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Chemical Safety

Chemical Safety in a Vulnerable World

The risks connected with chemical substances have been assessed in a number of conventions that have aimed to apply restrictions on the use of dangerous chemicals, and control of their worldwide trade. The developments in chemicals policy at the European and world level are discussed, with an insight into the interlaced structure of international cooperation that exists at both the political and the technical level.

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Keywords: chemical policy · conservation · environmental chemistry · international cooperation

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*Sabine Gärtner, Jens Küllmer, and Ulrich Schlottmann**

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The title of this article is the motto of the fourth meeting of the Intergovernmental Forum on Chemical Safety (Forum IV), which is to be held in Bangkok in November 2003. The IFCS has been in existence for 10 years. During this period politicians, scientists, and the general public have become increasingly aware of the risks associated with chemicals. International conventions providing for prohibitions and restrictions of dangerous chemicals, and for better control of trade have been set up. These conventions will soon be binding under international law. In developing countries many people who handle or use hazardous chemicals are illiterate or poorly educated; they may not fully understand what they are handling. The industrialized countries therefore have a special duty to incorporate chemical safety in development cooperation measures. Through their presence at this year's forum, prominent chemists such as Carl Djerassi will seek to underline the fact that a long term preventive approach to healthcare and the environment is only possible through international cooperation. This overview describes current developments in the field of chemical safety policy and presents a selection of the legislation currently in force for chemicals in the European Union. It also provides an insight into the interwoven structure of international cooperation that takes place at both the political and the technical level.

From the Contents

1. Introduction

The industrialization that the world has achieved in the past two hundred years is inextricably connected with the production and use of chemicals. Chemical production accounts for a substantial proportion of German economic output. In 2000, sales resulting from the production of and trade in chemicals came to more than € 1700 billion worldwide, of which Germany accounted for € 100 billion, making it the third-largest producer after the USA and Japan. According to OECD estimates, sales are twice as high as in the telecommunications sector.[1] Chemical products have undoubtedly contributed to a substantial improvement in the quality of life. Plastics, surfactants, and a large number of basic chemicals are improving the medical and hygienic situation worldwide. However, numerous toxic substances present risks and hazards that occur during the entire life cycle of a substance: during production, during transport and trade, and during storage, use, and disposal. Awareness of environmental and health risks has grown over the last 20 years. Today this is making itself felt in an increasingly complex set of international regulations on chemical safety. The focus is increasingly shifting towards the developing countries and their populations, as people there are less aware of the risks and hazards than those in the industrialized countries. Today the worldwide spread of persistent, bioaccumulating, and toxic chemicals by air or water, their occurrence in places where they are not used, and the destruction of the ozone layer are making it clear to everyone that "Chemical Safety—An International Challenge"[2] is not just an empty phrase.

But it should not be necessary for risks arising from chemicals to assume international dimensions before action is taken. That is why national or European regulations provide an appropriate framework for a large number of chemicals. Moreover, national laws and European Community (EC) legislation are enforceable law. Compliance with this law is monitored, while noncompliance is prosecuted and punished.

2. National and EC Regulations

2.1. Main Features of Chemicals Legislation

In the European Union (EU) the legal provisions on the trade in chemical products are largely well harmonized. One particular reason for this harmonization is the great relevance for the single market that arises from the lively trade in chemical products. National regulations have been largely confined to the requirements laid down by the EU, which in turn determines their content. It is nevertheless worth quoting at this point the purpose of the German Chemicals Act, which in particular transposes into national law the general chemicals directive of the EC, as set out in the Seventh Amendment to the directive:

The purpose of the Act is to protect people and the environment from harmful impacts of dangerous substances

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[**] This article is an update of "Chemical Safety—An International Challenge" by Bernd-Ulrich Hildebrand and Ulrich Schlottmann.[2]

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and preparations, and in particular to make such impacts identifiable, avert them and prevent their occurrence.[3]

This definition alone is sufficient to identify certain fundamental features of chemicals legislation:

1. Chemicals legislation is committed to the precautionary principle.
2. Chemicals legislation transcends the various protection objectives, that is, the same weight is given to general health or consumer protection, occupational safety, and environmental protection.
3. Chemicals legislation works with the elements of hazard identification, risk assessment, and risk containment.

Hazard identification gathers information about the intrinsic characteristics of a chemical; data on safety-relevant properties, such as explosion risks or flammability, toxicological properties, and on the whereabouts and behavior of a substance in the environment are obtained by means of testing. Risk assessment assesses the potential frequency and severity of the negative effects on man and the environment that may be caused by a chemical. Risk management is the process of identifying, assessing, selecting, and implementing measures designed to reduce the risk to man and the environment. Such measures may range from safety advice on handling a chemical, through restrictions on trade and use, to prohibition.

2.2. Some Selected EC Legal Acts

Community legal acts continue to be legal acts of the European Community and not of the European Union, since only the EC possesses law-making powers. The sole right to take initiatives for Community legal acts rests with the European Commission. Before a proposal for a Community measure is submitted, detailed analyses of the costs and benefits of the planned measure are performed and assessed. The results of an enacted measure, especially the implementation of the measure in the Member States, including the benefits and burdens for those concerned, are usually documented by a Commission experience report. Such an experience report may become the starting point for practical clarifications, amendments, or additions to the legal act under consideration (http://europa.eu.int/eur-lex/de/treaties/). The organization within the EU Commission, especially the Directorates General for the Environment and for Enterprises (Figure 1) and the various EC legal acts in the field of chemical safety (Figure 2) are set out in tabular form.

2.2.1. Basic Directives on Dangerous Substances

The EC's fundamental set of regulations for chemicals is Directive 67/548/EEC, concerning the Harmonization of Legal and Administrative Provisions for the Classification, Packaging, and Labeling of Dangerous Goods, which dates from 1967. This directive, which has undergone numerous substantive amendments and technical adaptations over the years, contains, amongst other things, the provisions on

European Commission

and its Directorates General
ENVIRONMENT (DG ENV)
ENTERPRISES (DG ENTR)

Executive functions

The Commission is the executive body of the European Union. It prepares implementation provisions for basic rules and sees to correct application of these rules in individual cases.

Such functions are lead managed by GD ENV with regard to Directive 67/548/EEC, the EC Regulation on Existing Substances, the Biocide Directive and the Regulation on the Export/Import of Dangerous Chemicals, and by DG ENTR with regard to the Preparations Directive, the Restrictions Directive and the GLP (Good Laboratory Practice) Directives.

Right of initiative

The Commission has the sole right of initiative with regard to law-making by the Community. Fundamental changes to existing legal acts in the course of which decisions by the Council and the European Parliament are also required are prepared by the Commission to proposal level. Lead management is by one of the DGs, as described above. Amendments to the Restrictions Directive, as in the present case of additions to the restrictions on alkyl phenols, are also prepared by DG ENTR.

Committees and Working Groups

When exercising its implementation powers which are defined in the specified legal acts, the Commission is obliged to obtain the opinion of a committee (the "Comitology Committee") composed of government officials of the Member States. Examples are the "Article 15 Committee" pursuant to the EC Regulation on Existing Substances, which *inter alia* takes votes on Community risk assessment of priority existing substances; the "Standing Committee on Biocides", which will vote on the inclusion or non-inclusion of permitted active substances; and the "Update Committee pursuant to Directive 67/548/EEC", to which the ongoing measures to update the eight annexes to the Directive in line with technical progress are submitted.

In preparation for the meetings of the Comitology Committees, meetings chaired by the Commission are held of working groups or committees for which the term "competent authorities committee" has become established. In particular, these also discuss individual questions that arise in the Member States during the implementation of the relevant legal acts and for which a generally acceptable answer is sought in the interests of harmonised enforcement.

Figure 1. The EU Commission and its Directorates General "Environment" and "Enterprises".

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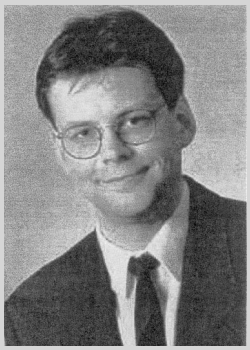
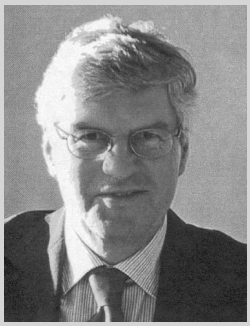


Jens Küllmer, born in 1972, has degrees in Forestry and Environmental Studies (Diplom-Forstwirt, Diplom-Umweltwissenschaftler), and an MBA in International Business Management. In 1998 he was scientific assistant at the Great Lakes Forestry Center (Marie, Canada), and between 1999–2002 was scientific assistant at the Rhineland-Palatinate regional parliament, Mainz. He is now assistant head of division responsible for International Chemicals Policy at the Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety in Bonn.

classification and labeling, on information about special risks and safety advice (known for short as R and S phrases), listed in Annex I, and continuously updates the dangerous substances for which EC-wide classifications exist. In addition, Annex V describes the methods that are used for conducting the prescribed tests. The Sixth Amending Directive, dating from 1979 (Directive 79/831/EEC), was the first to introduce a registration procedure for the marketing control of chemicals, while the Seventh Amending Directive, dating from 1992 (Directive 92/32/EEC), developed the registration procedure further, in particular by defining the data to be submitted for a substance on a graduated basis that depends on the volume traded; the hazard symbol "dangerous to the environment" was introduced, and the Directive laid down that public authorities were to undertake a risk assessment for a registered substance on the basis of the data available. It is very important to note that the question of whether or not a registered substance may be traded depends not on compliance with substantive requirements, but merely on whether the registrant has submitted the full data required, which the competent national authority has to determine within a short period (for instance, 60 days). A considerably more stringent kind of control would be an authorization procedure, but this was not chosen for general chemicals. In an authorization procedure, the question of marketability is linked to compliance with substantive requirements; furthermore, the substance may not be marketed until the competent authority has expressly given permission (see also Section 2.2.4.). The registration procedure is nevertheless considered to have a considerable controlling effect. According to the industry, where internal investigations reveal that substances are too unfavorable from the point of view of chemical legislation, these substances are not registered and hence not placed on the market. Even so, it must be said that nearly every substance registered has to be assigned at least one hazardous property, and roughly half of the substances are classed as "dangerous to the environment".

In addition to a number of special exemptions from the registration procedure that are allowed under chemical legislation (for example, for research and development substances and petty quantities), there is one very fundamental exemption: The registration procedure does not apply to "existing substances", in other words, those substances which were already in existence on the European market before September 18, 1981, and which are listed in the European



Ulrich Schlottmann, born in 1941, gained his doctorate under Horst Böhme. After working in the Federal Ministry for Youth, Family, and Health he was made head of the "Chemicals" department in 1982, and in 1986 he moved to the newly established Environment Ministry. He specializes in international chemical safety, test methods, good laboratory practice, and alternatives to animal experiments. Since 1979 he has been visiting lecturer at the University of Bonn; chairman of the GDCh expert group on "Environmental Chemistry and Ecotoxicology and a member of the GDCh board.

Community Legal Acts aimed at Chemical Safety

Directive on Dangerous Substances (67/548/EEC): • Requirements for the registration of substances, especially provisions on submission of data • Provisions on classification and labeling of substances • 8 annexes with technical rules Extensively revised by Directive 92/32/EEC ("Seventh Amending Directive") Updating of annexes in line with technical progress by means of (to date) 28 "Adaptation Directives"
Commission Directive 93/67/EEC defining the principles for risk assessment for substances subject to registration
EC Regulation on Existing Substances ((EEC) No. 793/93): • Data submission obligations for existing substances, graduated by marketing volume • Preparation of lists of existing substances to be dealt with on a priority basis under Commission Regulations • Risk assessment of priority existing substances
Commission Regulation (EC) No. 1488/94 on implementation provisions for risk assessment of existing substances
Biocide Directive (98/8/EC): • Approval of biocide products by the Member States • Prohibition of non-approved biocide products • Preparation of a Community list of active substances permitted in biocide products • Mutual recognition of approvals
Commission Regulation (EC) No. 1896/2000 on the first phase of the review programme for existing biocide active substances ("First Review Regulation"): • Notification obligations for existing biocide active substances • Data submission obligations in cases where interest exists in inclusion of an existing active substances in the review programme • Restrictions on marketability of non-notified existing substances • Definition of active substances in the product categories wood preservatives rodenticides as priority
In preparation: Regulation on the second phase of the review programme for all biocide active substances ("Second Review Regulation"): • Further prioritization • Allocation of active substances to reporting Member States • Performing active substance assessment • Procedures for decisions on inclusion or non-inclusion of an active substance in the Community positive list
Preparations Directive (1999/45/EC): • Provisions on classification and labeling of preparations made from chemical substances, plant protection agents and biocides
Directive concerning restrictions on the marketing and use of certain dangerous substances and preparations (76/769/EEC) • 21 amendment directives supplementing the basic directive by adding fundamentally new restrictions on substances or substance groups; several amendment directives currently in preparation • 12 adaptation directives adding to existing restrictions • Restrictions exist for, amongst other things, PCB; PCP; chlorinated solvents; tar oils; asbestos; cadmium; carcinogenic and mutagenic substances; TBT
Directive on the application of Good Laboratory Practice (GLP) (87/18/EEC); Directive on inspection and review of GLP (88/320/EEC): • Provisions on the reconstructibility of the planning and implementation of statutory substance and product tests and their documentation • Official monitoring of compliance with GLP in test establishments • Complete revision of annexes by Commission Directives 1999/11/EC and 1999/12/EC
In preparation: Unification of the GLP Directives in a single legal act (codification)
EG Regulation (304/2003/EC)* on the import and export of dangerous chemicals • Transposes the Rotterdam Convention (PIC Convention) • relevant: Directive (2003/106/EC) on the approval of the Rotterdam Convention

Figure 2. Except as otherwise stated ("Commission Directive"), the legal acts listed above were passed by the Council (before being introduced in the Maastricht Agreement) or by the Council and the European Parliament (after coming into effect in the Maastricht Agreement). The relationship between a legal act passed by the Council, or by the Council and the EP, and one passed by the Commission is roughly the same as the relationship between an act and a government ordinance. EC directives have to be transposed, that is, they do not take effect in the Member States until they have been transposed into national law. EC regulations, by contrast, are directly applicable law. The legal acts listed are (with the exception of *) based on Article 95, formerly Article 100a, of the EC Treaty. They are thus measures which are intended to contribute to the functioning of the single European market.

Inventory of Existing Commercial Chemical Substances (EINECS). Thus those substances which, because of their large production and marketing volumes, their multifarious uses of which the public are generally unaware, and their resulting input into the environment, give rise to the real risks to man and the environment, initially remained unregulated.

2.2.2. Regulations on Existing Substances

Since the enactment of the EC regulation on existing substances, the Council Regulation (EEC) No. 793/93 of March 23, 1993 on the evaluation and control of the environmental risks of existing chemical substances, there has been a range of instruments for testing and assessing existing substances.

EINECS lists some 100000 existing substances, of which approximately 30000 are thought to be actually in use. For these substances the EC Regulation on existing substances lays down two complementary systems: a general system based on the volume marketed, and a special system based on the individual substance. Until 1995 producers of existing substances with a marketing volume of more than 1000 tonnes had to supply certain data to the EU Commission, and until 1998 this also applied to the producers of existing substances with a marketing volume of 10 to 1000 tonnes. However, substantive data on safety-relevant aspects, toxicology, and ecotoxicology only had to be supplied for the 1000-tonne substances, and then only where available. On the basis of these data the Commission lays down the order in which the existing substances must be dealt with. Since 1994 the EU Commission has issued lists of existing substances to be dealt with on a priority basis and allocated them to specific Member States, which assume reporting duties in accordance with the EC Regulation on existing substances. The aim is to adopt, for each of these priority substances, a coordinated Community risk assessment combined with a recommendation on measures to minimize risks. As the scope of the EC Regulation on existing substances does not include risk management, any risk mitigation measure suggested, whether it be an occupational safety measure or a restriction on use or trade, must in any case be implemented within the context of other sets of regulations. Nine years after the EC Regulation on existing substances was enforced, the results are sobering:

- 139 existing substances are to be found on four priority lists currently in use,
- for 16 existing substances the Commission has adopted recommendations on Community risk assessments,
- not a single existing substance has so far been made the subject of restriction on use or trade.

2.2.3. Directives Relating to Restrictions on Dangerous Substances and Preparations

As already mentioned, any risk mitigation measures that prove necessary on the basis of the risk assessment are implemented under other Community legal acts. The most important set of rules for restrictions on the use and marketing of substances and preparations is Directive 76/769/EEC, known for short as the Restrictions Directive.[4] Every introduction of additional restrictions supplementary to this Directive requires a relatively complex procedure, since both the Council of Ministers and the European Parliament (EP) are involved in making decisions. A number of important measures have nevertheless been introduced in the context of the Restrictions Directive, such as restrictions on PCBs, PCP. tar oils, tributyltin; no restrictions have yet been imposed on any substance for which a risk assessment has been undertaken under the EC Regulation on existing substances.

This result must be regarded as a virtual failure for the EC policy on existing substances. Even though more knowledge is now available on a number of important substances, the real objective has not been achieved, namely to reduce the risks to man and the environment arising from chemicals and to ensure that chemicals exhibiting unreasonable risks for man and the environment are rapidly removed from the substance cycle. There are undoubtedly a number of reasons for this failure:

- The principal player in the task of dealing with existing substances in the EC, namely the Commission, does not possess a separate administrative unit with good personnel resources for rapid performance of its tasks under the Regulation on existing substances.
- The rapporteurs do not have any enforcement rights in relation to industry and have to go through a tedious process of obtaining Community decisions to complete dossiers.
- The completion of an assessment procedure is not tied to any specific deadlines, which means that continual submission of new and supplementary data can turn into a never-ending story.
- The failure to involve downstream users and a consequent lack of knowledge about such users means there is a great deal of uncertainty about exposure to the substance, the risk arising from the substance, and the choice of appropriate risk-mitigation measures.
- The onus of proof is on the authorities.

2.2.4. Biocide Directive

A fundamentally different approach was taken for a group of special products known collectively as "biocide products". Designed to control these products, the Directive 98/8/EC on the Marketing of Biocide Products (February 16, 1998) is still relatively young. The area of application of the EC Biocide Directive covers a large number of products ranging from disinfectants to mothballs, from large-volume industrially used material preservatives to niche products, from enclosed use in cooling circuits to open use as rat poisons. The only thing these products have in common is that they are used against living organisms that are regarded by humans as harmful. Thus biocides have by definition the effect of impairing or killing living organisms. In view of this property, which they share with plant protection agents, the model used for the EC Biocide Directive was not general chemical legislation, but the EC Plant Protectives Directive.

Although it has been in force since May 2000 and was eventually transposed into national law in Germany in June 2002 (announcement of revised version of the Chemicals Act

of June 20, 2002, Federal Law Gazette I. page 2090, see http://www.bmu.de), no practical experience exists to date regarding the application of the regulations. In particular, the above-mentioned heterogeneity of the products concerned is probably a major challenge for the competent authorities, which renders it difficult to arrive at correct assessments. For this reason, critics of the directive are already prophesying its failure. Compared with the aforementioned sets of rules, however, the EC Biocide Directive has a major advantage, which gives the authorities more enforcement power and probably exerts more pressure on the relevant industries to contribute to timely completion of the individual testing and decision procedures. What the EC Biocide Directive prescribes is an authorization, rather than a registration procedure. In other words, the marketing of a biocide product remains prohibited until the approval authority grants approval on the basis of comprehensive documents to be submitted by the applicant and the evaluation thereof; the onus of proof regarding the acceptability of the product rests with the applicant. This also has an impact on the testing program for old biocide-active substances, that is, for those active substances that were already on the European market when the implementation deadline expired in May 2000. Admittedly existing biocide-active substances and biocide products containing such active substances are subject to transitional rules. These however include an arrangement in which the existing active substances are fed into a multiphase review program. Existing active substances that have not cleared the first hurdle of this review program, in accordance with the First Review Regulation (EC) No. 1896/2000, will shortly cease to be marketable, as will the biocide products containing such active substances. The Biocide Directive is not affected by the amendments to EC chemicals legislation described below.

2.3. Revision of European Chemicals Policy[*]

The sobering balance after several years of the Regulation on existing substances, and the manifestly poor interaction of this regulation with the Restrictions Directive, set in motion in 1998 a process of discussion about the European policy on chemicals, which led from the informal council of environment ministers under the British presidency of the Council (Chester, 1998), via the EU Commission's report of 1998 about the functioning of EC chemicals legislation, to the decision by the council of environment ministers on the cornerstones of a new chemical policy in June 1999. In February 2001 the Commission submitted its White Paper on future chemicals policy in the European Union.

The implementation of the White Paper requires a fundamental reform of EC chemical legislation aimed at the total replacement of the existing regulations. The Council and the EP have basically welcomed the goals and content of the White Paper and made numerous proposals for its implementation. At present this process is at a standstill, because the continuation of a substantive discussion about future chemicals policy is tied to the submission of concrete law-making proposals by the Commission, which are currently lacking. This is probably also an indication of the enormous economic pressure that the Commission has been exposed to since the beginning of the White Paper process. The process nevertheless appears to be irreversible, since there is a general consensus that the EC work on existing substances cannot be continued along old lines.

The core of the White Paper is the REACH-System (Registration, Evaluation and Authorization of Chemicals).[5]

- The distinction between existing and new substances is to be abolished. All chemicals (above a certain threshold quantity) are to be registered with their respective uses. The timing of the registration and the necessary documents are to be geared to the production and marketing volumes.
- The manufacturers and users must perform an initial risk assessment. Subsequent users, that is, downstream users, are also to be included. The onus of proof regarding the safety of the use of a substance will rest with industry. An official review of this assessment or a separate assessment by the authority itself will only be undertaken in the case of high-volume substances and especially problematic substances.
- The use of substances with especially harmful properties is to be made subject to an authorization procedure; this will include not only carcinogenic, mutagenic, and teratogenic substances, but probably also persistent and bioaccumulating substances. Risk assessment and risk management are to be dovetailed more effectively. Restrictive measures are no longer to be decided by the Council and the EP, but by the Commission and the Member States in a committee procedure.
- To ensure the smooth performance of the necessary tasks, an agency of the Commission is to be set up with the necessary competencies and appropriate resources (working title: Chemicals Agency).

The chemicals policy proposed in the White Paper opens up a realistic perspective that might put an end to the enormous gaps in the data, the backlog of assessments, and the management deficits relating to existing substances within a finite period of time.

The Federal Ministry for the Environment considers the reform necessary. If properly designed, it will:

- increase confidence in the products of the chemical industry,
- open up opportunities for innovation and competition by means of providing more reliable information on substances and better communication between producers and downstream users,
- and above all it will bring about necessary improvements in environmental protection, consumer protection, and occupational safety.

Central to the acceptance and success of the new system is the practical orientation of its concrete design. In the

[*] The selection describes the situation in spring 2003. Since then, the European Community has presented a draft regulation for future chemicals policy (REACH regulation). This draft was published on the Internet, especially to allow nongovernmental organizations to comment on the proposed regulations. By the deadline (July 10, 2003) 7000 statements had been received.

forthcoming discussions at EU level it is therefore necessary to make proposals for realistic and practicable solutions for the numerous individual issues, in order to contribute to the success of the reform. The joint position of the Federal Government, the Chemical Industry Association (VCI) and the Mining, Chemical, and Energy Trade Union (IG BCE) of March 2002 contains a number of concrete proposals to this end. (http://www.bundesregierung.de/artikel,-72155/Gemeinsame-Position-der-Bundes.htm)

3. International Activities

3.1. Protocols and Conventions

3.1.1. The Montreal Protocol

The gaps in the ozone layer over the polar regions present a threat to humans, animals, and plants, because of the increase in UV-B radiation reaching the surface of the earth. This natural protective shield has been damaged by the worldwide use of ozone-damaging substances, such as chlorofluorocarbons (CFCs) and halons, which are used for fire protection materials.

The Montreal Protocol (MP) is the international contractual basis for the United Nations worldwide program for discontinuing the use of ozone-damaging substances. 16 years ago, 46 countries undertook to stop producing and using substances that were damaging to the ozone layer. In the meantime more than 180 countries have signed this protocol. The signatory states are responsible for a total of over 90% of the consumption of these substances. The original target (from 1987) of halving the consumption of CFCs by the year 2000 has since been raised considerably on a number of occasions in light of the alarming reports on the status of the ozone layer. For example, the production of CFCs in the industrialized countries was discontinued at the beginning of 1996.

The amendment to the MP which, was passed in Peking in 1999, states that from 2002 onwards the production and use of the substance bromochloromethane, which can be used as a solvent and fire extinguisher, is to be totally banned in the signatory states. This amendment and the treaty modifications adopted at the same meeting were transposed into Community law by decree of the EC Council (2002/215/EC). It follows from the reasons given for this decision that additional steps must be taken to monitor trade in ozone-depleting substances, especially partially halogenated CFCs and new substances. Methyl bromide remained unnoticed by the public for a very long time; this is despite the fact that one atom of bromine destroys 80 times more ozone than a chlorine atom.[6] Thus the bromine content of a compound such as methyl bromide is more reactive and has a greater impact on stratospheric ozone than the chlorine content of CFCs. This pesticide has nevertheless been in use for decades as a preferred means of treating arable land. In Germany its use in the agricultural sector was banned in 1982 owing to its harmful effects on the groundwater. Since then, most of the industrialized countries have banned the use of methyl bromide. However, the USA, Italy, and South Africa continue to oppose a ban on methyl bromide. Under the MP, the USA is to stop using it by 2005 and the developing countries by 2015.

The Montreal Protocol is closely linked to the Convention on Climate Change (Kyoto Protocol). At the most recent conference of the parties in Rome in November 2002, the Multilateral Fund (MLF) for the Montreal Protocol was increased to a figure of US$ 573 million for a period of three years (2003–2005). With this sum the industrialized countries are fulfilling their contractual obligation to ensure that compliance with the discontinuation is not impeded by a lack of financial resources, in particular regarding the G77 states (in the UN sector originally 77 developing countries, today about 135 nations) and China.

The current contribution formula for the MP shows a figure of around 12% for Germany, equating to some US$ 57 million. At the same time, however, Germany will again exercise its option to supply 20% of its contributions to the MLF in the form of creditable bilateral development cooperation projects, which account for a sum of around US$ 4 million per annum. The design and execution of the projects is handled for the Federal Government largely by the development aid agency GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit). The ProKlima project is an example of implementation of the MP. (http://www.gtz.de/climate/deutsch/activities.htm)

3.1.2. The POPs Convention

In May 2001 the signatory conference for the POPs Convention took place in Stockholm. The POPs Convention (Figure 3)[7] implements international prohibition and restric-

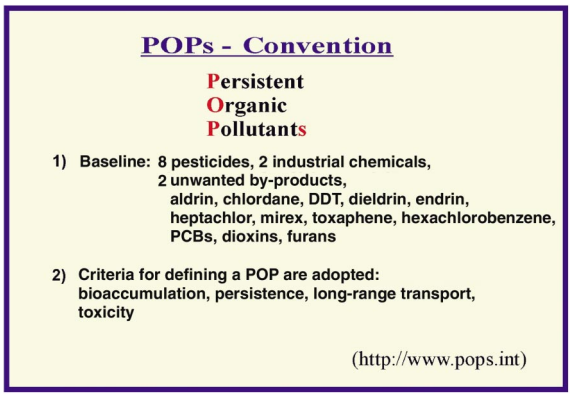


Figure 3. The POPs Convention.

tion measures with regard to certain persistent organic pollutants (POPs). The core of the Convention is that twelve particularly dangerous POPs for the environment are to be prohibited or reduced until they are totally eliminated. The dynamic design of the rules of the Convention allows the original POP substances to be joined by further substances that meet the four criteria of persistency, bioaccumulation, long-range transport potential, and harmful properties. The POPs Convention prohibits the following chemicals: aldrin,

dieldrin, endrin, chlordane, mirex, toxaphene, heptachlor, hexachlorobenzene, di(*para*-chlorophenyl)trichloroethane (DDT), polychlorinated biphenyls (PCBs), polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). With the exception of DDT, which may still be produced and used on a country-specific basis for combating malaria, and of unwanted by-products, all other substances are listed in the Appendix (Appendix A) to the Convention, which regulates the phasing out of the production and use of these substances. The production and use of DDT for vector control will remain necessary until inexpensive alternatives become available. The relevant countries must inform the United Nations Environment Program (UNEP) on Chemicals and the World Health Organization (WHO) about the use of DDT. The use of DDT as a pesticide in the agricultural sector is however prohibited.

3.1.3. The PIC Convention

According to estimates by the WHO, about one million accidents each year are caused worldwide through poisoning from pesticides. The worldwide trade in dangerous chemicals is merely the beginning of the life cycle of a chemical; it is followed by storage, use, and the disposal of residual stocks. That is why steps should be taken as early as the trade stage to ensure that dangerous chemicals do not adversely affect man and the environment. This applies particularly to developing countries, most of which are today suffering from the effects of incorrect usage.

For this reason, a meeting of the International Community of States (Rotterdam, 1998) decided to adopt a convention defining binding rules for the trade in dangerous chemicals (PIC Convention). In accordance with the precautionary principle, this convention allows states to impose a ban on imports before a chemical is imported. This does not prohibit trade in chemicals, but makes it subject to very stringent rules, namely the "PIC procedure", where PIC stands for "prior informed consent". In the context of imports, this means that the potential importing country must be informed about the chemical and take a decision before the chemical is actually imported. To date this has applied to 26 agricultural and five industrial chemicals, including DDT, aldrin and heptachlor. The substances agreed in the convention may only be imported by one country into another if the receiving country has first consented to the import. The convention requires that the dangerous properties of the chemicals must be made known so that a potential receiving country can reach an informed decision on an import application. This information enables the receiving country to take appropriate risk mitigation measures, which may range from protective and qualification measures for users to a ban on importation. Taking appropriate risk management measures is regular practice within the European community of states. The PIC Convention was developed primarily to protect the poorer regions of the world, which currently have a less than adequate monitoring system for chemical management, and for which the PIC procedure aims to provide better protection for the environment and human health, hence saving lives.

Spring 2003 saw the introduction of Regulation (EC) No. 304/2003 of the European Parliament and the Council on the Export and Import of Dangerous Chemicals. This superseded the existing Council Regulation (EEC) No. 2455/92 (July 1992) concerning the Export and Import of Certain Dangerous Chemicals. No reductions were to be made in the level of environmental and health protection in the importing countries. In order to achieve this goal, some of the provisions go beyond those of the PIC Convention. This conforms with Article 15, Paragraph 4 of the PIC Convention, which states that the contracting parties may take measures that provide more stringent protection for human health and the environment than laid down in the Convention, provided these measures are compatible with the Convention and with international law. The Community also considered it advantageous in terms of practicability that there should be a single agency responsible for contact between the Community, the PIC Secretariat, other contracting parties, and other countries. The Commission has assumed the function of the point of contact for this purpose. Exports of dangerous chemicals that are prohibited in the Community or subject to strict restrictions continue to be subject to a joint export notification procedure. In the case of imports, the Community must take decisions before the importation of chemicals that are subject to the international PIC procedure is allowed. The fact that exporters and importers are obliged to furnish information on the quantities of chemicals in international trade that are covered by this Regulation makes for better monitoring and assessment of the impacts and effectiveness of this new Regulation.

In autumn 2002, the 9th Intergovernmental Conference (9^{th} INC PIC) on trade in dangerous chemicals was held in Bonn. The conference was attended by more than 200 delegates from about 100 nations, and numerous representatives of nongovernmental organizations (NGOs). The meeting proposed the inclusion of the toxic insecticide monocrotophos in the PIC list of substances. This insecticide is used as a pesticide, particularly in cotton production. In Europe a recent Community decision (2002/371/EC) already states that textile fibers made of cotton may no longer contain any monocrotophos. In addition the conference paved the way for the inclusion of three more pesticides (DNOC, GRANOX TBC, and SPINOX T) and all carcinogenic forms of asbestos. To this end the mandate of the Interim Review Committee, an expert body which prepares the inclusion of new substances, was extended. It is to continue its work with virtually unchanged membership until the first Conference of the Parties; this ensures the continuity of its work (http://www.pic.int).

The Federal Government is seeking to ensure that the permanent secretariat of the Rotterdam Convention (PIC) and of the Stockholm Convention on the Prohibition of Persistent Organic Chemicals (POPs) will in future be located in Bonn. The relevant decision will be taken at the First Conference of the Parties (COP-1), which has to be held within one year of coming into effect (90 days after the 50th ratification), probably in the second half of 2004. In August 2003 the PIC Convention had been ratified by 46 countries and the POPs Convention by 35 countries.

3.2. Intergovernmental Forums and Activities

3.2.1. Intergovernmental Forum for Chemical Safety (IFCS)

The first Conference on Environment and Development (UNCED) was held in Rio de Janeiro in 1992, in which the positive experiences of the Montreal Protocol were maintained. Numerous heads of state and heads of government approved Chapter 19 of Agenda 21, which sets out details of the principles for internationally effective chemical safety. This chapter contains objectives for environmentally sound handling and use of chemicals, including measures to prevent illegal international trade in toxic and dangerous products (Figure 4).

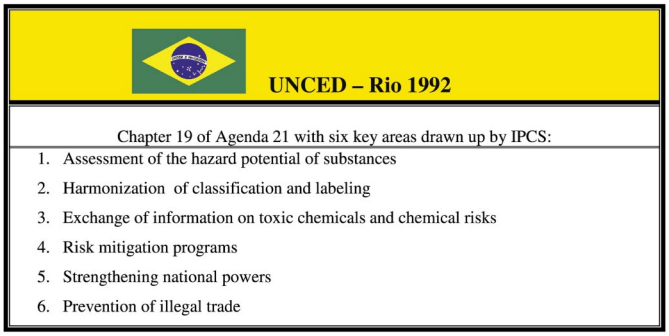


Figure 4. Key areas of Chapter 19 of the UNCED Agenda 21.

An important point is the intensification of international cooperation and the coordination of ongoing international and regional activities. As part of the implementation of this program, the International Conference on Chemical Safety was held in Stockholm in April 1994, which was organized by the United Nations Environment Program (UNEP), the International Labor Organization (ILO) and the World Health Organization (WHO). The conference established the Intergovernmental Forum on Chemical Safety (IFCS), the central task of which is to promote, monitor, and harmonize the implementation of Chapter 19. The Forum is to draw up recommendations for governments and for international and intergovernmental organizations. Moreover, Forum I in 1994 laid down a concrete plan of action on the six key areas of Chapter 19 with a time scale extending until 2000. In 1995, to coordinate the work of the international organizations, the Inter-Organization Program for the Sound Management of Chemicals (IOMC) was set up, comprising UNEP, WHO, ILO, FAO, UNIDO, UNITAR (1998) and OECD.

In 2000 the participants in the IFCS Forum III approved the Bahia Declaration and a concrete plan of action.[8] This declaration makes recommendations on measures in the field of chemical safety after the year 2000. At Forum IV in Bangkok in November 2003, which will be held under the motto "Chemical Safety in a Vulnerable World", the measures implementing the Bahia Declaration are to be evaluated (see the historical development of the IFCS in Figure 5). A further main focus is the systematic improvement and continuation of assistance for the threshold and developing countries. In the interests of better worldwide sharing of

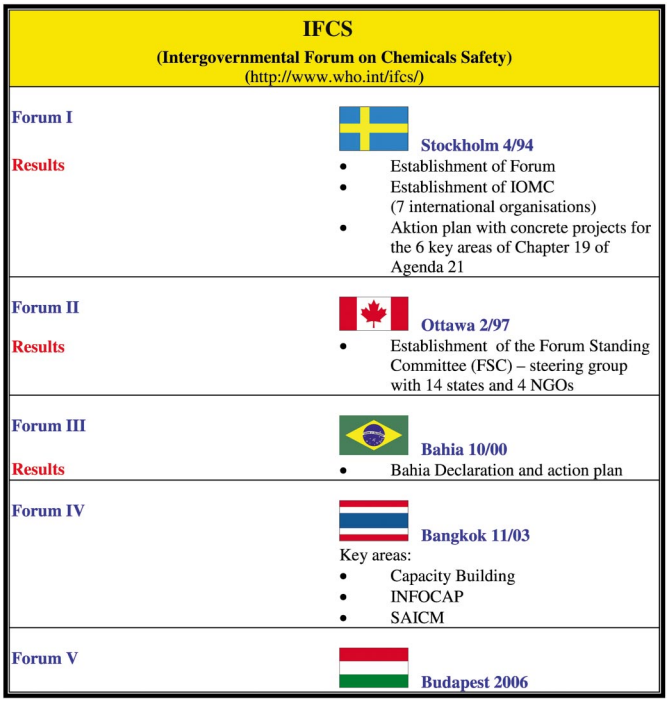


Figure 5. The historical development of the IFCS.

information, work is already in progress on developing a computer-based information system accessible to the general public (Information Exchange Network on Capacity Building for the Sound Management of Chemicals, INFOCAP, http://www.infocap.info).

3.2.2. The Classification and Labeling of Chemicals (Globally Harmonized System, GHS)

The above-mentioned conference in Rio de Janeiro made the first move towards developing a globally harmonized system for the classification and labeling of dangerous chemicals (Figure 6). This goal was achieved at the follow-up conference, the World Summit in Johannesburg in 2002. Since December 2002 a draft GHS for implementation has been on the table, the content of which was passed by the United Nations body ECOSOC (Economic and Social Council) after years of negotiation. In July 2003 this draft was approved and published as a United Nations recommendation. As soon as the GHS is implemented, trade barriers will be abolished and costs will be reduced. Animal experiments, many of which are unnecessary because of widespread repetition and duplication of tests, will be eliminated. Moreover, greater transparency will be achieved in the use of chemicals.

The GHS is to address the fields of transport, workplace, consumers, and environment. The harmonization approach encompasses the classification criteria and labeling provisions on physicochemical, health-endangering, and environmentally harmful properties. On the one hand the new system is to be based on successful existing precursor models. At the same time, however, it is to introduce standardized safety data sheets worldwide and easily understood hazard symbols

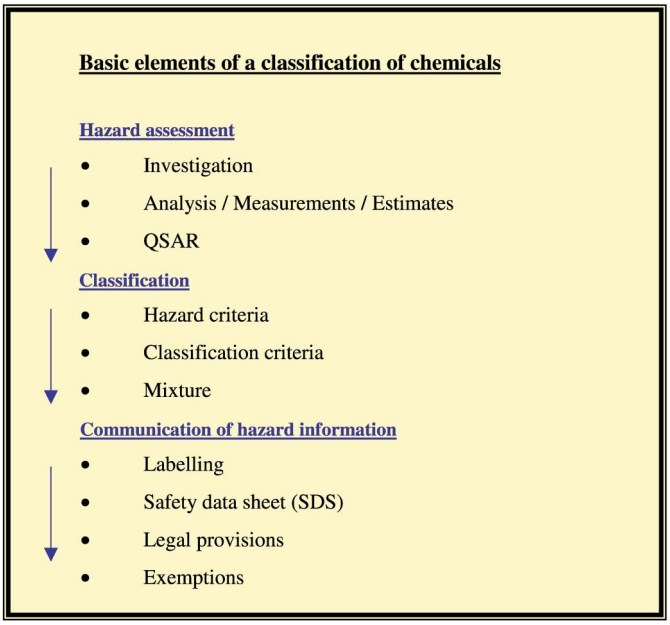


Figure 6. GHS Classification and Labeling Criteria.

which make clear the risks to humans and the environment that arise when using chemicals. The labeling and information sheets would be used for the carriage of dangerous goods and the use of chemicals in industry and agriculture. This will unify the existing classification and labeling systems and supersede the separate systems for dangerous goods and hazardous substances (http://www.unece.org/trans/danger/danger.html).

The principal technical work on this harmonization will be undertaken by the expert bodies of the OECD, UNCETDG, and ILO. Their ambitious and demanding work programs are extensive. In December 2002 the EU member states instructed the Commission to submit a proposal for EU-wide implementation of the GHS by 2005. The action plans of Bahia and Johannesburg envisage worldwide introduction of the GHS by 2008. Furthermore, the GHS will make a major contribution toward the objective of worldwide sustainability in the safe use of chemicals by the year 2020 (http://www.unece.org/trans/danger/publi/ghs/ghs.html) .

3.2.3. *Development Assistance for Chemical Management (Capacity Building)*

In the last 15 years Germany has made financial resources of as much as € 280 million available for improving chemical safety in developing countries. At the 9th INC PIC in Bonn, states from South and Central America announced further workshops on chemical safety. The "Convention Project Chemical Safety" run by the GTZ, in cooperation with the Federal Ministry for the Environment, has already brought about improvements in chemicals management in model projects of the kind implemented in Argentina. For example, poison information centers have been set up on German lines. Moreover in the interests of improving the use of chemicals in developing countries, the new EC Regulation on Export and Import of Dangerous Chemicals provides that all chemicals exported must have a sufficient storage life to permit effective and safe use. With the help of European assistance, Argentina and Thailand, for example, are now able to integrate further chemicals into the PIC procedure that are classified as dangerous. Particularly in the case of pesticides and, above all, their export to developing countries, it is essential that information on proper storage conditions be disseminated and that storage containers be appropriately sized to prevent residual stocks of expired chemicals. In cooperation with relevant international organizations, such as the FAO, UNEP, and ILO, development assistance is promoting, amongst other things, the implementation of the GHS system and the control of exports/imports of chemicals in southern Africa, the documentation and disposal of obsolete pesticides and PCBs in African and Asia countries, and the introduction of management systems for safe and economic use of chemicals in small and medium enterprises in developing countries.

3.2.4. *Sustainable Chemistry*

The term "sustainable chemistry" describes a fundamental strategy that aims not only to reduce the environmental impact of chemicals, but also to minimize all burdens on the environment and to conserve resources;[9] it includes legal regulations. Its broadly based objective is a networked and closely coordinated design of chemical and product policy, environmental and health policy which takes account of social, economic, and ecological aspects.

A sustainable chemicals policy can only be implemented jointly with industry and should not restrict its competitiveness. In the long term, ecological benefits go hand-in-hand with economic benefits. The chemical industry has been demonstrating this for years in cases where process innovations that make ecological sense have been systematically implemented, thus giving rise to profitable energy-saving effects. A global sustainability policy in the chemicals sector lends special significance to the responsibility of industry and the industrialized countries for the developing countries. For this reason the systematic implementation of modern knowledge management (e.g., through a GHS) and an approach based on substance flows should be an essential component of the future sustainability strategy in chemicals policy, since more transparency leads to greater safety. The approach of an integrated product policy (IPP) also makes a contribution to the sustainable use of chemicals. IPP can be developed and improved. The EU Commission therefore proposes to present new proposals for the development of IPP in 2003. At the same time it is necessary to consider how IPP and substance-flow management can best be kept compatible.

3.3. *International Program on Chemical Safety, IPCS*

The IPCS was founded in 1980 as a joint venture by the UNEP, WHO, and ILO (Figure 7). The aim of the IPCS is to produce a fundamental scientific base for reducing the risks to

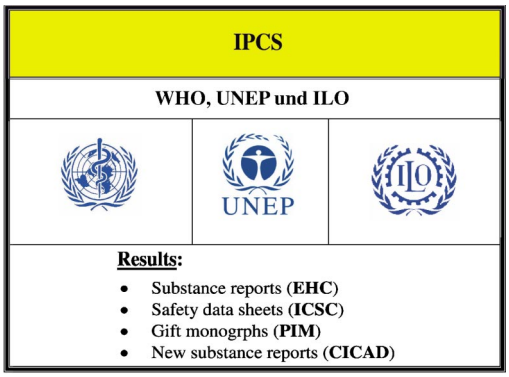


Figure 7. The IPCS.

human health and the environment that are caused by chemicals. It seeks to strengthen national and international efforts in the field of chemical safety. This benefits not only the participating states, but also, in particular, those states where the structures for chemical safety and the knowledge needed for building up such structures are not yet very well developed. One key area of the work of the IPCS is to compile and disseminate findings regarding risks to man and the environment arising from chemicals which may be of both industrial and natural origin. To this end numerous monographs on substances and assessment methods have been produced. States which are active in the IPCS work with internationally recognized experts from all over the world. The following items have been published:

- Substance reports (Environmental Health Criteria, EHC)
  These reports prepared for scientific experts contain up-to-date information on health hazards and risks for a specific substance or group of substances. Recent EHCs also contain information on environmental impacts. There are currently 228 EHC reports, with more than 1000 CAS entries.
- Safety data sheets (International Chemical Safety Cards, ICSC)
  These summarize the principal data on a product and information on health protection and safe handling tailored to the use of the product; for example, in factories or the agricultural sector. There are currently 1305 ICSCs for 1315 compounds at the UN level.
- Poisons Information Monographs (PIMs)
  These contain a brief description of the main chemical, physical, and toxicological properties of individual substances and provides information on diagnosis and the treatment of poisoning. PIMs are intended for poison emergency centers and other advisory units. There are currently 230 PIMs covering 462 substances.
- New substance reports (Concise International Chemical Assessment Documents, CICAD)
  These contain information of the hazard potential of a substance, dose-response relationships and, on the basis of sample exposure data, risk characterizations. As a rule, CICADs are based on existing substance reports. The intention is that national substance reports prepared in accordance with the CICAD procedure should be capable of easy transformation into internationally usable and recognized substance reports with a minimum of financial input. There are 47 CICADs, covering 147 chemicals. They are published by the Wissenschaftliche Verlagsgesellschaft in Stuttgart.

The steering group (PAC) of the IPCS last met in Peking in 2002, where it was decided to reorganize the IPCS into the following activity areas:

1. Risk assessment, including harmonization of methods and rule-making functions with a view to defining target parameters (e.g., the WHO Drinking Water and Air Quality Guidelines)
2. Poisons information, precautions, and management, including epidemiology, continuation of case collections, and the use of aggregated sources on toxicological data of relevance to humans
3. Chemical accidents and emergencies, including preparedness for public health precautions and monitoring
4. Assistance with establishing appropriate structures (Capacity Building).

The new structure of the IPCS is to be published in the course of 2003.

3.4. The OECD

The OECD must continue to be regarded as a very important body for the development of international chemical safety; some 80% of worldwide production of chemicals takes place in the member countries of the OECD. This percentage will increase sharply with the accession of states planned to be involved in EU enlargement in 2004, and the possible inclusion of Russia, Brazil, and China, which are also expected to apply for membership. The growing number of members (currently 29) combined with the shrinking budget has given rise to a substantive debate about the original work of the OECD. In the Environment Health and Safety Program (EHS), which has been in existence since 1971, the OECD has maintained its proven long-term key activities for the year 2003/4. Notable examples include good laboratory practice (GLP) in the testing of pharmaceuticals, chemicals, and pesticides, the chemical test methods, the harmonization of classification and labeling (GHS), and risk assessment. The OECD can be expected to emerge strengthened from the initiated reform process if it plays an active part in shaping this process itself.

A significant decision at the last plenary session (34th Joint Meeting on Chemicals in November 2002) was to continue the ICCA program until 2005, now that the pilot phase has been completed. ICCA stands for International Council of Chemical Associations, a voluntary worldwide chemical industry program that seeks to close the data gaps for the most important industrial chemicals (HPV chemicals). The advisory body on existing substances (BUA) of the German Chemical Society (GDCh, http://www.gdch.de) has so far dealt with 23 substances in the ICCA program, which have already been approved by the OECD. At the end of 2002 another 33 of the substance dossiers prepared by the OECD member states were discussed. By the end of 2002, a total of 89 substances in this program had been dealt with.[10]

Furthermore, the pilot phase of monitoring national compliance with the OECD principles for GLP by means of inspections (mutual joint visits, MJV) has been completed. The GLP principles require compliance with the provisions on the reconstructibility of the planning and implementation of legally prescribed substance and product tests and their documentation. The OECD has also developed and laid down guidelines for ensuring official monitoring of compliance with the GLP principles in test establishments. If a test establishment uses an OECD-recognized test method in an officially prescribed test, complies with the GLP principles, and is officially monitored, then the test results obtained are to be recognized throughout the OECD. Mutual recognition of data is one of the major goals of the chemical program.

This program is open to countries outside the OECD if they satisfy the requirements. The test methods[11] and the GLP principles[12] are the basic building blocks for the mutual acceptance of data (MAD). In the next few years the OECD will be devoting increasing attention to structure–activity relationships (SARs), aspects of toxicogenomics, and sustainability in the chemicals sector (http://www1.oecd.org/ehs/chem2.htm).

3.5. World Summit, Johannesburg 2002

Ten years after the conference in Rio de Janeiro, the World Summit for Sustainable Development (WSSD) in Johannesburg ended with the approval of the declaration tabled by South Africa of the action plan that had been negotiated over a period of several months ("Johannesburg Plan of Implementation"). In the period leading up to the conference, the EU had urged that decisions be passed in Johannesburg on concrete targets, timetables, and implementation programs for chemical safety (Figure 8). Item 23 of the plan of implementation contains a renewal of the commitments in Agenda 21. Throughout their entire life cycle, chemicals are to be properly handled in the interests of sustainable development and the protection of human health and the environment, with the aim of ensuring by the year 2020 that chemicals are used and produced in such a way that significant negative impacts on human health and the environment are minimized. Transparent procedures for risk assessment and risk management that are based on scientific findings are to be used, and the precautionary principle in Principle 15 of the Rio Declaration for Environment and Development is to be taken into account. Developing countries are to be given technical and financial assistance with building up their capacities for the proper handling of chemicals and hazardous wastes (capacity building).

Figure 8. An overview of the principal statements on chemicals policy in the Johannesburg Plan of Implementation, 2002.

3.6. Governing Council of the United Nations Environment Program

The United Nations Environmental Program (UNEP) was founded as a UN institution in Stockholm in 1972 to address global problems of environment policy that can only be dealt with meaningfully by adopting a multilateral approach. The UNEP Governing Council (UNEP GC) meets every two years to decide the UNEP work program, in line with the political objectives.

For this reason delegates from 148 countries met in Nairobi for the 22nd UNEP GC in February 2003 to take the first steps towards the implementation of an action plan whose objective is to minimize the health and environmental impacts of chemicals by 2020. The agenda included the following decisions in the chemicals sector: the PIC and POPs Conventions, worldwide discontinuation of the use of lead, a global reduction in mercury levels, and a Strategic Approach to International Chemicals Management (SAICM, http://www.chem.unep.ch/irptc/strategy/default.htm).

The resolutions passed on the PIC and POPs Conventions are primarily intended to bring an earlier introduction of these conventions and to bring their practical implementation forward on a voluntary basis.

In the case of lead, the UNEP was particularly requested to assist the developing countries in their efforts to stop using lead in fuels, dyes, and other areas particularly dangerous to humans through capacity building.

Following the UNEP's submission of a worldwide mercury evaluation in 2002, concrete steps to reduce the use of Hg worldwide are to follow. The UNEP GC kept open the option of using legal or other methods to achieve this objective. The UNEP GC also decided to include in the reduction drive other heavy metals that are dangerous to humans and the environment (http://www.chem.unep.ch/mercury/default.htm).

The UNEP GC also decided that, in conjunction with the other UN organizations, it would analyze worldwide activities in the field of chemicals management, identify deficits, and draw up first proposals for a strategic approach (SAICM). The decision to develop an SAICM is based on the resolutions passed by the UNEP Global Ministerial Environment Forum (GMEF) in Cartagena in February 2002 and by the WSSD. A strategic approach allows for a clear and meaningful statement of priorities that groups a number of different of activities and brings together the existing chemicals management organizations. The main goal of this strategic approach is thus to implement the sustainable use of chemicals as

speedily and efficiently as possible. The global strategic approach for international chemicals management is to be approved by the GMEF in 2006. Organizing the necessary conferences and developing the SAICM calls for financial assistance, which UNEP puts at between US$ 4–5 million.

4. Outlook

The Montreal Protocol and the PIC and POPs Conventions are successful examples of the international efforts that are being made to achieve greater chemical safety. International negotiations are usually lengthy and difficult, because the interests of the individual countries often differ widely. International conventions will undoubtedly become increasingly important with the internationalization of the markets, since the protection of humans and the environment from dangerous chemicals can only be achieved on a worldwide basis. This realization is increasingly being accepted by the chemical industry worldwide, which in the past has tended to be guided by a purely commercial business philosophy.

In view of declining financial and human resources, it is essential to set meaningful priorities so that activities do not stop at declarations of intent, but are followed by practical action. In particular, international negotiations should not be misused as an excuse for delaying or preventing the adoption of measures for which a European framework is appropriate. The European framework, which is admittedly large but still manageable, provides an opportunity to document the feasibility of measures. This can be used to further the development of management institutions and processes. In the past, Europe has frequently shown itself to be a driving force behind progressive environmental protection: Prevention is better than cure.

List of Important Abbreviations

BMU	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (*Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit*)
BUA	Advisory Council on Existing Substances *(Beratergremium für Altstoffe)*
CAS	Chemical Abstracts Service
CICAD	Concise International Chemical Assessment Documents (WHO)
COP	Conference of the Parties
EC	European Community
EHC	Environmental Health Criteria Documents (WHO)
EINECS	European Inventory of Existing Commercial Chemical Substances
EU	European Union
FAO	Food and Agriculture Organization (of the United Nations, Rome)
GC	Governing Council
GDCh	German Chemical Society *(Gesellschaft Deutscher Chemiker)*
GLP	Good Laboratory Practice
GMEF	Global Ministerial Environment Forum
GTZ	*Deutsche Gesellschaft für Technische Zusammenarbeit mbH* (German development assistance agency)
G77	Third World interest group founded in 1964 by 77 developing countries
HPV Chemicals	High Production Volume Chemicals
ICCA	International Council of Chemical Associations
IFCS	Intergovernmental Forum on Chemical Safety
ILO	International Labor Organization (Geneva)
INC	Intergovernmental Negotiating Committee
IPCS	International Program on Chemical Safety
IPP	Integrated Product Policy
MLF	Multilateral Fund of Montreal Protocol
MP	Montreal Protocol
OECD	Organization for Economic Cooperation and Development (Paris)
PAC	Program Advisory Committee of IPCS
PCB	Polychlorinated biphenyls
PCP	Pentachlorophenol
PIC	Prior Informed Consent (Procedure)
PIM	Poisons Information Monographs (of the WHO)
POPs	Persistent Organic Pollutants
QSAR	Quality-Structure–Activity Relationship
SAICM	Strategic Approach on International Chemicals Management
UN	United Nations
UNCED	United Nations Conference on Environment and Development (Rio 1992)
UNCETDG	United Nations Committee of Experts on the Transport of Dangerous Goods
UNEP	United Nations Environment Program (Nairobi)
UNEP GC	UNEP Governing Council
UNIDO	United Nations Industrial Development Organization
UNITAR	United Nations Institute for Training and Development
WHO	World Health Organization
WSSD	World Summit for Sustainable Development (Johannesburg 2002)

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