showing a difference between 77 per cent and 97 per cent decabromodiphenyl oxide and 2) the estimated toxicology of the lower brominated diphenyl oxides. Today's commercial decabromodiphenyl oxide is of an average purity of 97 per cent or greater.

- The major global flame retardant manufacturers commit to minimising levels of release of pentabromodiphenyl oxide during manufacture and to regularly review their existing Responsible Care Pollution Prevention and Product Stewardship programmes to ensure the proper handling, use and disposal of pentabromodiphenyl oxide. This commitment was due to concern expressed by some OECD member countries regarding reports of the environmental detection of pentabromodiphenyl oxide in Sweden.

- Additional commitments regarding toxicology and environmental fate data and co-operative efforts on the safe disposal and recycling of products containing these brominated flame retardants are included. Further, our commitment provides for accountability; at regular intervals we will confirm our compliance with the terms of this agreement to OECD.

For additional information on the OECD Voluntary Industry Commitment, please contact:

Dr Marcia Hardy, BFRIP Chairman,
Tel: 504-388-7616
FAX: 504-388-7046

Dr. Richard Smith, EBFRIP Chairman
Tel: 44-171-493-9711
FAX: 44-171-493-9714

Activities and Upcoming Events

For the latest on the OECD "VIC" and other important information on the brominated flame retardants, we offer:

September 18, 1995

EBFRIP will sponsor an informational meeting "Brominated Flame Retardants - Legislation and Environmental Conference" in Weybridge, Surrey, England on Monday September 18, 1995. For information please contact White Rose Conferences, TEL: 44-1709-828181, FAX 44-1709-828732

November 14, 1995

BFRIP will sponsor a workshop "Brominated Flame Retardants - An Update on Current Regulatory and Research Activities" in Crystal City, Virginia, USA. For information, please contact N. Leiva, CMA BFRIP Panel Manager, TEL: 202/887-1121, FAX: 202/887-5427

Partners for the Environment

Manik Roy

Environmental Protection Agency
United States

A New Way of Doing Business

- Over the last several years, an important change has been taking place in our national strategy for protecting the environment. In addition to traditional approaches to environmental protection, EPA is building cooperative partnerships with a variety of groups, including small and large businesses, citizen groups, state and local governments and institutions.

- Through an array of partnership programs that we collectively refer to as ***Partners for the Environment,*** EPA is working to demonstrate that voluntary commitments achieve real environmental results in a timely and cost-effective way.

- Since the Agency launched this voluntary approach in the early 1990's with the 33/50 Program and the Green Lights program, thousands of organizations have joined with the Agency to reach a range of important environmental goals.

- Some of the environmental goals achieved include:

  ◊ reducing toxic emissions and solid waste through the 33/50 program and Waste Wi$e;
  ◊ reducing indoor air pollution and pesticide risk through our indoor air quality outreach initiatives and the Pesticide Environmental Stewardship Program;
  ◊ conserving water and energy use through the WAVE Program;
  ◊ improving energy efficiency and reducing greenhouse gases through our Climate Change Action Plan initiatives such as Climate Wise, Green Lights, and the Energy Star Buildings and Office Equipment programs; and
  ◊ preventing pollution by increasing business' incorporation of environmental considerations into the design and redesign of products and processes through the Design for the Environment Program.

- The importance of voluntary initiatives is becoming increasingly apparent. For example, the President's Climate Change Action Plan and its related programs such as Green Lights, WasteWi$e, Climate Wise and Energy Star, represent the first time that EPA and the government as a whole have taken a purely voluntary, cooperative approach to an extremely pressing environmental issue -- global climate change.

Collective Success

- The Partners for the Environment Programs are making a real difference by demonstrating that significant environmental improvements and cost savings result from voluntary efforts.

- For example, together EPA's Partners for the Environment programs have:
  - ◊ reduced toxic emissions by 750 million pounds;
  - ◊ eliminated 1.8 million tons of solid waste in one year; and
  - ◊ reduced greenhouse gas emissions by preventing 13.4 million metric tons of CO_2 emissions in 1995.

- These programs don't just reduce pollution; they also save energy.
  - ◊ The Partners for the Environment programs saved 110 trillion BTU's in 1995 -- that's enough to light 11 million households for a year.

- The success of these programs is growing dramatically. By the year 2000 with continued participation from even more partners, these numbers will more than triple.

- In 1995 Partners for the Environment programs had more than 6,000 participants from every major sector of the economy, from Fortune 500 companies to small shop owners.

- The voluntary partnerships fostered by these programs are not just for the good of the environment; they make good business sense and prove that pollution prevention pays.
  - ◊ Together these partners have saved $360 million in 1995; and expect to save $7 billion annually by the year 2000.

- As a result of these successes, use of the partnership tool throughout the Agency has expanded greatly. We now have a wide variety of programs with a strong partnership component.

- Many of these programs target very different audiences and environmental problems and vary greatly in scale, from those that focus on one business sector at a time to those that reach out to most large companies across many sectors.

- As you might expect, many of our business partners are members of more than one partnership program, in order to benefit from several different opportunities to simultaneously prevent pollution, reduce operating costs, and help protect the environment. Last September, Deputy Administrator Fred Hansen created the Partnership Programs Coordinating Committee to increase public awareness of the Agency's voluntary programs, and to foster coordination among, and continuing improvements in, all of our Partnership Programs.

- The coordinating committee consists of representatives of every major EPA office. We have created an umbrella name and identifying logo for our programs: "Partners for the Environment;" and a summary catalogue and fact sheet on all of EPA's voluntary programs.

- We are in the midst of a number of activities to improve our internal efficiency in running these programs, as well as strengthening our message and services to customers. These include:
  - ◊ increasing joint outreach efforts, which will include the first all-inclusive Partnership Program outreach and recognition event;

  - ◊ exploring and strengthening synergies among some of our partnership programs that share similar goals;

  - ◊ developing common metrics for measuring the environmental benefits of partnership programs; and

◊ coordinating EPA's partnership program activities with the Vice President's National Performance Review.

- EPA is also experimenting with new approaches in its voluntary programs. With newer pilot initiatives like CSI and Project XL, the Agency is creating voluntary experiments to explore opportunities for regulatory change and improvement.

Recent Accomplishments

- Last year the Vice President's National Performance Review launched a government-wide effort to highlight ways in which the Federal government was positively impacting Americans.

- As part of that effort, called Project Vanguard, EPA committed to dramatically increase partnerships with businesses by boosting awareness of the positive environmental and economic benefits associated with Partnership Programs, such as Green Lights, 33/50, Wa$teWi$e, Energy Star, Project XL, Climate Wise, and CSI.

- In the past year alone, EPA, and partner agencies, have recruited more than 1,500 new program participants.

- During that time, EPA conducted or presented at nearly 200 events attended by nearly 12,000 participants to increase awareness of the programs. EPA also produced 55 informational and technical documents, placed program information in more than 900 media articles, and contacted nearly 35,000 interested stakeholders and potential participants.

- EPA's partnership programs have been successful because of your participation. And, if this success continues and expands, these programs will become a central component of EPA's environmental protection portfolio, and will continue to complement regulatory approaches in the future.

- One thing is clear: through the success of EPA's Partners for the Environment programs such as those I've mentioned today, pollution prevention is becoming a central consideration in the private sector's way of doing business. Our partners are achieving measurable environmental results more quickly and with lower costs through voluntary efforts to reduce environmental pollution and health risks than would be the case with regulatory approaches.

Aggregate Numbers: Partners for the Environment Common Metrics

Measure	1995	Projected 2000
Toxics reduced (pounds)	750,000,000	0
Waste reduced (tons)	1,800,000	8,300,000
CO_2 prevented (million metric tons)	13.4	184.2
Energy saved (trillion BTUs)	110.0	573.9
Number of partners	6,014	18,566
Money saved (millions)	360	6,859

Implementing a Voluntary Consent Order to Collect Data Regarding Workplace Exposure to Refractory Ceramic Fiber

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Results from a series of toxicological studies, which were designed to evaluate the potential health effects of prolonged exposure to airborne fibers, were provided to the U.S. Environmental Protection Agency (EPA) by the members of the Refractory Ceramic Fibers Coalition (RCFC – an industry trade association). The EPA decided to conduct an accelerated review of the data, pursuant to Section 4 (f) of the Toxic Substances Control Act (TSCA), following which the EPA Administrator concluded that sufficient data was not available to determine whether or not RCFs present an unreasonable exposure risk to humans, but there appeared to be a sufficient basis for concern to pursue further investigation. After reaching an agreement that an assessment of occupational exposures would be beneficial, RCFC and EPA developed and adopted a voluntary Consent Order, pursuant to Section 4 of TSCA, along with a rigorous protocol governing data collection and analysis. The RCFC implemented the Consent Order, beginning in 1993, and has, to date, provided data involving hundreds of workplace monitoring samples to the EPA. Approximately 90 per cent of all monitoring samples fall below the industry's recommended exposure guideline of one fiber per cubic centimeter, and there is a trend towards reduced occupational exposure in both manufacturing and customer facilities. In a broader initiative, the RCFC developed and implemented a comprehensive Product Stewardship Program (PSP) involving seven key elements: health effects research, workplace monitoring, exposure assessments, communications, product research, special studies, and study of workplace controls. Based upon the results produced by the Consent Order and PSP, EPA has recognized that significant progress is being made towards the reduction of potential risks associated with the manufacture and use of RCF.

SLIDE #1

What Are Refractory Ceramic Fibers (RCF)?

- Man-Made Vitreous Fibers (MMVF)
  - Glass Fibers
  - Mineral Wool
  - Slag Wool
  - RCF
- Produced by the Fiberization of Molten Calcined Kaolin Clay or Alumina (Al_2O_3) and Silica (SiO_2)
- High Temperature Industrial Insulation (2800°F)
  - Low Thermal Conductivity
  - Light Weight
  - Low Heat Storage
  - Chemical/Corrosion Resistant
  - Resistant to Thermal Shock
  - Ease of Installation
- RCF Represents 1%-2% of MMVF Production Worldwide
  - Domestic Production of Approximately 5.7 Million Tons/Yr.

SLIDE #2

RCF Timeline

1951 ----------	RCF Patented;
1953 to 1978 ---------	Various Independent and Industry Sponsored Animal Studies, Inconclusive Results, RCF Considered a Nuisance Dust;
1979 ----------	Los Alamos National Laboratory State-of-the-art Animal Study;
1984 ----------	TSCA 8(e) Submittal to EPA;
1985 ----------	Beginning of Product Stewardship;
1986 ----------	(1) Beginning of RCC Geneva Maximum Tolerated and Multi-dose Animal Studies,
----------	(2) ECFIA Human Morbidity Study,
----------	(3) X-ray Study;
1987 ----------	University of Cincinnati Epidemiology Study;
1992 ----------	TSCA 4(f) Expedited Review of RCF Health Issue;
1993 ----------	RCFC/EPA Consent Agreement;
1980's & 1990's -----	(1) Lung Modeling, (2) Communications (newsletters, regulatory updates), (3) Special Studies (stack emissions), (4) 3-D Research, (5) Control Technologies, (6) Exposure Surveys;
Future ----------	Continued Research, Co-operation, Communications.

SLIDE #3

Toxic Control Substance Act (TSCA) Overview

Establish a Mechanism for Identifying and Controlling Toxic Chemical Hazards to Human Health and the Environment.

- Gives EPA Authority to Gather Certain Kinds of Basic Information on Chemical Risks from Manufacturers and Processors of those Chemicals;
- Requires Companies to Test Selected Existing Chemicals for Toxic Effects;
- Requires EPA to Review Most New Chemicals Before They Are Manufactured;
- Includes Authority for EPA to Take Control Actions, from Hazard Warning Labels to Bans on the Manufacture or Use of Especially Hazardous Chemicals.

SLIDE #4

EPA/RCFC Consent Agreement

- Developed as a Result of Ongoing Activities, Industry Stewardship Program, EPA 4(f) Determination (Indicating Agency Concerns with Toxicity and Worker Exposure);
- Would Allow Better Characterization of Worker Exposure, Provide Better Understanding of What Variables Contribute Most To or Reduce Worker Exposure Levels, and Can Help Determine the Effectiveness of a Product Stewardship Program;
- Consent Order Signed May 4, 1993;
- Developed Out of Negotiations Between EPA and RCFC Member Companies (Unifrax Corp., Premier Refractories, and Thermal Ceramics);
- 5-Year Exposure Monitoring Program for Manufacturing Plants (Internal) and Customers (External) Including “Processors” and “End Users”;
- Requires RCFC Members to Monitor and Report RCF Exposure Levels for Workers – Protocol Targets 8 Broadly Defined Representative Categories;
- Includes:

    - Workplace and Worker Sampling Schemes;
    - Protocols for Fiber Collection and Analysis;
    - Provisions for Evaluation of Resulting Data.

SLIDE #5

Consent Agreement Monitoring Strategy

- Workplace TWA's and TLA's

  - Fiber
  - Crystalline Silica "After Service"

- Analytical Protocols

  - PCM NIOSH 7400 "B" Counting Rules
  - TEM

- Annual Sampling Targets (RCFC)

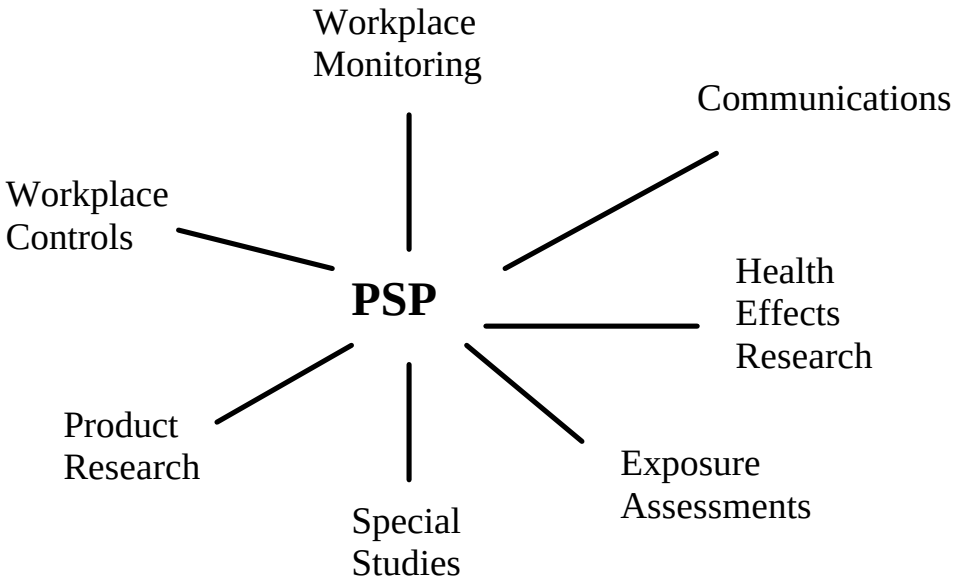
  - 320 TWA's Internal
  - 400 TWA's External

- Task Oriented Categorization (Functional Categories)

  - Fiber Production
  - Finishing
  - Installation
  - Removal
  - Assembly
  - Mixing/Forming
  - Auxiliary
  - Other.

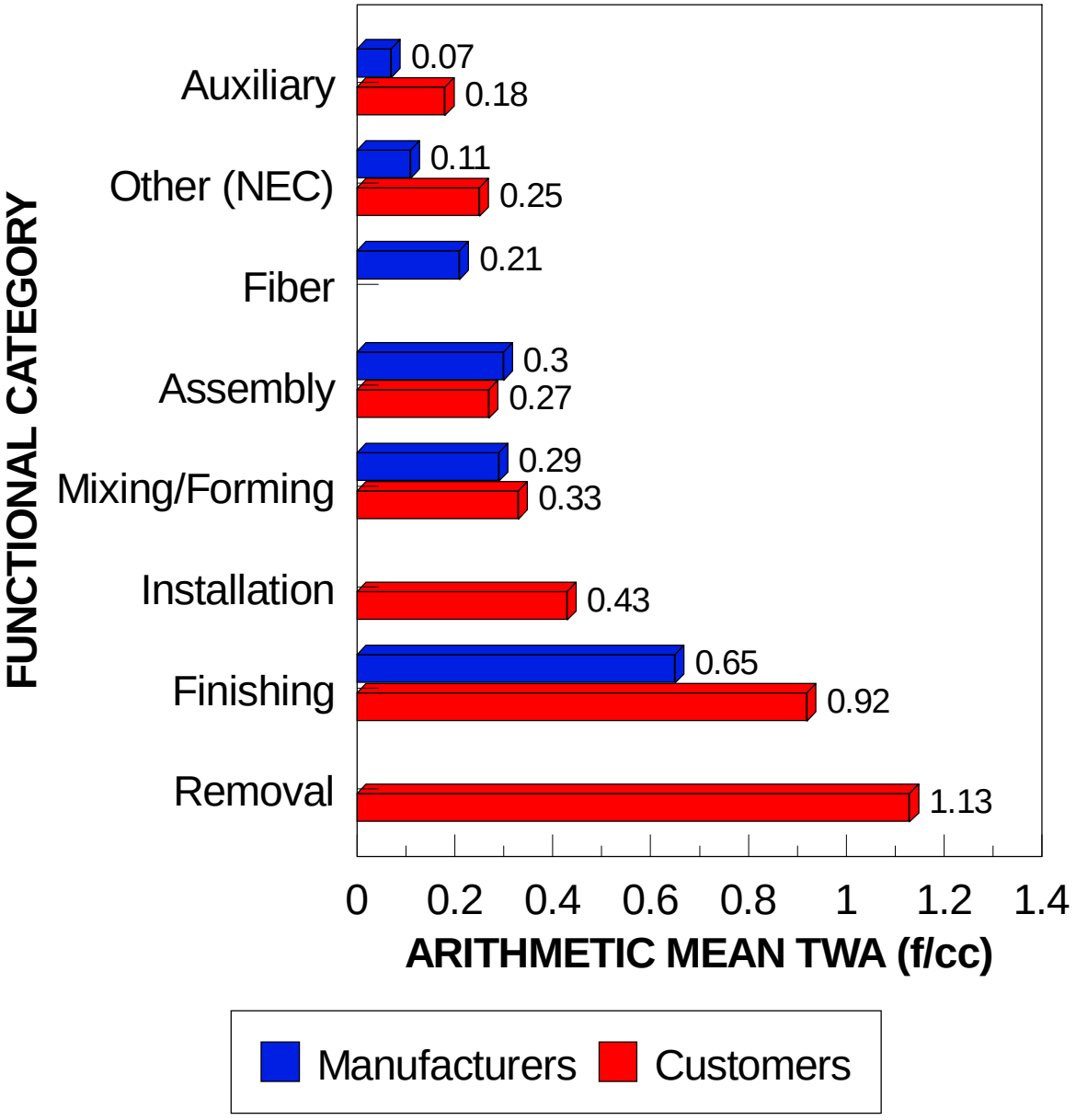
SLIDE #6

Seven Key Elements of the RCFC Product Stewardship Program



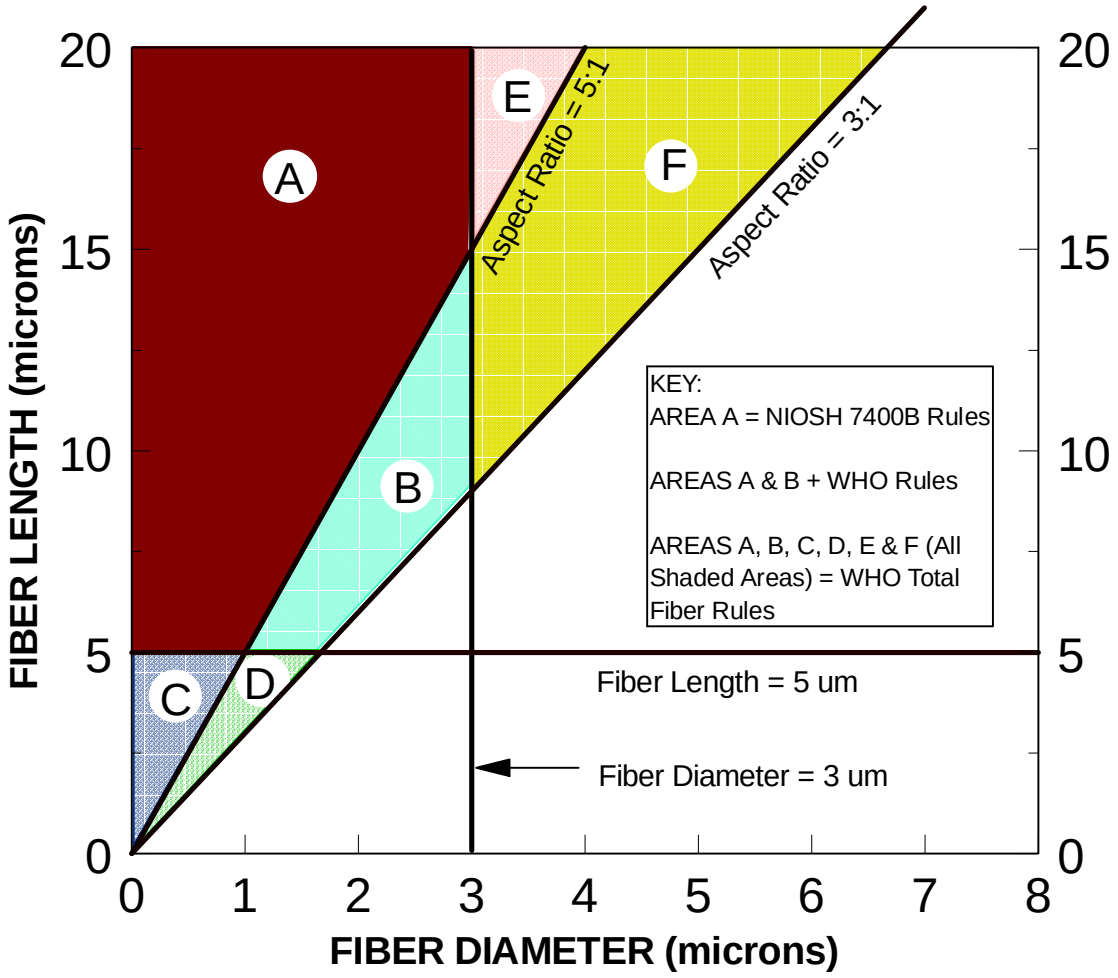
SLIDE #7

Average Concentrations by Functional Job Category
Manufacturers and Customers Comparison
(Thirty Months Data)



SLIDE #8

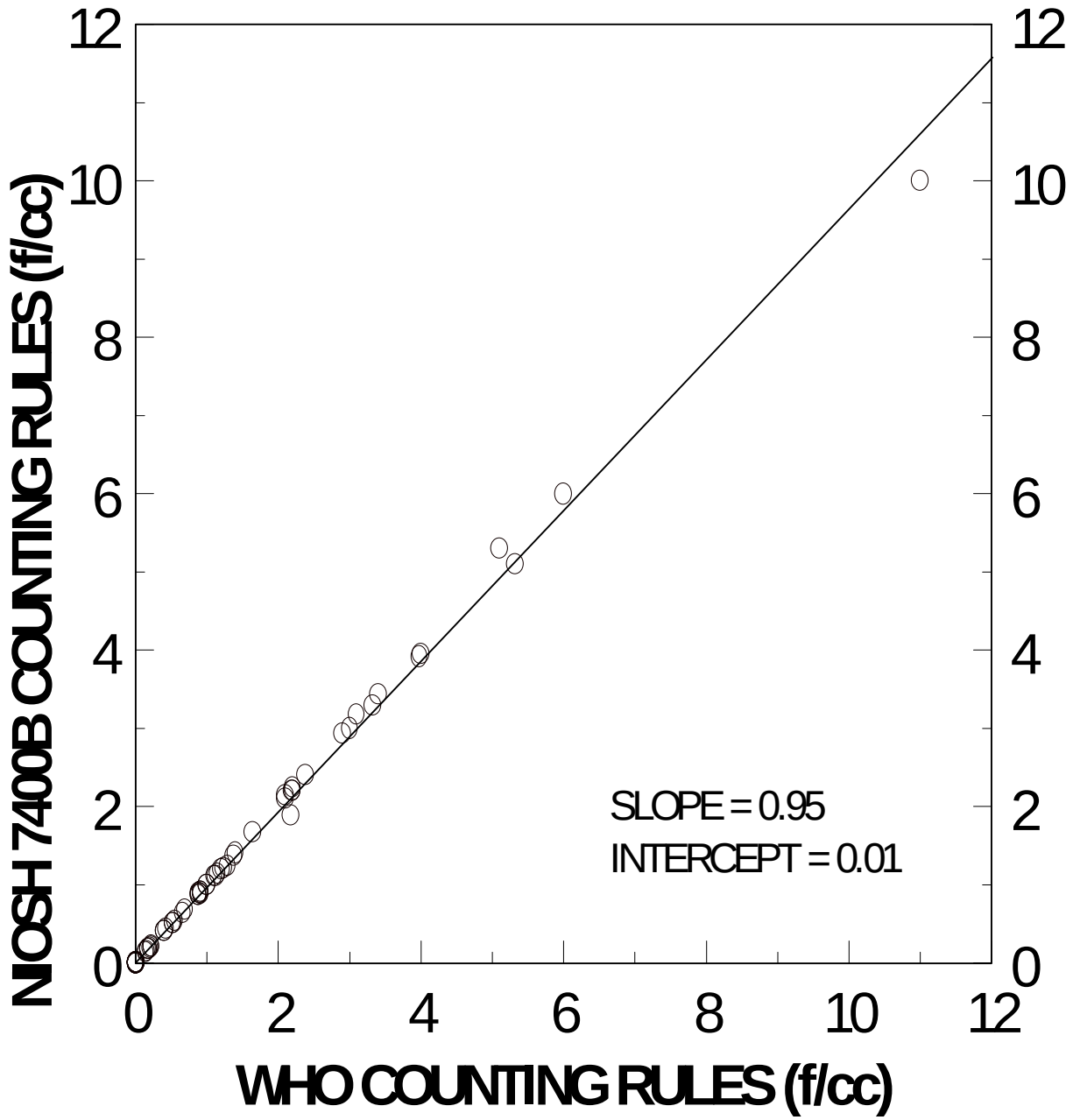
Graphical Representation of NIOSH 7400B, WHO, and WHO Total Fibers Counting Rules



NOTE: Areas A, E, and F extend beyond length = 20 um with the same fiber diameter and aspect ratio limits

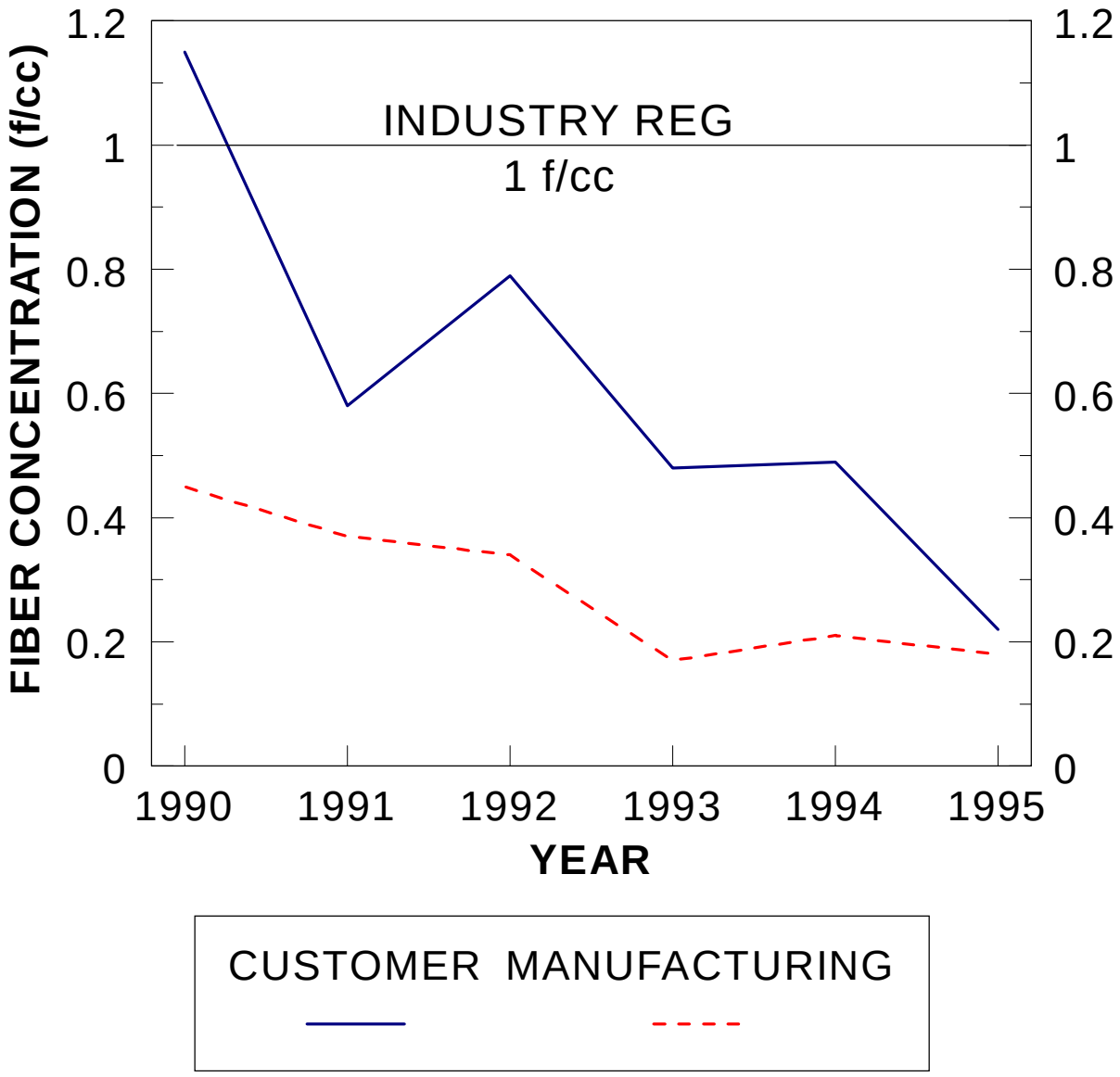
SLIDE #9

Comparison:
TEM and PCOM Samples for RCF
30 Month Data



SLIDE #10

Time Trends Illustrate
PSP Progress in Reducing Exposures



SLIDE #11

RCFC
Product Stewardship Program

- PSP is a Comprehensive Framework for Assessing and Reducing Occupational Exposure to RCF;
- EPA Deputy Director, Office of Pollution Prevention and Toxics (OPPT): "RCFC is the Model of a Good Corporate Citizen";
- EPA Acting Assistant Administrator of OPPT: Signing Ceremony -- "We Need to Move Away from Confrontation and Towards Collaboration Between Government and Industry. This Agreement is a Great Example of Just That Kind of Collaboration.";
- EPA Officials Also Singled Out the RCFC Product Stewardship Program as a Significant Step Towards Risk Reduction.

SLIDE #12

PSP: Future Agenda

- Actively Pursue Efforts to Continue a Downward Trend in Employee Exposure to RCF;
- Continue Communication of Health Related Data/Results to Employees, Customers, Distributors, Regulators, Etc.;
- Continue Airborne Fiber Monitoring of RCF Manufacturers, Distributors, and End-Users;
- 3-D's Program: Continue Effort to Develop Fibers That are Biologically Less Active;
- Continued Evaluation of Epidemiological and Toxicological Investigations;
- Develop Data Exchange Mechanism Between RCFC/ECFIA.

SLIDE #13

Product Stewardship is Good Business

- Manufacturers Are In the Solutions and Problem Solving Business -- Not Just Selling the Product Itself;
- PSP Improves Perceived Product Value and Customer Service;
- PSP Increases Interaction with the Customers, Employees, and Suppliers and Strengthens the Relationship.

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