

INTERNATIONAL LABOUR ORGANIZATION
Sectoral Activities Programme

**Background information for developing
an ILO policy framework for hazardous
substances**

Document for discussion at the
**Meeting of Experts to Examine Instruments, Knowledge,
Advocacy, Technical Cooperation and International
Collaboration as Tools with a view to Developing a
Policy Framework for Hazardous Substances**

Geneva, 2007

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Abbreviations and acronyms

ACC	American Chemistry Council
ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
BOELVs	binding occupational exposure limit values
CASR	Chemical Abstracts Service Registry
CEN	European Committee for Standardization
CETDG	Committee of Experts on the Transport of Dangerous Goods
CICAD	concise international chemical assessment documents
COSHH	control of substances hazardous to health
ECOSOC	Economic and Social Council
EHC	environmental health criteria
EPA	Environmental Protection Agency
FAO	Food and Agriculture Organization of the United Nations
GFAs	global framework agreements
GHS	Globally Harmonized System for the Classification and Labelling of Chemicals
GPS	Global Product Strategy
HPV	high production volume
HSE	Health and Safety Executive
IAEA	International Atomic Energy Agency
ICCA	International Council of Chemical Associations
ICCS	International Conference on Chemical Safety
ICEM	International Federation of Chemical, Energy, Mine and General Workers' Unions
ICSC	International Chemical Safety Card
IDLH	immediately dangerous to life and health
IGOs	intergovernmental organizations
ILC	International Labour Conference
ILO	International Labour Organization
ILO-OSH 2001	<i>ILO Guidelines on occupational safety and health management systems</i>
IOE	International Organisation of Employers
IOELVs	indicative occupational exposure limit values
IOHA	International Occupational Hygiene Association

IOMC	Inter-Organization Programme for the Sound Management of Chemicals
IPCS	International Programme on Chemical Safety
ISO	International Organization for Standardization
ITUC	International Trade Union Confederation
MNE Declaration	ILO Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy
NGOs	non-governmental organizations
NIOSH	National Institute for Occupational Safety and Health
NOSHC	Nanoparticle Occupational Safety and Health Consortium
OECD	Organisation for Economic Co-operation and Development
OELs	occupational exposure limits
OSH	occupational safety and health
OSHA	Occupational Safety and Health Administration
OSH–MS	occupational safety and health management systems
RC	Responsible Care
REACH	registration, evaluation, authorization and restriction of chemicals
RTDG	Recommendations on transport of dangerous goods
SAICM	Strategic Approach to International Chemicals Management
SCEGHS	Subcommittee of Experts on the Globally Harmonized System for the Classification and Labelling of Chemicals
SMEs	small and medium-sized enterprises
TLVs	threshold limit values
TUC	Trades Union Congress
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNITAR	United Nations Institute for Training and Research
UNRTDG	United Nations Recommendations on transport of dangerous goods
VI	voluntary initiative
WHO	World Health Organization

Introduction

1. Within the general context of International Labour Organization (ILO) action in the area of occupational safety and health (OSH), the protection of workers from exposure to hazardous substances has always been a major concern for the ILO since it was founded in 1919, both in terms of standard setting and technical assistance to the tripartite constituents. Furthermore, current international, regional and national actions related to the sound management of chemicals illustrate the continued importance of this concern. The ILO has been, and continues to be, a major actor in international forums focusing on chemical safety, and ensuring that the views of its tripartite constituents are taken into account in the ongoing activities aimed at developing a global system for the sound management of chemicals.
2. At its 292nd Session (March 2005), the Governing Body decided that a “Meeting of Experts to Examine Instruments, Knowledge, Advocacy, Technical Cooperation and International Collaboration as Tools with a view to Developing a Policy Framework for Hazardous Substances” would be held under the auspices of the ILO’s Sectoral Activities Programme during the 2006–07 biennium.¹ The purpose of the Meeting, as decided by the 297th Session (November 2006) of the Governing Body, was to discuss how ILO instruments and other tools concerning OSH and hazardous substances could be best incorporated into a new policy framework and action plan. The Meeting could also examine best practices and appropriate national legal frameworks to promote safe and healthy working environments; review the roles of governments, and employers’ and workers’ organizations; and examine ways of establishing tripartite consultation mechanisms on OSH, and of ensuring that workers and their organizations participate in the consultation mechanisms and thereby build a preventive safety and health culture at work. The Meeting should also consider the impact of new and ongoing initiatives related to hazardous substances, including the UN-wide Strategic Approach to International Chemicals Management (SAICM). The Meeting could adopt recommendations that would be the basis for subsequent ILO action.²
3. At its 297th Session (November 2006), the Governing Body decided that the Governments of the following 12 countries would be invited to nominate experts to participate in the Meeting in their personal capacity: Australia, China, Egypt, France, Germany, India, Japan, Mexico, Russian Federation, South Africa, United Kingdom and the United States; the Governments of Belgium, Brazil, Bulgaria, Canada, Colombia, Denmark, Islamic Republic of Iran, Italy, Republic of Korea, Kuwait, Malaysia, Morocco, Netherlands, New Zealand, Nigeria, Poland, Qatar, Saudi Arabia, Singapore, Spain, Switzerland and the Bolivarian Republic of Venezuela were placed on a reserve list to nominate an expert if any of the governments in the first list declined to do so. It was also decided that the participants at the Meeting would include 12 experts nominated after consultation with the Employers’ group and 12 after consultation with the Workers’ group of the Governing Body.³
4. In view of the above, this background paper prepared by the Office suggests that this Meeting of Experts should also take into account major ongoing international, regional and

¹ GB.292/13(Rev.).

² GB.297/15(Rev.).

³ GB.297/15.

national activities in the environmentally sound management of chemicals, particularly the ILO's Global Strategy on Occupational Safety and Health and the proposed revision of standards related to single substances,⁴ the new Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187),⁵ and the implementation of the Globally Harmonized System for the Classification and Labelling of Chemicals (GHS).⁶

5. The present document therefore presents, in a summary format, current action, issues and instruments relating to the sound management of hazardous substances. It provides an overview of the key aspects related to the prevention of exposure to hazardous substances, emerging hazards, a summary of related ILO and international standards and instruments, ongoing national, regional and international action, the role and impact of social dialogue, and proposes possible elements for developing an ILO policy framework and plan of action on hazardous substances. Its purpose is to provide a basis for discussions at the Meeting, as participants consider how, within the context of ILO standards and activities concerning OSH, the management of hazardous substances can be harmonized within the present international and regional frameworks for the sound management of chemicals. The conclusions of this Meeting of Experts will assist the ILO in further focusing its action to fulfil its long-standing international and inter-agency commitments in this area.

⁴ Global Strategy on Occupational Safety and Health: conclusions adopted by the International Labour Conference (ILC) at its 91st Session, 2003, International Labour Office, 2004. ISBN 92-2-116287-7; full text available at http://www.ilo.org/public/english/protection/safework/globstrat_e.pdf

⁵ <http://www.ilo.org/public/english/protection/safework/promoframe.htm>

⁶ GHS: United Nations, 2003, ISBN 92-1-116840-6; latest edition available at http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html

1. Hazardous substances

1.1. Scope

6. Given the time available to the Meeting of Experts, the focus will be mainly on issues relating to hazardous industrial chemicals in the workplace, taking into account the ILO Governing Body decision to designate a number of OSH standards on single substances as being in need of revision. In addition, the potential hazards from exposure to nanomaterials will be considered as an example of a major emerging issue. For the reasons presented below, biological hazards, asbestos and radioactive substances in the workplace are not included in this review of hazardous substances.
7. Biological hazards in the workplace include hazards arising from biotechnology (various bacteria and toxins, allergens), agriculture (anthrax, allergens) and health-care services (infectious agents, toxins, genotoxic drugs, hospital wastes, etc.) among others. The subject is therefore sufficiently complex in terms of the diversity of hazards, types of exposure and assessment and prevention methodologies that they should be dealt with separately. In 1993, the ILC adopted a resolution concerning exposure to and safety in the use of biological agents at work. Based on this resolution, the Governing Body requested the Director-General “to take steps to address the question of exposure to and safety in the use of biological agents at work and to consider the need for new international instruments in order to minimize the risks to workers, the public and the environment”. Interest in developing standards on the subject was reaffirmed in 1997¹ and 1999² with an indication that these standards would establish general principles covering appropriate working methods and practice in the field of biotechnology, including risk-assessment procedures and technical control, and organizational measures to safeguard the health of workers. Pertinent issues concerning the protection of the public and the environment would also be covered.³ In the Global Strategy, the development of new standards in the area of biological hazards was among the issues that should be given the highest priority.⁴
8. Regarding asbestos, the subject is very specific in terms of the magnitude of worker exposure, its impact on the health of workers and the political implications. It should therefore be dealt with separately, as is being done currently by the ILO. A resolution adopted at the 95th Session of the ILC in June 2006,⁵ called for the elimination of the future use of asbestos and the identification and proper management of asbestos currently in place as the most effective means to protect workers from asbestos exposure and to prevent future asbestos-related diseases and deaths. It also called for renewed efforts by member States to ratify and give effect to the provisions of the Asbestos Convention, 1986 (No. 162), and the Occupational Cancer Convention, 1974 (No. 139). In fact, many countries have already taken steps to ban the use of asbestos, or have established very strict control measures. Through its SafeWork Programme, the ILO continues to participate in

¹ GB.270/2, 270th Session, Geneva, Nov. 1997.

² GB.276/2, 276th Session, Geneva, Nov. 1999, second item on the agenda, “Proposals for the agenda of the 90th Session (2002) of the International Labour Conference”.

³ GB.276/2, paras 151–162.

⁴ Global Strategy, op. cit., para. 8.

⁵ http://www.ilo.org/public/english/protection/safework/health/resolution_on_asbestos.pdf

international forums concerned with asbestos to ensure that the views of its constituents are taken into account.

9. Radioactive substances represent another group of hazardous substances which will not be addressed in this document. The ILO has long been involved in this area through its standards and other instruments, and works in close collaboration with other international organizations, including, in particular, the International Atomic Energy Agency (IAEA) in order to prevent worker exposure to ionizing radiation. Current standards in this area are considered up to date and can be updated regularly in line with internationally agreed standards.⁶

1.2. Overview

10. Since chemicals, natural and man-made, are an integral part of our natural and urban environment and their benefit to society is invaluable, there is no choice but to learn to manage effectively their unwanted and harmful effects. As they are everywhere, there is a strong need to ensure that each chemical product comes to market only after it has been properly identified, an in-depth assessment of any possible hazardous properties has been carried out, and safe-handling methods have been developed to avoid, or at least reduce, risks. Man-made or industrial chemical substances can be released at every stage of their life cycle from production (or import) and processing through manufacturing and use (industrial and private) to disposal. This may lead to the exposure of workers and the general population, pollution (poorly managed industries, contaminated sites, accidents, etc.) as well as diffuse releases causing long-term, combined exposure to low levels of chemical mixtures. The assessment and management of these risks therefore require an integrated approach rather than isolated measures, particularly as some of these problems may have a global impact.

1.3. Impact on workers' safety and health

11. The ILO estimated that nearly 440,000 people throughout the world died as a result of occupational exposure to hazardous substances in 2005 (see table 1). Cancer is considered to be the most serious occupational disease. Over 70 per cent of this total figure, or nearly 315,000 people, died of cancer. The ILO estimate is based on national statistics. However, the actual figure is likely to be much higher. The Trades Union Congress (TUC) in the United Kingdom has estimated that the incidence of occupational cancer in the United Kingdom may be as high as 12,000–24,000 deaths a year, which is four times the figure suggested by the Health and Safety Executive (HSE). The discrepancy is due to problems related to the outdated methodologies presently used to compile national statistics. Research published by the Queensland Cancer Fund and the University of Sydney indicate that every year some 5,000 Australian workers – twice the officially accepted best estimate for the prevalence of occupational cancer – develop cancer as a result of exposure to carcinogens in their offices or plants.⁷ The table below provides a recent estimate of fatalities that may be attributed to long-term exposure to hazardous substances.

⁶ List of ILO instruments and publications related to radiation protection, at <http://www.ilo.org/public/english/protection/safework/publicat/iloscat/rad-prot.htm>

⁷ TUC: Australian study backs TUC cancer claim, press release, 20 June 2006.

Table 1. Estimated annual average number of deaths attributable to occupational exposure to hazardous substances by condition worldwide in 2006⁸

Causes of death	Number of deaths		Estimated percentages attributed to hazardous substances		Number of deaths attributed to hazardous substances
	Male	Female	Male	Female	
Cancer (total)					314 939
■ Lung cancer and mesothelioma	996 000	333 000	15	5	166 050
■ Liver cancer	509 000	188 000	4	1	22 240
■ Bladder cancer	128 000	42 000	10	5	14 900
■ Leukaemia	117 000	98 000	10	5	16 600
■ Prostate cancer	253 000		1		2 530
■ Cancer of the mouth	250 000	127 000	1	0.5	3 135
■ Cancer of the oesophagus	336 000	157 000	1	0.5	3 517
■ Stomach cancer	649 000	360 000	1	0.5	8 290
■ Colorectal cancer	308 000	282 000	1	0.5	4 490
■ Skin cancer	30 000	28 000	10	2	3 560
■ Pancreatic cancer	129 000	99 000	1	0.5	1 785
■ Other and unspecified cancers	819 000	1 350 000	6.8	1.2	71 892
Cardiovascular diseases, 15–60 years	3 074 000		1	1	30 740
Nervous system disorders, 15+ years	658 000		1	1	6 580
Renal disorders, 15+ years	710 000		1	1	7 100
Chronic respiratory diseases, 15+ years	3 550 000		1	1	35 500
Pneumoconiosis estimate	36 000		100	100	36 000
Asthma, 15+ years	179 000		2	2	3 580
Total					434 439

12. Statistics on occupational injuries due to accidents involving physical hazards, such as fires, explosions, corrosion of materials, and displacement of air (asphyxiation) are difficult to separate from the available general occupational accident and disease statistics. However, industrial disasters such as the 1974 cyclohexane explosion at Flixborough in the United Kingdom, the 1984 Bhopal methyl isocyanate leak that killed thousands of people in India,⁹ or more recently the 2001 ammonium nitrate explosion at the AZF plant in France, illustrate the catastrophic capabilities of hazardous substances when all the necessary preventive and protective measures and safety and health management controls are not implemented properly.

⁸ Taken from P. Baichoo, B. Dardelin and J. Kruger: “ILO activities in the area of chemical safety”, in *African Newsletter on Occupational Health and Safety*, 2006, 16: 52–55.

⁹ This disaster prompted the adoption of a resolution concerning the promotion of measures against risks and accidents arising out of the use of dangerous substances and processes in industry (ILC, 71st Session, 1985, *Record of Proceedings* 34/49). The resolution was proposed by India and called for, among other things, the Office to assess the task of harmonizing existing systems for the classification and labelling of chemicals. The development of the GHS is the outcome of the initial work done by the ILO.

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13. It is therefore not surprising that the ILO has been very active in this area since it was founded in 1919, through the setting of specific standards, the elaboration of codes of practice and technical guidelines, and the provision of assistance to support employers' and workers' organizations in developing training and information on the prevention of exposure to hazardous substances. The ILO has always been and continues to be equally active in collaborating with national, regional and international agencies responsible for chemical safety issues. The past 15 years have seen the ILO contribute significantly to major world summits and new global coordination mechanisms, as well as to a number of international regulatory and technical standards for the environmentally sound management of chemicals, including hazardous substances. Key aspects of ILO action are described in detail below.

1.4. What is a hazardous substance?

14. The Prevention of Major Industrial Accidents Convention, 1993 (No. 174), provides a specific definition of the term "hazardous substance":

The term "hazardous substance" means a substance or mixture of substances which by virtue of chemical, physical or toxicological properties, either singly or in combination, constitutes a hazard.¹⁰

15. The terms "hazardous substance" and "hazardous chemical" are commonly used as synonyms. Most countries, as well as many regional and international bodies active in the area of chemical safety, have developed different definitions and lists of designated or classified hazardous substances to reflect specific regulatory requirements. For example, the United States Occupational Safety and Health Administration (OSHA)¹¹ defines a hazardous chemical as any chemical that presents a physical hazard or a health hazard; "physical hazard" means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water reactive; a "health hazard" means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins and agents which act on the haematopoietic system, and which damage the lungs, skin, eyes or mucous membranes.
16. On the other hand, the United States Environmental Protection Agency (EPA) defines "hazardous substances" as the chemicals which must be reported, if released into the environment above a certain amount, and publishes a list of hazardous substances.¹² As a result of growing concerns for the environment, hazardous substances are additionally characterized by their capacity to persist and bioaccumulate in the environment. Both parameters are used in their classification as dangerous to the environment. For the purpose of transport, the United Nations Recommendations on transport of dangerous goods (UNRTDG) classify infectious substances as hazardous substances. The UN GHS

¹⁰ Convention No. 174, Art. 3(a).

¹¹ US Department of Labor, Occupational Safety and Health Administration, OSHA Act (1970), General Industry, 29 CFR 1910, Subpart Z, Toxic and hazardous substances, at <http://www.osha.gov/SLTC/hazardoustoxicsubstances/standards.html>

¹² US EPA: <http://www.epa.gov/superfund/programs/er/hazsubs/lauths.htm>

provides comprehensive hazard classification of chemicals for the purposes of transport, and workplace and consumer use. The different hazard categories defined in the GHS, as summarized in Appendix I, illustrate the complexity involved in transposing physical and toxicological properties of substances into regulatory guidance.

17. It is therefore important, in the process of considering worker protection strategies, to take account of the fact that chemicals, whether a single substance or a mixture, are classified as hazardous only in the context of a regulatory process. Based on the determination of their intrinsic properties through recognized testing procedures, they are included in lists of regulated chemicals including occupational or environmental exposure limits. The risk aspect, i.e. the likelihood of exposure, is part of a separate assessment process to determine exposure limits. As a result, the definitions may vary, depending on the purpose of the designation, such as human health versus environmental protection. Finally, classification as a “hazardous substance” is applied mainly to industrial chemicals manufactured or used in the workplace in significant volumes and for which at least a minimum amount of assessment data are available. Other substances that may be classified as hazardous, such as radioactive and biological substances, are usually subject to different, specific classification and regulatory processes.

1.5. The occupational safety and health context

18. Any strategy for the prevention of exposure to hazardous substances in the workplace will be relevant, coherent and ultimately effective only if it strongly adheres to the general principles of OSH, namely hazard identification and characterization, exposure assessment, risk characterization and the implementation of risk-management measures. The International Occupational Hygiene Association (IOHA) defines OSH as “the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace, and which could impair the health and well-being of workers, also taking into account the possible impact on the surrounding communities and the general environment”. The table below, adapted from a diagram in a United States National Institute for Occupational Safety and Health (NIOSH) publication on exposure to nanomaterials,¹³ transposes these principles to the steps required for determining the hazardous properties of any substance and developing appropriate control measures.

Table 2. Standard steps in the management of hazardous substances

Steps to protect workers from exposure to a workplace hazard	Focus and actions to be taken
1. <i>Hazard identification:</i> Is there any reason to believe the substance could be harmful?	<ul style="list-style-type: none"> ■ Toxicological research ■ Assessment of health and environmental effects ■ Safety research (physical properties, reactivity, flammability, explosiveness, corrosion of materials, etc.)
2. <i>Hazard characterization:</i> How and under what conditions could it be harmful?	<ul style="list-style-type: none"> ■ Toxicological research ■ Field assessment ■ Classification and labelling
3. <i>Exposure assessment:</i> Will there be exposure in real work conditions?	<ul style="list-style-type: none"> ■ Metrology research (measurement methods) ■ Field assessment ■ Control technology research ■ Personal protective equipment research

¹³ “Progress toward safe nanotechnology in the workplace”, a report from the NIOSH Nanotechnology Research Center, DHHS (NIOSH) Publication No. 2007-123, June 2007; electronic version at <http://www.cdc.gov/niosh>

4. <i>Risk characterization</i> : Is the substance hazardous and will there be exposure?	<ul style="list-style-type: none"> ■ Risk assessment ■ Dose modelling ■ Exposure characterization
5. <i>Risk management</i> : Develop procedures and controls to eliminate or minimize exposures below harmful levels	<ul style="list-style-type: none"> ■ Hazard and risk communication ■ Guidance development for controls ■ Exposure levels, personal protective equipment and medical surveillance ■ Information dissemination (safety data sheets) and training

19. All the principles above are reflected in one form or another in the ILO's standards and instruments relating to OSH. In addition to the specific provisions set down in the ILO's standards directly related to hazardous chemicals in the workplace, the general framework principles defined in the Occupational Safety and Health Convention, 1981 (No. 155), and the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187), are very relevant to the development of an ILO policy framework and plan of action for hazardous substances. Convention No. 187 introduces a very important concept, applicable to all occupational hazards, including hazardous substances, as it advocates the implementation of a systems approach to the management of OSH at both national and enterprise levels, based on the *ILO Guidelines on occupational safety and health management systems* (ILO-OSH 2001).

1.6. Research and knowledge gaps

20. As can be seen from table 2, the first, fundamental steps in preventing occupational and environmental exposure to hazardous substances are the identification and characterization of the hazardous properties of the substance. Despite constant research efforts by countries and industry, only a fraction of chemicals available for market use have been tested. As illustrated below, precise and reliable data on the number of existing natural or man-made chemical substances, the quantities used and produced and hazard assessment data are difficult to find, often outdated and conflicting. The Chemical Abstracts Service Registry (CASR),¹⁴ which provides a global service for registering all natural and man-made chemical substances and defining their chemical structure and names, contains more than 32 million organic and inorganic substances in its database. About 13 million of these are available commercially and 245,000 are regulated nationally or internationally. Around 110,000 man-made chemicals are produced in industrial quantities.¹⁵ Adequate hazard assessment data are available for only 5,000–6,000 substances and occupational exposure limits (OELs) have been set for 500–600 single hazardous chemicals.¹⁶ Very little assessment data are available for mixtures of chemicals. These estimates give a sobering idea of the magnitude of the chemical hazard assessment gap.

21. This problem was recognized as a fundamental issue by the United Nations Conference on Environment and Development (UNCED) (Rio de Janeiro, 1992) and the subsequent Earth Summits (New York, 1997; Johannesburg, 2002) convened to assess the progress made in

¹⁴ CASR: <http://www.cas.org/expertise/cascontent/index.html>

¹⁵ I. Obadia: "Chemicals: Benefits and dangers", in *World of Work*, No. 7, Mar. 1994, International Labour Office.

¹⁶ ACGIH: "Threshold limit values", 2007 (ed.), ISBN: 978-1-882417-69-8, 256 pp., at <http://www.acgih.org>

achieving the goals of Agenda 21.¹⁷ As a result of the strong commitments made by countries and intergovernmental organizations (IGOs) at these conferences, a large number of national and regional agencies and IGOs have stepped up their work on hazard assessments, updated their lists of regulated chemicals and OELs, and increased their monitoring of environmental hazards. Although most industrialized countries have infrastructures devoted to chemical hazard evaluation and regulation, the specialized agencies and scientific bodies of the Organisation for Economic Co-operation and Development (OECD) countries are the most active in this area. UN specialized agencies and programmes, such as the joint World Health Organization (WHO)/ILO/United Nations Environment Programme (UNEP) International Programme on Chemical Safety (IPCS),¹⁸ the UNEP Chemicals Programme or the UN Committee of Experts on the Transport of Dangerous Goods (CETDG) or the Food and Agriculture Organization of the United Nations (FAO), are very active in the various aspects of chemical hazard identification, assessment and management. The chemical industry plays a significant role in shouldering this burden, as illustrated by the International Council of Chemical Associations (ICCA)'s Global Initiative on High Production Volume (HPV) chemicals.¹⁹

22. One other significant knowledge gap that needs to be taken into account is the difficulty of accessing information on hazardous substances, particularly in developing countries where access to the Internet is limited or the information does not exist in the national language. This is somewhat alleviated by the significant technical cooperation efforts carried out at the national, regional and international levels, but the needs far outstrip the assistance available and more and better coordinated efforts have to be made to help developing countries establish affordable systems to access chemical hazard prevention and protection data.

1.7. Management gaps

23. Although most countries have put in place, within the context of their national OSH frameworks, monitoring, inspection and regulatory systems for the prevention of workplace and environmental exposure to hazardous substances, many do not have the necessary regulatory frameworks or sufficient financial and technical resources or skilled personnel to effectively enforce their implementation. A number of regional and international IGOs and bodies such as the specialized agencies of the European Union (EU) and all the organizations participating in the Inter-Organization Programme for the Sound Management of Chemicals (IOMC),²⁰ including the ILO, provide a significant level of technical assistance to their constituents and to developing countries in all aspects of the management of hazardous chemicals.

1.8. Hazardous substances and the environment

24. Most of the current national and international chemical assessment, regulatory and technical assistance activities undertaken to achieve the goals set down by the UNCED in

¹⁷ United Nations Commission for Sustainable Development (CSD), at http://www.un.org/esa/sustdev/documents/docs_key_conferences.htm

¹⁸ WHO: IPCS, at <http://www.who.int/ipcs/en/>

¹⁹ ICCA: <http://www.cefic.org/activities/hse/mgt/hpv/hpvinit.htm>

²⁰ IOMC: <http://www.who.int/iomc/en/>

Agenda 21 and subsequent world or earth summit plans of action, are mostly concerned with the impact of hazardous substances on the general environment. The strong participation of the ILO in these international forums has ensured that the link between the world of work and the environment has been taken into account and that the environmentally sound management of chemicals includes the workplace and the prevention of worker exposure to hazardous substances.²¹ Examples of hazardous substances that are currently of great concern for the environment, and consequently for human health, are the heavy metals such as lead, cadmium and mercury; persistent organic pollutants²² and atmospheric pollutants such as oxides of sulphur and nitrogen and carbon dioxide. Endocrine disrupting chemicals, such as some insecticides and fungicides, phthalate plasticizers, dioxins and antifouling paints are also a concern as they interfere with the normal function of the hormonal systems of humans and animals.²³

1.9. Long-standing workplace chemical hazards

25. A number of hazardous substances for which sufficient hazard and exposure data are available continue to be of great concern, particularly those to which workers may be exposed for long periods of time, for example, heavy metals, substances that cause respiratory diseases, such as coal dust, solvents harmful to the nervous system, substances that induce asthma and dermatitis or carcinogens. A good number of these substances are identified in national lists of occupational diseases. The ILO's list of occupational diseases is used by many countries as a model for establishing their own list.²⁴ Continued national and international action in this area is needed and should be reflected in future ILO policy framework and action plans regarding hazardous substances.
26. Most of the industrialized countries establish and maintain lists of OELs that regulate hazardous substance concentration levels to which workers may be exposed via inhalation, ingestion or skin contact, for specified time periods without being at risk. These limits can be binding or indicative and also cover other hazards such as heat, noise, radiation and cold. One list that is outstanding in terms of its coverage and strong scientific peer review process is the list of threshold limit values (TLVs) of the American Conference of Governmental Industrial Hygienists (ACGIH).²⁵ The list of TLVs is used as a basis for the national lists in many developing countries. In the EU, most of the exposure limits are non-binding, indicative occupational exposure limit values (IOELVs) adopted through European Commission Directives. A limited number of binding occupational exposure limit values (BOELVs) that take into account socio-economic factors are adopted through Council and European Parliament Directives.²⁶

²¹ Tripartite Advisory Meeting on Environment and the World of Work, Geneva, 1992, 30 pp.; ISBN 92-2-108615-1.

²² UNEP Chemicals: <http://www.chem.unep.ch/pops/newlayout/infpopschem.htm>

²³ OECD environmental outlook for the chemicals industry, 2001; electronic version at <http://www.oecd.org/ehs>

²⁴ ILO: List of occupational diseases, at <http://www.ilo.org/ilolex/cgi-lex/convde.pl?R194>

²⁵ ACGIH: <http://www.acgih.org/home.htm>

²⁶ Exposure limits in the EU: http://ec.europa.eu/employment_social/health_safety/occupational_en.htm

1.10. Hazardous substances and vulnerable workers

27. Because of different physiological sensitivities, young workers, pregnant women, women of childbearing age and older workers are more vulnerable to exposure to hazardous substances than the standard healthy man weighing 70 kg usually taken as a model for research on the toxic effects of exposure to chemicals and the development of appropriate OELs. Although most national and international legislation, including ILO standards relevant to this issue regulate the protection of such workers, more efforts to develop specific preventive and protective measures should be made.
28. In 2000 the ILO estimated that the total economically active child population aged between 5 and 17 years was 352 million. Of these, nearly 250 million were engaged in forms of child labour that should be eliminated. The ILO also estimated that over 171 million of these children worked in hazardous environments and were at risk of exposure to physical and chemical workplace hazards.
29. As an ever increasing number of women are joining the workforce, they are increasingly being exposed to a variety of chemicals in the workplace and in the environment. A resolution adopted by the ILC in 1985 recommended that measures should be taken to extend special protection to women and men with regard to reproductive hazards.²⁷ This is also reflected in the Maternity Protection Recommendation, 2000 (No. 191).²⁸ Although most of the concerns regarding exposure risks are related to women, there are also reproductive risks for men from exposure to chemicals such as lead. There is some evidence of a relationship between long-term exposure to lead (for example over ten years) and a reduced sperm count or concentration.²⁹ Most member States have adopted gender-neutral limits for exposure to hazardous substances and the levels of these limits have recently been made more stringent in many countries.
30. Human life expectancy rates and retirement age continue to rise. More research is therefore needed into the impact of exposure to hazardous substances on the health of older workers. Hazard assessment and the subsequent regulatory work on hazardous substances should systematically integrate studies focused on the protection of vulnerable workers and on reproductive toxicity.

1.11. The special case of nanomaterials

31. The ongoing scientific studies and discussions concerning the safety and health aspects of nanotechnologies illustrate the approaches currently followed to assess the potential hazards of new technologies. Nanotechnologies refer not only to the manufacture and use of nanomaterials, but also to nanoelectronics, nanophotonics and nanomedicine. Nanotechnology uses innovative methods to control and manipulate matter at near-atomic scale to produce new materials, structures and devices. Nanoparticles are a specific class or subset of these new materials that have at least one dimension that is less than 100 nm. They exhibit unique properties because of their nanoscale dimensions. For consistency, the

²⁷ ILO: "Resolution on equal opportunities and equal treatment for men and women in employment", ILC, 71st Session, Geneva, 1985.

²⁸ Recommendation No. 191, Para. 6.

²⁹ Alexander et al.: "Effects of lead on male reproduction", in *Occupational and Environmental Medicine*, 53 (1996), p. 411.

term “nanomaterial” will be used in this document, with the understanding that it refers only to manufactured nanoparticles.

- 32.** Because of their small size and large surface area, engineered nanoparticles may have chemical, physical and biological properties distinctly different from larger particles of similar chemical composition. Those properties may include the ability to reach the gas exchange regions of the lung, travel from the lung throughout the body, penetrate dermal barriers, cross cell membranes and interact at the molecular level. As with any new technology, the earliest and most extensive exposure to engineered nanoparticles is most likely to occur in the workplace. As workers are currently producing and using nanoparticles, it is important to assess whether these exposures present any health threat to them.
- 33.** Several governments have established national task forces to evaluate the potential impact of nanomaterials on human health and the environment, to carry out the hazard classification, risk assessment and management required, and to assess the regulatory implications. A significant amount of research into the various health and environmental aspects of nanomaterials is under way in many countries, particularly in parts of the EU³⁰ (France, Germany and the United Kingdom) and the United States where the NIOSH Nanotechnology Research Center is investigating all aspects of worker exposure to nanomaterials.³¹ The consideration of these issues and plans to develop the required assessment methodology is now being addressed through a coordinated approach by the OECD.³² The OECD Council agreed to establish a Working Party on Manufactured Nanomaterials on 14 September 2006 as a subsidiary body of the Chemicals Committee. A number of standardization efforts are also under way, most notably within the International Organization for Standardization (ISO), especially with regard to definitions, characterization and nomenclature. An expert group from the United Nations Educational, Scientific and Cultural Organization (UNESCO) is evaluating the ethical aspects of nanotechnology and has already published a number of reports on the subject.³³
- 34.** Although the industry is relatively new, the private sector is leading a number of initiatives. Several nanotechnology trade associations have emerged in the United States, including the NanoBusiness Alliance. The American Chemistry Council (ACC) also has a committee devoted to nanotechnology and is encouraging research into the environmental safety and health of nanomaterials. In addition, the Nanoparticle Occupational Safety and Health Consortium (NOSHC) has been formed by industry to investigate OSH issues associated with aerosol nanoparticles and workplace exposure monitoring and protocols.³⁴

³⁰ “Nanotechnologies: A preliminary risk analysis”, workshop report (Brussels, Mar. 2004), European Commission, Risk Assessment Unit, Public Health and Risk Assessment Directorate, Health and Consumer Protection Directorate-General, 2004. The present report may be found at http://europa.eu.int/comm/health/ph_risk/events_risk_en.htm

³¹ “Progress toward safe nanotechnology in the workplace”, op. cit.

³² Report of the OECD Workshop on the Safety of Manufactured Nanomaterials Building Co-operation, Co-ordination and Communication, Washington, DC, United States, 7–9 December 2005, OECD Environment Directorate, Environment, Health and Safety Division, doc. No. ENV/JM/MONO(2006)19. The document is available electronically at <http://www.oecd.org/ehs/>

³³ UNESCO: <http://www.unesco.org/shs/est>

³⁴ A directory of nanotechnology industry-related organizations can be found at <http://www.nanovip.com>

Environmental non-governmental organizations (NGOs) such as Environmental Defence, Greenpeace UK, ETC Group and the Natural Resources Defence Council are engaged in nanotechnology issues. Also, scientific organizations such as the National Academy of Sciences, the Royal Society of the United Kingdom and the International Life Sciences Institute are providing important advice on issues related to nanotechnology and the environment.³⁵

35. A review of the referenced literature indicates that some occupational and environmental exposure to a limited number of engineered nanomaterials has been reported, but there is still insufficient data to characterize the health and environmental effects associated with exposure to such materials. The generally agreed approach is first to obtain a deeper understanding of the biological responses and toxicity of a selected set of nanomaterials, in order to build an adequate knowledge base for the development of validated and harmonized testing methods and exposure management tools. Significant research to develop a better understanding of the physical properties and health effects of exposure to nanomaterials is under way. The approach taken by national and international bodies to address the OSH aspects of nanomaterials could serve as a model for the assessment of future new hazardous substances.

1.12. Summary

36. The most critical element in achieving the effective management of hazardous chemicals is the production of the hazard assessment data required to develop and implement the technical and regulatory tools to prevent or minimize harm to workers' health and to the environment. Despite significant efforts, the development of assessment data for existing chemicals is still too slow. The case study on nanomaterials illustrates that in the development and deployment of new technologies, hazard identification and assessment should be considered at an early stage prior to full industrialization. Effective collaboration between governments, employers and workers to ensure the integration of safety and health in the development of new technologies is a prerequisite for the successful implementation of such technologies in both economic and social terms. Other key issues that need special consideration are the lack of data concerning vulnerable workers and the limited access of adapted chemical hazard information in developing countries.

³⁵ US EPA: Nanotechnology White Paper (EPA 100/B-07/001), Feb. 2007; electronic version available at <http://www.epa.gov>

2. International labour standards and other instruments

37. The ILO Constitution sets forth the principle that workers should be protected from sickness, disease and injury arising from their employment. ILO standards on OSH provide essential tools for governments, employers and workers to establish such practices and to provide for maximum safety at work. These instruments, including those concerning hazardous substances, must therefore be considered in the light of ILO fundamental Conventions, which constitute the enabling environment for all labour standards. Among the four priority Conventions, those on tripartite consultation and labour inspection are particularly relevant to OSH as well.
38. However, the driving force behind ILO work in the area of OSH relies on the instruments which specifically regulate the main principles and the essential means and methods to deal with the prevention of exposure to, and management of, occupational hazards. These are laid down in 18 Conventions, one Protocol and 22 Recommendations (see Appendix III). Among these instruments, eight Conventions and ten Recommendations are specific to hazardous substances. In addition, among the codes of practice developed in the area of OSH, a significant number deal either specifically or partially with the management of hazardous substances. It should be noted that, as OSH is a cross-cutting issue, OSH concerns, including prevention of exposure to hazardous substances, are also addressed in many other ILO instruments, even if these standards focus on other concerns, such as child labour or agriculture.
39. A review of the status and need for revision of ILO standards adopted prior to 1985 was concluded in March 2002 by the Working Party on Policy regarding the Revision of Standards, part of the Committee on Legal Issues and International Labour Standards (commonly referred to as the Cartier group).¹ Of the relevant OSH standards it examined, 35 were considered up to date, ten were in need of revision² and two were considered to be no longer fully up to date but still relevant in some respects. Since March 2002 three further instruments – one Convention, one Protocol and one Recommendation – have been adopted by the ILC. As noted above, in 2003 the ILO adopted a Global Strategy for OSH which included the promotion of a preventive safety and health culture, the promotion and development of relevant instruments, and technical assistance. This decision led to the adoption in 2006 of a Convention and a Recommendation concerning a promotional framework for OSH. The key instruments relevant for the sound management of hazardous substances are summarized below.

¹ See GB.283/LILS/WP/PRS/1/1.

² In the proposals for the agenda of the 90th Session (2002) of the ILC (GB.276/2), possible ways to revise these instruments were submitted to the Governing Body.

2.1. Instruments concerned with policies and principles

Occupational Safety and Health Convention, 1981 (No. 155), and its Protocol of 2002, and Recommendation (No. 164)

40. The Convention lays down fundamental objectives and defines the basic principles of a coherent national policy. It covers all branches of activity and all workers in those branches and is the most comprehensive of the current standards. The key provisions require member States, in consultation with the most representative employers' and workers' organizations, to formulate, implement and periodically review a coherent national policy on OSH and the working environment, the aim being the prevention of occupational accidents and injuries by eliminating or minimizing the causes of hazards. In general terms, Convention No. 155 specifies the spheres of action that shall be taken into account in the policy. Nevertheless, it also provides detailed rules on actions to be taken at the national level and at the level of the undertaking. These cover the entire range of measures regulated in the more specific OSH instruments adopted both before and after Convention No. 155.
41. The Convention is supplemented by a Recommendation (No. 164) which provides further details and additional practical guidance on several of the provisions in Convention No. 155. The Protocol of 2002 to the Occupational Safety and Health Convention (No. 155), calls for the establishment and the periodic review of requirements and procedures for the recording and notification of occupational accidents and diseases, and for the publication of related annual statistics. Also directly related to Convention No. 155, the List of Occupational Diseases Recommendation, 2002 (No. 194), recommends that national lists of occupational diseases drafted for the purposes of prevention, recording, notification and compensation, should, at the least, comprise the diseases listed in Schedule I of the Employment Injury Benefits Convention, 1964 (No. 121). In addition, to the extent possible, other diseases contained in the list of occupational diseases as annexed to the Recommendation and suspected occupational diseases should be included. Most of the current codes of practice provide additional guidance as to the practical application of Convention No. 155 (see Appendix II).

Occupational Health Services Convention, 1985 (No. 161), and Recommendation (No. 171)

42. Convention No. 161 is also a policy instrument although the policy provision is not as developed as in Convention No. 155. The Convention deals comprehensively with the provision of occupational health services and commits ratifying States to progressively develop occupational health services for all workers. The Convention provides for the status, organization and conditions of operation for health services. The functions of these services are to include surveillance of the working environment and of workers' health, information, education, training and advice, and first aid, treatment and health programmes. Further guidance is given in the supplementing Recommendation (No. 171). The ILO code of practice *Technical and ethical guidelines for workers' health surveillance* (Geneva, 1992) provides additional guidance on the subject. The ILO code of practice *Protection of workers' personal data* (Geneva, 1997) is also relevant in this area.

Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187), and Recommendation (No. 197)

43. This Convention aims to promote a preventive safety and health culture and to progressively achieve a safe and healthy working environment. It emphasizes the need to ensure that a higher priority is given to OSH in national agendas and to foster political commitments in a tripartite context for the improvement of OSH. It is a promotional rather than prescriptive Convention and is based on the application at the national level of a systems management approach to OSH. This means the constant monitoring, evaluation and improvement of the various elements comprising the national OSH system, including a national policy developed in accordance with the principles of Article 4 of the Occupational Safety and Health Convention, 1981 (No. 155). The Convention also defines the elements and function of the national policy, the national system and the national programme. Further operational details and mechanisms are provided in the Recommendation (No. 197). The ILO–OSH 2001 provides detailed guidance on implementing the systems management approach as it applies to OSH at the enterprise level.

Labour Inspection Convention, 1947 (No. 81), and Recommendation (No. 81), and Protocol of 1995 to Convention No. 81

44. The Convention lays down the main rules governing the establishment, organization, means, powers and obligations, functions and competence of the labour inspectorate as an enforcement institution for protecting workers and for promoting legislation adapted to the changing needs of the world of work. The establishment of a labour inspection system is obligatory for industrial establishments and optional for commercial establishments. Pursuant to the Protocol to Convention No. 81, member States should extend the application of the Convention to activities in the non-commercial services sector. Convention No. 81 is supplemented by a Recommendation (No. 81), which provides further details on the preventive duties of labour inspectorates and the collaboration of employers and workers in regard to safety and health and annual reporting on inspection.

The ILO Guidelines on occupational safety and health management systems (ILO–OSH 2001)

45. The ILO–OSH 2001 provides a unique international model, compatible with other management system standards and guides. It reflects ILO values such as tripartism and relevant international standards including the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187), and the Occupational Safety and Health Convention, 1981 (No. 155). It provides guidance on the systematic management of OSH at the national and organization levels. The ILO Guidelines encourage the integration of occupational safety and health management systems (OSH–MS) with other management systems and state that OSH should be an integral part of business management. At the national level, they provide for the establishment of a national framework for OSH–MS, preferably supported by national laws and regulations. At the organization level, the ILO–OSH 2001 encourages the integration of OSH–MS elements into overall policy and management arrangements, as well as stressing the importance that, at the organization level, OSH should be a line management responsibility, and should not be seen as a task for OSH departments and/or specialists. The establishment of an effective system to manage safety and health at work is an essential aspect for safety and health in all fields, including the sound management of hazardous substances.

2.2. Instruments directly concerned with general aspects of hazardous substances

Chemicals Convention, 1990 (No. 170), and Recommendation (No. 177)

46. The Convention is general in scope and concerns all chemicals classified as hazardous that are used or produced in the workplace. It provides for a comprehensive national framework for the sound management of chemicals, including the formulation, implementation and periodic review of a coherent policy, in consultation with employers' and workers' organizations. A very important feature of the Convention are its provisions on chemical hazard communication designed to ensure that information on hazards and related preventive and protective measures flows from manufacturers and importers to the users. This includes requirements for the classification and labelling of chemicals, as well as regulating the production, handling, storage and transport of chemicals, the disposal and treatment of chemical wastes, the release of chemicals and the maintenance, repair and cleaning of equipment and containers for chemicals. At the workplace, the employer is required to ensure that all chemicals are identified and that adequate information is available through labelling and safety data sheets, as well as to take all the necessary measures to eliminate, minimize or control exposure. Products that do not expose workers to hazardous chemicals under "normal or reasonably foreseeable conditions of use" as well as "organisms" are excluded from this requirement. Most biological hazards are also excluded. The importance of cooperation between employers and workers is also underlined and workers' duties and rights and the rights of their representatives are defined. The responsibilities of exporting States are also clarified. The Recommendation and the ILO code of practice *Safety in the use of chemicals at work* (Geneva, 1993) provide additional guidance. The ILO code of practice *The use of synthetic vitreous fibre insulation wools (glass wool, rock wool, slag wool)* (Geneva, 2000) is the only ILO instrument dealing specifically with OSH concerns related to these substances. Another ILO document dealing in part with hazardous substances is *Safety and health in shipbreaking: Guidelines for Asian countries and Turkey*, 2004. Other ILO instruments concerned with single hazardous substances are presented in further detail below.

Prevention of Major Industrial Accidents Convention, 1993 (No. 174), and Recommendation (No. 181)

47. Convention No. 174 provides that a national policy on the protection of workers, the public and the environment against major industrial accidents is to be formulated, implemented and periodically reviewed. The aim is to prevent major industrial accidents involving hazardous substances as well as to mitigate the consequences of such accidents where they do occur. The standards apply to major hazard installations excluding nuclear and military installations, and transport outside of an installation other than by pipeline. Convention No. 174 sets out the systematic identification of major hazard installations, and their control, responsibilities of the employers, competent authorities and the rights and responsibilities of workers. It also contains responsibilities for an exporting State, similar to the provision found in the Chemicals Convention, 1990 (No. 170). The Prevention of Major Industrial Accidents Recommendation, 1993 (No. 181), contains recommendations for the international transfer of information to be organized by the ILO and the rapid compensation of victims of accidents. It also provides that ratifying States should take the related ILO code of practice *The prevention of major accidents* (Geneva, 1991) into account when formulating national policy, and that multinationals should provide equal measures in all their establishments.

**Occupational Cancer Convention, 1974 (No. 139),
and Recommendation (No. 147)**

48. This Convention focuses purely on carcinogenic substances and agents. No scope of application to branches of activity or categories of workers is specified, which implies that it applies to all workplaces. The Convention requires ratifying member States periodically to determine, on the one hand, the carcinogenic substances and agents to which occupational exposure must be prohibited or regulated (or in other words made subject to authorization and control) and, on the other hand, the carcinogenic substances and agents to which other protective provisions of the Convention are to apply. Carcinogenic substances and agents must be determined after taking into consideration codes of practice or guides published by the ILO in the light of current scientific knowledge.³ The number of workers exposed to carcinogenic substances is to be kept to a minimum, measures are to be taken to limit workers' exposure to carcinogenic substances and appropriate systems of records and inspection are to be established. Workers are to be informed of the dangers and are to undergo medical examinations during and after employment in order to supervise their state of health in relation to possible exposure. Supervision of workers' health and measures for information and education are further clarified in the Recommendation (No. 147).

**2.3. Instruments partially concerned with general or
sectoral aspects of hazardous substances**

***Working environment (Air Pollution, Noise and
Vibration) Convention, 1977 (No. 148), and
Recommendation (No. 156)***

49. The Convention is a broad instrument which provides for the prevention and control of, and protection of workers against, hazards due to air pollution, noise and vibration. Member States who ratify the Convention may accept the obligations of the Convention separately in respect of air pollution, noise and vibration. Preventive and protective measures include the establishment of criteria to determine hazards and exposure limits by the competent authority. As far as possible, technical and organizational measures are to be used to keep the workplace free from hazards and, if these fail, personal protective equipment is to be provided. The Convention also provides that employers' and workers' representatives are to have the opportunity to accompany inspectors supervising the application of OSH measures. The Recommendation (No. 156) details the measures to be taken as well as guidance relating to the supervision of workers' health and training, information and research. Provisions on a system for recording medical information are found only in Recommendation No. 156. Additional guidance has been developed in the ILO codes of practice *Occupational exposure to airborne substances harmful to health* (Geneva, 1980) and *Ambient factors in the workplace* (Geneva, 2001).

***Hygiene (Commerce and Offices) Convention, 1964
(No. 120), and Recommendation (No. 120)***

50. The Convention seeks to preserve the health and welfare of workers employed in commerce and offices. For this purpose, it sets out basic hygiene measures to be respected

³ For example, ILO: *Occupational cancer, prevention and control*, Occupational Safety and Health Series, No. 39, second rev. (ed.) (ILO, Geneva, 1989).

including those encompassing cleanliness, ventilation, lighting, temperature, layout of workstations, drinking water, sanitary facilities, seating, changing facilities, protection against hazardous substances, processes and techniques, noise and vibration, first-aid posts and enforcement. Further guidance is provided in the Recommendation (No. 120).

***Safety and Health in Construction Convention, 1988
(No. 167), and Recommendation (No. 175)***

51. The Convention contains detailed protective and preventive measures concerning the safety of workplaces and the physical hazards specific to construction sites. It also prescribes protective and preventive measures concerning explosives and health hazards from hazardous substances. Another feature of the Convention is the provisions on cooperation between employers in order to comply with OSH measures, in cases where two or more undertakings are engaged in activities at the same workplace. Further guidance on some of these issues is provided in the Recommendation (No. 175) and in the ILO code of practice *Safety and health in construction* (Geneva, 1992).

***Safety and Health in Mines Convention, 1995 (No. 176),
and Recommendation (No. 183)***

52. The Convention provides that a ratifying State is to formulate, carry out and periodically review a coherent national policy on safety and health in mines. A competent authority is to be established with the role of monitoring and regulating the various aspects of OSH in mines. The prescribed preventive and protective measures contain employers' responsibilities and workers' rights and duties. They also include requirements for the safe storage, transportation and disposal of hazardous substances used in the mining process and waste produced at the mine, and for the elimination or minimization of risks resulting from exposure to those hazards. Recommendation No. 183 provides further detailed provisions. The ILO codes of practice *Safety and health in opencast mines* (Geneva, 1991), *Safety and health in coal mines* (Geneva, 1986) and *Safety and health in underground coal mines* (Geneva, 2006) also contain guidance on hazardous substances.

***Safety and Health in Agriculture Convention, 2001
(No. 184), and Recommendation (No. 192)***

53. The Convention provides that a ratifying member State is to formulate, implement and periodically review a coherent national policy on OSH in agriculture. The prescribed preventive and protective measures include the sound management of chemicals. The Recommendation (No. 192) contains measures for OSH surveillance and risk assessment. It also provides that measures prescribed to give effect to the provisions of Convention No. 184 concerning the sound management of chemicals in agriculture should be taken in "the light of the principles of the Chemicals Convention, 1990 (No. 170), and other relevant international technical standards".

***Codes of practice on safety and health in forestry work,
1998; and safety and health in the non-ferrous metals
industries, 2001; and guidelines for labour inspection
in forestry, 2005***

54. These sector-specific instruments provide detailed guidance on the prevention of exposure to hazardous substances.

2.4. Instruments concerned with a single hazardous substance

55. As mentioned previously, the ILO has adopted a series of instruments concerned with a single hazardous substance. These instruments were among those examined by the Cartier group. On the basis of the group's recommendations, as well as consultations with the member States, the Governing Body concluded that the following instruments specifically regulating protection against hazardous substances and agents were in need of revision.⁴

White Lead (Painting) Convention, 1921 (No. 13)

56. The Convention aims to prevent lead poisoning. It prohibits the use of white lead, sulphate of lead and all products containing these pigments in the internal painting of buildings. The employment of young persons under 18 years of age and of all women in industrial painting work involving the use of these products is prohibited. Permitted uses are regulated in accordance with principles provided for by the Convention, which enumerates various hygiene measures to be taken in such cases. The main concerns put forward by the Cartier group⁵ were that the employment prohibition prescription (Article 3) should be gender neutral and that, in regulating the use of a single substance, Convention No. 13 does reflect current exposure prevention and health protection systems implemented in most countries.

Benzene Convention, 1971 (No. 136), and Recommendation (No. 144)

57. The aim of the Convention is to protect against the health hazards arising from worker exposure to benzene and to products whose benzene content exceeds 1 per cent by volume. It provides, with certain exceptions, for the mandatory use of less harmful substitute products when available, and for the prohibition of the use of benzene and products containing benzene in certain work processes when adequate protection from exposure cannot be provided to workers. It prohibits the employment of pregnant women, nursing mothers and young persons under 18 years of age in work processes involving exposure to benzene or products containing benzene. The Recommendation provides further detailed prescriptions concerning restrictions on the use of benzene, technical measures to prevent hazards, medical measures, containers holding benzene and training. The main concerns raised⁶ regarding the two instruments are again the issue of gender neutrality, the fact that they are not adapted to OSH scientific and technological progress, particularly in relation to current exposure prevention and management methodologies implemented in many countries, and the narrowness of the scope to a single substance. One significant example of obsolescence is that the Convention refers to a specific exposure limit (25 ppm⁷ in

⁴ GB.271/LILS/WP/PRS/2 and GB.271/LILS/11/2; GB.274/3, paras 220–239 (Mar. 1999); GB.276/4, paras 243–258 (Nov. 1999); and GB.277/LILS/WP/PRS/4 and GB.277/LILS/11/2.

⁵ GB.271/LILS/WP/PRS/2, paras 110–119.

⁶ GB.271/LILS/WP/PRS/2, paras 19–31.

⁷ Parts per million (concentration unit, volume/volume at standard temperature and pressure).

Convention No. 136)⁸ when the current occupational exposure limit for benzene is now 1 ppm in most countries.

Lead Poisoning (Women and Children) Recommendation, 1919 (No. 4), and White Phosphorus Recommendation, 1919 (No. 6)

58. The Governing Body concluded that, as these two autonomous Recommendations regulated issues related to single hazardous substances, they should also be revised.⁹ In the case of Recommendation No. 4, the illness concerned is contained in the list of occupational diseases. In addition, this Recommendation is specifically aimed at the protection of women and children under 18 years of age. Recommendation No. 6 merely invites member States to adhere to the Berne Convention on white phosphorous (1906). There is no other ILO instrument in this field.

Past proposals for standard setting related to individual hazardous substances

59. Following the conclusions that Conventions Nos 13 and 136 should be revised,¹⁰ it was proposed to include both these revisions under the common title “Use of hazardous substances” in the portfolio of proposals suggested for inclusion on the agenda of the ILC. The Governing Body¹¹ was invited to consider different follow-up strategies on these decisions. With reference to the modern trends in the management of hazardous chemicals or substances, it was not considered relevant to undertake an individual revision of these instruments but rather to consider the possibility of consolidating all or most of the existing instruments regulating the use of single hazardous substances and developing a framework for the management of especially hazardous substances, including new chemicals.¹² This approach could provide a broader framework for the safe management of especially hazardous substances and could include a new approach for regularly updating technical standards related to especially hazardous substances in a systematic manner.
60. This proposal was submitted on several occasions to the Governing Body, but was not selected for individual consideration on the agenda of the Conference. It was, however, among the issues considered in the context of the general discussion on ILO standards-related activities in the area of OSH at the 2003 ILC. In this context it was proposed to reconsider all these proposals, taking into account the larger context in which that discussion was being held. Due to time constraints and a focus on other priority issues in this area, an in-depth discussion could not be held on which strategy to choose. In the resulting Global Strategy it was suggested, without providing further details, that further

⁸ In the context of the supervision of this Convention, the Committee of Experts on the Application of Standards (CEACR) regularly draws governments’ attention to the fact that, since the adoption of this Convention, scientific knowledge has evolved and invites governments to “consider the possibility” of aligning their limit values with those recommended by, for example, the ACGIH. The limit currently recommended by the ACGIH is a maximum of 0.5 ppm or 0.6 mg/m³.

⁹ GB.277/LILS/WP/PRS/4, pp. 5–6

¹⁰ As this stage Recommendation No. 144 had not yet been examined.

¹¹ GB.274/2, paras 220–239.

¹² GB.276/2, para. 248.

consideration be given to the proposal to develop provisions for the safe management of certain particularly hazardous substances, possibly in the form of a Protocol to Convention No. 170.¹³

2.5. Summary

61. The array of ILO instruments available in this area provides a unique international basis for the sound management of hazardous substances to advance the Organization's objectives. It is unique because it is the fruit of a tripartite standard-setting process involving dialogue between governments and employers' and workers' organizations. However, as for any human scientific and technological endeavour, the field of OSH – particularly the aspects related to hazardous substances – is continuously influenced by progress and change at all levels. The table in Appendix III and the related diagram in Appendix IV show that the set of general OSH instruments and guidelines includes all the provisions needed for developing comprehensive and coherent national OSH systems and programmes with clearly identified objectives, and responsibilities at all levels, as well as mechanisms for broad consultation, periodic review and adaptation to scientific and technical progress, and for management based on continuous improvement of working conditions and environment and the building of a preventive safety culture. In the light of the abovementioned review and the existing instruments, the questions that arise include how to determine the most appropriate means and measures to increase the impact of relevant up to date ILO–OSH standards – taking into account that the strong support of both employers' and workers' organizations is essential in this respect – and how to identify the best approach to be eventually pursued with respect to the five instruments earmarked for revision.

¹³ Global Strategy, *op. cit.*, para. 7.

3. Global, regional and national action

62. The practice of OSH – particularly in the area of hazardous chemicals – is multidisciplinary and calls on scientific and technical, psychosocial, socio-economic and even political expertise to develop effective prevention and protection systems. The ILO has always sought or been invited to collaborate with other IGOs active in this area and to make use of their experience and knowledge in the development of international legal and technical standards that complement those of the ILO and are of benefit to its constituents. International cooperation is also an effective means to promote ILO values and ensure that the views of employers and workers are taken into account in international forums usually reserved for governments. Amid growing concerns for human and environmental health, the past two decades have seen unprecedented national, regional and international efforts to develop and implement globally coordinated and harmonized regulatory and technical management tools for the safe production, handling, use and disposal of hazardous chemicals. A number of major international conferences, to which the ILO contributed very significantly, adopted a number of principles and objectives which are still the basis for most of the current worldwide work on chemical safety. A significant part of this global work is focused on the critical need to identify, inventory, assess and classify hazardous chemicals so that effective management tools can be developed and implemented. In order to ensure complementarity and thus efficient use of resources to avoid duplication, this work is coordinated through specialized international, regional and national agencies, and programmes such as the joint IPCS, OECD, UNEP and the responsible European Commission agencies.

63. Following the United Nations Conference on the Human Environment (Stockholm, 1972), the ILO, UNEP and the WHO established the IPCS in 1982 with the objective of providing internationally peer-reviewed chemical risk assessments and of carrying out a number of activities related to chemical safety.¹ The UNCED (Rio de Janeiro, 1992), also known as the Earth Summit, adopted Agenda 21, which included Chapter 19 on the environmentally sound management of chemicals that advocated the global harmonization of the tools to assess, classify and label hazardous chemicals, and the dissemination of information on preventive and protective measures. The International Conference on Chemical Safety (ICCS) (Stockholm, 1994), which established itself as the Intergovernmental Forum on Chemical Safety (IFCS), adopted a resolution defining a set of priorities for action in implementing environmentally sound management of chemicals.² The IOMC was created in 1995 to improve coordination of the chemical safety work carried out by the key IGOs with responsibilities in this area.³ The prior work of the IFCS and the IOMC led to the development of the more recent UNEP SAICM. Subsequent global conferences such as the 1997 Earth Summit +5 and the 2002 World Summit on Sustainable Development (WSSD)⁴ reaffirmed the goals of the UNCED and strengthened further the global commitment to achieving as rapidly as possible environmentally sound management of chemicals. Among the numerous international regulatory and technical tools and approaches developed in the last 20 years, the ones described below are essential to achieving this goal. A number of OECD countries have also developed similar tools which

¹ IPCS: <http://www.who.int/ipcs>

² IFCS: <http://www.who.int/ifcs/forums/one/en/index.html>

³ IOMC: <http://www.who.int/iomc/en/>

⁴ UN Division for Sustainable Development: http://www.un.org/esa/sustdev/documents/docs_key_conferences.htm

have sometimes served as models for international work and for other countries with fewer resources to devote to this field.

3.1. International action

The IPCS International Chemical Safety Cards⁵

64. The International Chemical Safety Cards (ICSCs) project was developed in 1984 and is funded by the EU, the ILO and the WHO. The project is currently managed by the ILO on behalf of the IPCS. The ICSCs summarize essential safety and health information on chemical substances in a clear way and are intended for use at the shop-floor level by workers, and by those responsible for workplace safety and health. To a large extent, the information provided in the ICSCs conforms to the provisions in the Chemicals Convention, 1990 (No. 170), and the Chemicals Recommendation, 1990 (No. 177), relating to chemical safety data sheets and to the GHS. The ICSCs are designed to serve as an international reference with respect to chemical safety information and are therefore prepared through an ongoing process of drafting and peer reviewing by scientists from specialized institutions designated by the member States who contribute to the work of the IPCS. This process also takes account of the advice and comments provided by manufacturers, employers' and workers' organizations and other specialized national and professional institutions. A large number of national institutions are involved in the translation of the ICSCs into different languages. Currently over 1,600 ICSCs are available free of charge on the Internet in 18 languages.

The Globally Harmonized System for the Classification and Labelling of Chemicals

65. The ILO initiated this project as a follow-up to the adoption of the Chemicals Convention, 1990 (No. 170), and had an important role in steering its development initially under the umbrella of the IPCS and then the IOMC. It was carried out by three focal points, namely, the OECD for the harmonization of classification criteria for health and environmental hazards, the UN CETDG for physical hazards and the ILO for the harmonization of chemical hazard communication (labelling and chemical safety data sheets). In order to provide a mechanism for maintaining and promoting the application of the GHS by member States, the UN Economic and Social Council (ECOSOC) decided in 1999 to reconfigure the CETDG as the UN Committee of Experts on the Transport of Dangerous Goods and on the GHS. At its December 2002 session in Geneva, the full Committee adopted the final version of the GHS, which was officially published in 2003 in the six languages of the United Nations.

66. The GHS has been designed to cover all chemicals including pure substances and mixtures, with the exception of pharmaceutical products, and to provide for the chemical hazard communication requirements of the workplace, transport of dangerous goods, consumers and the environment. As such it is a truly harmonized and universal technical standard that is already starting to have a far-reaching impact on all national and international chemical safety regulatory and technical standards. An increasingly large number of countries, including the United States and the EU countries, have made a

⁵ ICSC: <http://www.ilo.org/public/english/protection/safework/cis/products/icsc/index.htm>

commitment to implement progressively the GHS.⁶ Successful completion of the GHS was due in great part to the full involvement of the employers' and workers' organizations in the process. Their input at both policy and technical levels was critical in overcoming many significant obstacles. The GHS is truly the result of effective social dialogue.

67. In response to growing requests from countries for capacity building to support GHS implementation, the United Nations Institute for Training and Research (UNITAR)⁷ and the ILO initiated the "UNITAR/ILO Global GHS Capacity-Building Programme" in 2001. Building upon existing initiatives of international organizations, countries and others, the UNITAR/ILO programme provides guidance documents, educational, awareness raising, resource and training materials regarding the GHS. Relevant topics include the development of national GHS implementation strategies, legislation, situation/gap analyses, chemical hazards, labelling, safety data sheets, as well as related support measures such as comprehensibility testing of chemical hazard communication elements. The UNITAR and the ILO are the designated focal points for capacity building in the UN ECOSOC Subcommittee of Experts on the Globally Harmonized System for the Classification and Labelling of Chemicals (SCEGHS). The UNITAR has also developed, with input from the ILO, the methodology to assist countries in preparing and maintaining national chemical profiles.⁸

International chemical hazard and risk assessments

68. The IPCS, the OECD and other organizations collaborate under the umbrella of the IOMC to produce various assessment documents. In addition to the production of ICSCs, as well as methodology development and other assessment work related to chemicals in food and pesticides, the IPCS produces, through expert peer review meetings, the environmental health criteria (EHC) documents, and the concise international chemical assessment documents (CICAD). Both are used widely as international toxicology references. The OECD focuses on activities such as the development and harmonization of methodologies for testing the toxicity of chemicals and the maintenance of hazard information databases for the HPV chemicals,⁹ pesticides, etc. The FAO is involved in work on the safe use of pesticides. All the IGOs participating in the IOMC maintain several databases and repositories related to hazard assessment information. The most recent and comprehensive information mechanism is the Internet-based OECD "eChemPortal" offering free public access to information on properties of chemicals (physical chemical properties, environmental fate and behaviour, ecotoxicity and toxicity). It allows for simultaneous search of multiple databases, provides clearly described sources and quality of data, and also gives access to data submitted by industry to government chemical review programmes at national, regional and international levels.

⁶ Status of the implementation of the GHS by countries and regional and international organizations: http://www.unece.org/trans/danger/publi/ghs/implementation_e.html

⁷ UNITAR: <http://www.unitar.org>

⁸ UNITAR National Chemical Profiles Programme: <http://www.unitar.org/cwg/np/index.html>

⁹ OECD chemical safety work: http://www.oecd.org/topic/0,3373,en_2649_34365_1_1_1_1_37465,00.html

The Strategic Approach to International Chemicals Management

- 69.** The SAICM was adopted by the International Conference on Chemicals Management (ICCM) in February 2006 in Dubai, United Arab Emirates. The ILO, together with the other IGOs collaborating under the IOMC participated in a significant way in the development of this policy framework for international action on chemicals. Under the leadership of the UNEP, the SAICM was finalized by a multi-stakeholder and multi-sectoral preparatory committee, including representatives of trade unions and the chemical industry. The SAICM is a voluntary initiative (VI) that aims to respond to the stated need to assess and manage chemicals more effectively in order to achieve the 2020 goal for the sound management of chemicals throughout their life cycle, in accordance with Agenda 21 and the Johannesburg Plan of Implementation. The scope of the SAICM includes: (a) environmental, economic, social, health and labour aspects of chemical safety; and (b) agricultural and industrial chemicals, with a view to promoting sustainable development and covering chemicals at all stages of their life cycle, including in products. However, it does not cover products to the extent that the health and environmental aspects of the safety of the chemicals and products are regulated by a domestic food or pharmaceutical authority or arrangement.
- 70.** The Global Plan of Action contains activities that may be undertaken voluntarily by workers, their trade unions, industry and other stakeholders, in order to pursue the commitments and objectives expressed in the high-level Declaration and the Overarching Policy Strategy. The Dubai Declaration on International Chemicals Management noted the importance of private sector initiatives, such as product stewardship and the chemicals industry's Responsible Care Programme, to promote chemical safety. The Declaration stressed that promoting the sound management of chemicals and hazardous wastes be prioritized in national, regional and international policy frameworks, including strategies for sustainable development, development assistance and poverty reduction. The ministers, heads of delegation and representatives of trade unions, the chemicals industry and other civil society groups at the meeting agreed to work together towards closing the gaps and to addressing the discrepancies in the capacity to achieve sustainable chemicals management between developed and developing countries and those with economies in transition. Measures would include addressing the special needs of countries and strengthening their capacities for the sound management of chemicals and the development of safer alternative products and processes, including non-chemical alternatives, through partnership, technical support and financial assistance.¹⁰ At its 289th Session in November 2006, the ILO Governing Body adopted the SAICM's final text for implementation.¹¹
- 71.** The ILO's social partners in the chemical industry contributed to the successful conclusion of the SAICM, and have already initiated efforts at implementing programmes under the SAICM. The World Conference for Chemical Industries of the International Federation of Chemical, Energy, Mine and General Workers' Unions (ICEM), held in 2006, adopted an Action Plan calling for its affiliates to use the SAICM process to strengthen chemicals management, safety and OSH on a national, regional and global level.¹² Similarly, the global chemical industry took swift action towards implementing the SAICM by

¹⁰ SAICM – comprising the Dubai Declaration on International Chemicals Management, the Overarching Policy Strategy and the Global Plan of Action, 6 June 2006, pending formal publication, 4–6.

¹¹ GB.297/19/2.

¹² ICEM In Brief, 11 Dec. 2006.

strengthening its VIs.¹³ More details on employers' and workers' initiatives are given below.

3.2. National and regional action

72. The number of national and regional actions and regulatory and technical standards and tools are too numerous for a comprehensive overview. The ones described below illustrate the diversity, scope and importance of the most recent activities relevant to safety in the use of hazardous chemicals at work.

The new European legislative framework for hazardous substances

73. The Regulation for Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)¹⁴ entered into force on 1 June 2007 to streamline and improve the former legislative framework on chemicals of the EU. REACH is a radical step forward in EU chemicals management. It aims to improve the protection of human health and the environment, maintain competitiveness, enhance the innovative capability of the EU chemicals industry, and promote alternative methods for the hazard assessment of substances. The new regulation will furthermore give greater responsibility to industry to manage the risks from chemicals and to provide safety information that will be passed down the supply chain. A new European Chemicals Agency was established in Helsinki, also in June 2007, to manage the registration, evaluation, authorization and restriction processes for chemical substances to ensure consistency across the EU.
74. REACH will require the registration, over a period of 11 years, of some 30,000 chemical substances. Manufacturers and importers will have to generate data for all chemical substances produced or imported into the EU above 1 tonne per year. The registrants must also identify appropriate risk management measures and communicate them to the users. In addition, REACH will allow the further evaluation of substances where there are grounds for concern and it foresees an authorization system for the use of substances of very high concern. This applies to substances that cause cancer, infertility, genetic mutations or birth defects, and to those which are persistent and accumulate in the environment. The authorization system will require companies to switch progressively to safer alternatives where one exists. All applications for an authorization need to include an analysis of alternatives and a substitution plan where a suitable alternative exists. Current use restrictions will remain under the new system. REACH also ensures that animal testing is kept to the strict minimum and that alternative methods are encouraged.
75. On 25 June 2007, the European Commission proposed to align the current EU system of classification of chemical substances and mixtures to the UN GHS. The internationally accepted harmonized classification criteria and labelling elements will be integrated in new EU legislation, replacing the current law on the classification, labelling and packaging of chemical substances (Directive 67/548/EEC) and mixtures (Directive 1999/45/EC). The proposal is an important step on the Community's part towards global efforts to enhance

¹³ D. Jackson: "Strategy gets UN support", in *ICIS Chemical Business*, 15–21 May 2006, p. 20.

¹⁴ European Chemicals Agency: http://ec.europa.eu/echa/home_en.html – registration, evaluation, authorization and restriction of chemicals. REACH Regulation (EC) No. 1907/2006 and Directive 2006/121/EC amending Directive 67/548/EEC were published in the *Official Journal* on 30 December 2006

the protection of human health and the environment from the effects of dangerous chemicals. The harmonization of requirements at global level will give trade and competitiveness a boost and includes new pictograms. The proposed regulation will complement the new REACH.

Hazard assessment data development and dissemination in the United States

76. In the United States,¹⁵ a number of agencies such as the OSHA, the EPA or the NIOSH have developed and maintain a large number of databases that compile preventive and protective information on chemicals commonly found in the workplace. Examples are the recent Occupational Chemicals database (800 entries), the immediately dangerous to life and health (IDLH) values, the NIOSH *Manual of analytical methods* (NMAM), the NIOSH *Pocket guide to chemical hazards* (NPG), the *Occupational safety and health guidelines for chemical hazards*, which summarizes information on permissible exposure limits, chemical and physical properties, health hazards and related regulations. This is only a small sample of the information provided by the US agencies responsible for chemical safety. The OSHA also produces many electronic and other training and information tools specifically designed to help small and medium-sized enterprises (SMEs) comply with US regulations concerning OSH.¹⁶ Most of these agencies are involved significantly in international activities related to the development of chemical hazard assessments in collaboration with European and OECD member countries.

Chemicals management legislative framework in Canada

77. The Canadian Environmental Protection Act, 1999 (CEPA, 1999)¹⁷ is the environmental law governing the assessment and management of chemical substances in Canada. Through its categorization process, it makes Canada probably the first country in the world to take a systematic look at existing substances through one comprehensive regulatory system. A major intent of the Act is to prevent pollution on a sustainable basis and to address the issue of potentially dangerous chemical substances to which humans and the environment might be exposed. CEPA 1999 has a “risk-based” method of making decisions and the assessment and management of new and existing chemical substances is one of its primary objectives. More than 23,000 chemical substances were in use in Canada prior to the development of the New Substances Notification Program. This has allowed the Canadian environment and health agencies to put controls in place on these chemical substances. Under Canada’s New Substances Notification Program, government scientists examine over 800 chemical substances a year. The Government of Canada prohibits or puts restrictions on the use and disposal of those that could pose a risk to human health and the environment.

Control banding: The internationalization of a national standard

78. Growth in the use of chemicals in SMEs and in emerging economies, where access to people with the experience to assess and control exposure to chemicals is limited, has led to the development of a new approach to the control of chemicals. Called “control

¹⁵ US Centers for Disease Control and Prevention: <http://www.cdc.gov/Workplace/>

¹⁶ US OSHA: <http://www.osha.gov/dts/osta/oshasoft/index.html>

¹⁷ CEPA: http://www.chemicalsubstanceschimiques.gc.ca/substance/cepa-lcpe/index_e.html

banding”,¹⁸ it is a complementary approach to protecting workers’ health by focusing resources on exposure controls. Since it is not possible to assign a specific OEL to every chemical in use, a chemical is assigned to a “hazard band”, each requiring defined control measures, based on its hazard classification according to international criteria, the amount of chemical in use, and its volatility/dustiness. The user takes the hazard group, quantity and level of volatility/dustiness and matches them to a control approach using a simple table. The controls are described in control guidance sheets, which comprise both general information and, for commonly performed tasks, more specific advice. OSH expertise is not replaced and specific operating knowledge and professional judgement are required for implementation of the best “reasonably practicable” combination of controls to minimize risks to workers. Much of the recent work on control banding derives from work carried out by the United Kingdom’s HSE.¹⁹ Designed to assist SMEs in complying with the United Kingdom chemical safety regulations – the control of substances hazardous to health (COSHH) – the scheme uses the EU risk phrases that in Europe must be used in the classification and labelling of potentially harmful chemicals by the manufacturer of the chemical and that the user may find on the supplied material safety data sheets or labels. On the basis of close collaboration between the ILO and the HSE during the development of the GHS, the ILO initiated the transposition of the COSHH *Essentials Manual* into an international tool. The project is currently carried out under the umbrella of the IPCS. This is an example of the use of national tools as models for the development of internationally agreed technical standards.

3.3. Summary

79. Three important issues should be taken into account concerning global regional and national activities:

- The first is that the number, type and diversity of actions taken at all levels to implement sound systems for the management of hazardous substances is impressive and reflects the serious importance given by governments, the scientific community and industry to the increasing negative impact of the uncontrolled release of hazardous chemicals on human health and the environment and the urgency to apply effective remedial and preventive solutions.
- The second point that comes out strongly is the increasingly important level of efforts to establish a national framework for chemical safety in all countries and to harmonize approaches at a global level. In this regard, the implementation of the Chemicals Convention, 1990 (No. 170), and the GHS provides the framework for sound chemicals management, and fulfils the requirements of the SAICM’s Dubai Declaration and Overarching Policy Strategy.
- The third point is the very urgent need to create, strengthen, organize and implement globally coordinated and shared systems to assess the hazardous and toxic properties of existing and new chemicals so they can be classified and regulated, and information on preventive and protective measures for their production, handling, transport and disposal can be developed and disseminated.

¹⁸ ILO SafeWork: http://www.ilo.org/public/english/protection/safework/ctrl_banding/index.htm

¹⁹ H. Jackson: “Control banding – Practical tools for controlling exposure to chemicals”, IOHA, in *Asian-Pacific Newsletter on Occupational Health and Safety*, 2002; 9:62–63.

4. Social dialogue

- 80.** If laws and regulations are essential in determining the legal framework regulating the administration of national OSH infrastructures, the successful application of laws and regulations within the workplace rests to a large extent with employers, workers and the organizations representing them.¹ Often, the subject of OSH, including all aspects of chemical safety at work, has been the starting point for developing wider bipartite dialogue. Both employers and workers, and particularly employers' and workers' organizations, give OSH an important place in their collaborative or separate actions. The inclusion of the subject of OSH has long been a standard feature of collective bargaining agreements. Although the legal basis for the application of collective bargaining may differ significantly from country to country, the legislation of most industrialized and developing countries include a system for regulating collective bargaining. National legal frameworks also affect how collective bargaining applies to OSH. Mandatory joint safety committees are often the main mechanism for bipartite management of OSH within the enterprise. The traditional vision of collective bargaining is that of a formal periodic process of negotiation, but it is also a flexible continuous mechanism for solving problems as they arise. OSH is frequently seen as an ideal subject for mutual gains bargaining since both sides are interested in avoiding occupational accidents and diseases. The promotion of OSH and improvement of working conditions has certainly benefited greatly from such dialogue. This principle is embedded in the Chemicals Convention, 1990 (No. 170), which requires the formulation, implementation and review of a coherent policy on safety in the use of chemicals at work to be undertaken on a tripartite basis, as well as requiring the cooperation between employers and workers with respect to safety in the use of chemicals at work. The ILO Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy (MNE Declaration) underlines the importance of collective bargaining as a mechanism for dialogue and conflict resolution.
- 81.** The national consultative structures on OSH that exist in most developed countries and a number of developing countries (e.g. the National Advisory Committee on Occupational Safety and Health in the United States, the Health and Safety Commission in the United Kingdom, the EU Advisory Committee on Safety, Hygiene and Health Protection at Work or the National Permanent Tripartite Commission (CTTP) in Brazil) are examples of important mechanisms where employers and workers participate in the development of policies and action plans related to OSH. Employers and workers are also involved in the management of specialized OSH institutions such as the Canadian Center for Occupational Health and Safety and the European Agency for Safety and Health at Work in Bilbao. In developing countries, similar consultative mechanisms exist, such as Fundacentro² in Brazil.
- 82.** Employers have developed a number of VIs dealing with various OSH aspects and specific sectors of economic activity. Within the ILO, the Bureaux for Employers' and Workers' Activities carry out activities related to OSH, including the provision of technical

¹ R. Husbands: "National level tripartite and bipartite cooperation on health and safety", in ILO: *Encyclopaedia of occupational health and safety*, fourth edition, 1998, Vol. 1. ILO: *Voluntary initiatives affecting training and education on safety, health and environment in the chemical industries*, report for discussion at the Tripartite Meeting on Voluntary Initiatives Affecting Training and Education on Safety, Health and Environment in the Chemical Industries, Geneva, 22–26 February 1999. M.J. Wright: "Collective bargaining and safety and health", in ILO: *Encyclopaedia of occupational health and safety*, op. cit.

² <http://www.fundacentro.gov.br/start/default.asp?D=CTN>

assistance and training to their national counterpart organizations. Because of their technical capacities, employers' organizations are also involved in the development of technical standards directly related to many aspects of OSH, including hazardous substances. This occurs through national and regional specialized standardizing institutions such as the European Committee for Standardization (CEN) or the American National Standards Institute (ANSI) and through organizations such as the ISO. At the international level, both the International Organisation of Employers (IOE) and the International Trade Union Confederation (ITUC)³ give a significant place to OSH in their activities and their worldwide information and training activities. The European Trade Union Technical Bureau for Health and Safety is an example of the involvement of trade unions in promoting OSH principles and providing technical training to affiliates.

- 83.** Two examples of successful joint action of employers and workers that illustrate the level of synergies that can be achieved through bipartite dialogue are the joint action of employers' and workers' organizations in recommending the ILO as the appropriate forum for developing, on a tripartite basis, international guidelines on OSH management, and the subsequent success of these guidelines. The second is the development of the GHS where both employers and workers succeeded in ensuring that all aspects related to workplace exposure to hazardous chemicals were taken into account. They were particularly successful in drafting jointly a common text on the very complex and delicate issue of the protection of confidential business information. Other key initiatives developed and implemented worldwide show the importance given by both employers' and workers' organizations to OSH and hazardous substances.

4.1. Responsible Care⁴

- 84.** The chemical industry's VI, "Responsible Care", was first conceived in Canada in 1985 to address public concerns about the manufacture, distribution and use of chemicals. Since the 1992 adoption of Agenda 21 by the UNCED, the number of chemical industry associations embracing Responsible Care has grown from six to 47 countries. Under this initiative, the worldwide chemical industry is committed to continual improvement in all aspects of health, safety and environmental performance and to open communication about its activities and achievements. Responsible Care is more than a set of principles and declarations. Through the sharing of information and a rigorous system of checklists, performance indicators and verification procedures, it enables the industry to demonstrate how it has improved over the years and to develop policies for further improvement. The industry associations are responsible for the detailed implementation of the initiative in their countries. Individual countries' Responsible Care programmes are at different stages of development and have different emphases but are monitored and coordinated by the ICCA. Future plans involve spreading the implementation of Responsible Care as broadly as possible within the chemical and allied industries, and up and down the supply chain. The ICCA will also continue to promote its extension to partners in related industries who are encouraged to tailor the initiative to fit their own organizations.

³ Note: The ITUC is a new trade union body created out of the former International Confederation of Free Trade Unions (ICFTU), the World Confederation of Labour (WCL) and eight previously non-aligned national unions: <http://www.ituc-csi.org/>

⁴ ICCA Responsible Care: <http://www.icca-chem.org/section02a.html>

4.2. Global Product Strategy ⁵

85. Product stewardship is the industry's management of the health, safety and environmental aspects of a product throughout its total life cycle, working in cooperation with upstream and downstream users. In early 2006, the chemical industry, represented by the ICCA, introduced an innovative Global Product Strategy (GPS) to enhance best practices in stewardship within the industry and throughout the product chain. The GPS effort is an important pillar of the Responsible Care Programme that unites several current stewardship initiatives, builds a foundation for continuous stewardship improvement, fosters greater transparency and marks the first truly global effort to drive product stewardship to a higher level within the industry and with downstream users and customers. The GPS sets guidelines for continuously improving product stewardship performance, including greater transparency. It facilitates the development and sharing of cutting-edge stewardship management practices, promotes a tiered process for evaluating risk and identifying appropriate risk management actions for chemicals in commerce and calls for measuring industry performance and public reporting. The GPS improves product stewardship cooperation with downstream customers of the chemical industry, supports partnerships with IGOs and others to enhance product stewardship, and enhances outreach and dialogue with customers, the public and other stakeholders. Finally it promotes the building of a foundation for constructive industry engagement in the public policy process.

4.3. High production volume initiative

86. The global chemical industry, through the ICCA, launched a global initiative on HPV chemicals in October 1998. Through this commitment, the chemical industry undertook to provide, as a first step, harmonized data sets on the intrinsic hazards of, and initial hazard assessments for, approximately 1,000 HPV substances by the end of 2004 and to submit the information to the OECD for international agreement as part of its refocused HPV Chemicals Programme. The cost of generating data and the work to draft the assessments will be borne by industry – and shared, whenever possible, by companies in the international consortia. ⁶

4.4. International framework agreements ⁷

87. In 1999, at the ICEM's Durban Congress in South Africa, the Global Union Federation made it a priority to achieve negotiated global framework agreements (GFAs) with multinational companies. ⁸ Several of these agreements have now been negotiated in the oil, chemical, mining, electric, rubber and paper sectors. The aim of the ICEM is to put in place the very best standards on trade union rights, health, safety and environmental practices, and quality of work principles across a company's global operations. International framework agreements establish a set of principles in all operations of a multinational, regardless of whether or not those standards exist in an individual country's

⁵ ICCA Global Product Strategy: <http://www.icca-chem.org/section02d.html>

⁶ ICCA global initiative on HPV chemicals: <http://www.cefic.org/activities/hse/mgt/hpv/hpvinit.htm>

⁷ ICEM GFAs: <http://www.icem.org/en/69-Global-Framework-Agreements>

⁸ Statoil, Freudenberg, Endessa, Norske Skog, AngloGold, ENI, RAG, SCA, Lukoil, Rhodia, EDF and Lafarge.

legislation. An international framework agreement does not supplant collective bargaining at a particular worksite, but rather assures that high standards are consistently met regarding human rights, trade union rights and health, safety, environmental practices wherever a company has operations. A key ingredient to the content of international framework agreements is language providing a mechanism to regularly review the agreement by top officers of the company and trade union leaders.

4.5. Global union networking activities

88. Along with the concluding of GFAs with multinationals, the ICEM is building union networks within major multinational companies in the sector. An ICEM global corporate network is primarily a means of communication for those working for the same employer around the world, and for their trade unions, allowing them to cooperate and coordinate worldwide. For the time being, there are ICEM global union networks at Goodyear, Bridgestone, Río Tinto, DuPont, Endesa, Lafarge, Holcim, Novartis, ExxonMobil, International Paper, Sappi and Lukoil. Regarding safety and health matters, the global union network for one company meets every year, receives regularly detailed OSH reports from all regions including accident data and prevention activities and exchanges information on best practices and where to find them.

4.6. Summary

89. This overview of some key mechanisms used by both employers' and workers' organizations to address OSH issues does not provide a fully comprehensive "map" of existing mechanisms, bodies and activities, but illustrates clearly the magnitude of the efforts made by both social partners and thus the high importance given by employers' and workers' organizations to OSH. This input is a vital element in the development of preventive safety cultures and the management of OSH in the enterprise. Of course, many areas for improvement exist. Trade unions in industrialized countries could consider more concerted resource mobilization actions to assist their counterparts in developing countries and transition economies in building their national OSH systems. The principles of collective bargaining could certainly be extended to ensure stronger and more effective consultation and participation of workers in the process of developing much-needed voluntary technical standards, initiatives and information materials. These are essential tools in the complex process of transposing the provisions of laws and regulations into concrete preventive and protective action in the enterprise.

90. The informal economy is one major area where worldwide networks of employers' and workers' organizations could be mobilized in a more concerted and systematic way to assist in raising awareness. They could also bring much-needed knowledge on best practices and preventive and protective measures to SMEs doing contract work for larger companies. The promotion of ILO-OSH instruments, particularly Convention No. 170, and information materials such as codes of practice and guidelines could also be greatly enhanced by more visible support from employers' and workers' organizations, both nationally and internationally. Promoting and supporting jointly the establishment of information flow mechanisms in line with Convention No. 170 and the GHS would greatly improve safety and health in the use of chemicals in the informal economy. A strong joint promotion of the SAICM would enhance the successful implementation at the national level of the regulatory and technical standards to which reference is made. In the same way, more visible joint support of the IPCS ICSC project and the UN GHS would ensure faster global adoption of universal tools for communication on hazardous substances and thus facilitate access to reliable information on preventive and protective measures that is easy to translate in local languages.

5. Possible elements for developing an ILO policy framework and plan of action on hazardous substances

91. Over the last three decades, many essential elements of good chemical safety policy have been developed and used both by countries and through international cooperation. This has included reducing emissions of hazardous chemicals during production, keeping unsafe new chemicals from entering the market, developing harmonized methods for safety testing and ensuring test quality to avoid duplicative testing, and discouraging non-tariff barriers to trade. However, the ever increasing pace in scientific and technical progress, global growth of chemicals production, changes in the organization of work and transport growth require matching efforts in assessing the hazards of chemicals and developing the necessary preventive and protective methods and regulatory tools to avoid or minimize adverse effects to humans and the environment. The integration of assessment research and methodology development to address the hazards arising in each step in the whole life cycle of chemicals is the most effective way to screen out or control hazardous chemicals before they come to market. The harmonization of international standards and technical guidelines and strategies is also a strong prerequisite for implementing sound management methods adapted to the globalized production and trade of chemical products. The mutual acceptance of hazard assessment data between countries would help greatly in speeding up the assessment process. Universal access to hazard identification and prevention information is also an essential element in any global strategy for the sound management of chemicals. Finally, this goal cannot be achieved without the full involvement of the social partners through effective mechanisms of consultation and dialogue. Both governments and industry have an important stake in ensuring that the benefits of chemicals far outweigh their harmful effects. The issues and questions presented below reflect some of the problems, questions and priorities that may have to be considered in planning actions to ensure safety in the use of hazardous substances at work and protection of the environment.

5.1. Knowledge development and dissemination

92. The acquisition, management and dissemination of knowledge related to hazardous substances need to be continuous and integrated in the process of developing and marketing chemicals. Universal access to this knowledge is essential to the development of prevention and protection tools. This includes:

- assessing the hazardous properties of chemicals and strengthening screening and evaluation systems for new chemicals entering the market;
- supporting efforts to harmonize chemical hazard identification, assessment and management methods at an international level;
- promoting universal access to reliable information on hazardous substances such as classification and labelling and material safety data sheets in as many languages as possible;
- taking into account the special needs of vulnerable workers (women, young and older workers);
- supporting the development and implementation of international standards and technical guidelines on the prevention of exposure to, and the sound management of, hazardous substances, including OELs and lists of occupational diseases;

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- raising awareness about the strong links between the environment and the world of work and the fact that any workplace improvements in managing hazardous substances will contribute to the protection of the environment; and
 - monitoring national and international activities related to safety in the use of new technologies such as nanotechnologies and possibly contributing to them through ILO participation in relevant intergovernmental coordination groups.

5.2. ILO instruments

93. The corpus of the up to date general OSH and chemical safety instruments and the related guidelines provides a current, comprehensive and sound model for developing coherent national OSH systems that include the management of hazardous substances, with clearly identified objectives and responsibilities at all levels, as well as mechanisms for broad consultation, periodic adaptation taking account of scientific and technological progress, and for management based on continuous improvement of working conditions and environment, as well as the building of a preventive safety culture.
94. The situation is quite different, however, as regards ILO instruments focusing on a single hazard. In the context of sound management of chemicals and as a result of scientific, technological and regulatory progress, these instruments appear to have become partly obsolete. Against the background of existing instruments in this area, international regional and national trends, and the need to promote at the international and national levels a coherent and up to date set of ILO standards relevant to the sound management of chemicals, the following approaches may need to be considered in developing an ILO plan of action for hazardous substances:
- recognize the central importance of promoting the Chemicals Convention, 1990 (No. 170), as well as the Occupational Safety and Health Convention, 1981 (No. 155), the Occupational Health Services Convention, 1985 (No. 161), and the Promotional Framework for the Occupational Safety and Health Convention, 2006 (No. 187), as the foundation for the sound management of chemicals, including hazardous substances;
 - recognize the relevance in this context also of the Occupational Cancer Convention, 1974 (No. 139), the Safety and Health in Construction Convention, 1988 (No. 167), the Prevention of Major Industrial Accidents Convention, 1993 (No. 174), and the Safety and Health in Agriculture Convention, 2001 (No. 184); and
 - consider what action should be proposed in the light of the ongoing international developments in the area of chemicals and hazardous substances, the up to date instruments in this area, and the Governing Body decisions concerning the need for revision of the existing instruments regulating or recommending specific action related to individual substances (i.e. the White Lead (Painting) Convention, 1921 (No. 13), the Benzene Convention, 1971 (No. 136), and Recommendation (No. 144), the Lead Poisoning (Women and Children) Recommendation, 1919 (No. 4), and the White Phosphorus Recommendation, 1919 (No. 6).

5.3. Global activities

95. In the context of the ILO mandate and the limited resources available, the efforts of the Organization need to focus on a small number of important issues that can potentially have strong multiplier effects on the promotion of ILO objectives and standards related to the sound management of hazardous substances at work. The unfailing support given by the

tripartite constituents of the ILO during the 12 years it took to make the GHS a reality is a striking example of focusing on action with a strong multiplier effect, that is now influencing all national and international regulatory systems for the classification and labelling of chemicals. Employers' and workers' support on the issue of OSH–MS is another example of successful application of such action. By referring equally to ILO and other international chemical safety standards, technical guidelines, VIs and other key actions, the SAICM is the process of choice for obtaining such a multiplier effect. In this regard, the SAICM is a remarkable tool in that it coalesces most of the current ideas in terms of international regulation and management of hazardous chemicals and provides a global framework to harmonize and integrate all the important elements needed for a universal approach to the sound management of chemicals worldwide.

96. The strengthening of ILO participation, including employers' and workers' representatives in SAICM activities, should therefore be a high priority. In the context of such participation, the Office should continue promoting strongly ILO–OSH instruments and objectives relevant to hazardous substances in the workplace. The ILO should also, within the context of its technical cooperation activities related to the establishment of national OSH programmes and the development of national OSH profiles, support the joint ILO/UNITAR technical cooperation assistance programme for the promotion of implementation of the GHS and for the preparation and updating of national chemical profiles.¹

5.4. Capacity building

97. Implementation of both the Chemicals Convention, 1990 (No. 170), and the GHS will allow chemicals, including hazardous substances, to be managed without adverse effects to human health and the environment throughout their life cycles. The Chemicals Convention, 1990 (No. 170), provides the framework for the sound management of chemicals by encouraging member States to formulate, implement and periodically review a coherent policy on safety and the use of chemicals at work. It has the broad purpose of protecting the environment and the public, and the specific objective of protecting workers from the harmful effects of chemicals. It applies to all branches of economic activity in which chemicals are used, and it covers all chemicals, with particular measures concerning hazardous chemicals. In addition, it covers areas, such as the classification of chemicals, and the responsibility of the supplier for labelling and the provision of chemical safety data sheets. This allows for information to flow from supplier to user, and should include information on disposal. The classification and labelling of chemicals is the main focus of the GHS). The GHS started as a follow-up to the adoption of the Chemicals Convention, 1990 (No. 170). The GHS has been designed to cover all chemicals, including pure substances and mixtures and to provide for the chemical hazard communication requirements of the workplace, the transport of dangerous goods, of consumers and the environment. Together with the establishment of a national framework for the sound management of chemicals, most developing countries require the strengthening of their capacity to ensure proper functioning of this framework. Capacity-building efforts should be focused on, inter alia:

- development of legislation (including incorporating Convention No. 170 and the GHS);
- national action programmes, including promotional activities;

¹ UNITAR, Chemical and Wastes Management Programme: <http://www.unitar.org/cwg/index.html>

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- training of governments, employers' and workers' organizations; and
 - infrastructure development.

5.5. Social dialogue

98. As demonstrated above, the social dialogue process is a vital mechanism in the development of preventive safety cultures and the management of OSH in the enterprise. An ILO plan of action should focus on a number of key areas where further improvement could greatly facilitate the implementation of preventive and protective measures against exposure to hazardous substances at work. The following are some of the areas where joint employer and worker action could create synergies with positive results:

- Trade unions in industrialized countries could consider more concerted resource mobilization actions to assist unions in developing countries and transition economies to contribute to building their national OSH systems. The collaborative principles of collective bargaining could certainly be extended to ensure stronger and more effective consultation and participation of workers in the process of developing much-needed voluntary technical standards, initiatives and information materials. These are essential tools in the complex process of transposing the provisions of laws and regulations into concrete preventive and protective action in the enterprise.
- The informal economy is one major area where worldwide networks of employers' and workers' organizations could be mobilized in a more concerted and systematic way to assist in raising awareness. They could also bring much-needed knowledge on best practices and preventive and protective measures to SMEs doing contract work for larger companies.
- The promotion of ILO–OSH instruments and information materials such as codes of practice and guidelines could also be greatly enhanced by more visible support from employers' and workers' organizations, both nationally and internationally.
- Strong joint promotion of the SAICM would enhance the successful implementation at national level of the regulatory and technical standards to which reference is made.
- In the same way, more visible joint support of the IPCS ICSC project and the UN GHS would ensure faster global adoption of universal tools for communication on hazardous substances and thus facilitate access to reliable information on preventive and protective measures that is easy to translate into local languages.

5.6 Points to consider when developing a possible ILO plan of action for hazardous substances

99. In developing a plan of action for future ILO activities in the area of hazardous substances, the Meeting of Experts may wish to discuss points which, in the light of the considerations and proposals in the present report, were identified as being essential in further strengthening the ILO's capacity to promote at the international and national levels its OSH and chemical safety standards. In doing so, the wider conclusions adopted by the ILC at its 91st Session in 2003, concerning a Global Strategy on Occupational Safety and Health should also be taken into account, particularly with regard to capacity building and the establishment of national OSH programmes:

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- (a) Should the plan of action reflect the need to act through, and in collaboration with, the IPCS and the IOMC partners to increase, speed up and integrate processes for the assessment and management of existing and new hazardous substances in the development and marketing of chemicals, taking into account the special requirements for the protection of vulnerable workers as well as facilitated access to information on preventive and protective measures?
 - (b) Should the plan of action recognize the corpus of the up to date general OSH and chemical safety instruments, particularly the chemicals and the prevention of major industrial accidents Conventions (Nos 170 and 174), as a comprehensive and coherent basis for the sound management of chemicals and the establishment, through awareness-raising action and technical cooperation, of related national programmes?
 - (c) Should the plan of action consider approaches the ILO may pursue in addressing the future of the out of date standards and instruments concerned with single chemicals and, if so, what action should be taken?
 - (d) Should the plan of action reflect the need to focus and strengthen ILO international cooperation activities on chemical safety on the promotion of ILO chemical safety standards, particularly the chemicals and the prevention of major industrial accidents Conventions (Nos 170 and 174), the GHS and other key related international tools as important elements in the implementation of the SAICM with the strong support of organizations of employers and workers?
 - (e) Should the plan of action reflect the need to increase and strengthen the dialogue and joint actions of employers and workers in promoting the ratification of ILO–OSH and chemical safety standards and their use as a basis for the establishment of national OSH and chemical safety programmes?

Appendix I

Hazard categories defined in the globally harmonized system for the classification and labelling of chemicals

Physical hazards		
GHS hazard class	Hazard statements for physical hazards	Hazard category
Explosives	Unstable explosive	Unstable explosive
	Explosive; mass explosion hazard	Division 1.1
	Explosive; severe projection hazard	Division 1.2
	Explosive; fire, blast or projection hazard	Division 1.3
	Fire or projection hazard	Division 1.4
	May mass explode in fire	Division 1.5
Flammable gases	Extremely flammable gas	1
	Flammable gas	2
Flammable aerosols	Extremely flammable aerosol	1
	Flammable aerosol	2
Flammable liquids	Extremely flammable liquid and vapour	1
	Highly flammable liquid and vapour	2
	Flammable liquid and vapour	3
	Combustible liquid	4
Flammable solids	Flammable solid	1, 2
Self-reactive substances and mixtures and organic peroxides	Heating may cause an explosion	Type A
	Heating may cause a fire or explosion	Type B
	Heating may cause a fire	Types C, D, E, F
Pyrophoric liquids; pyrophoric solids	Catches fire spontaneously if exposed to air	1
Self-heating substances and mixtures	Self-heating; may catch fire	1
	Self-heating in large quantities; may catch fire	2
Substances and mixtures which, in contact with water, emit flammable gases	In contact with water releases flammable gases which may ignite spontaneously	1
	In contact with water releases flammable gas	2, 3
Oxidizing gases	May cause or intensify fire; oxidizer	1
Oxidizing liquids; oxidizing solids	May cause fire or explosion; strong oxidizer	1
	May intensify fire; oxidizer	2, 3
Gases under pressure	Contains gas under pressure; may explode if heated	Compressed gas; liquefied gas; dissolved gas
Gases under pressure	Contains refrigerated gas; may cause cryogenic burns or injury	Refrigerated liquefied gas
Corrosive to metals	May be corrosive to metals	1

Health hazards		
GHS hazard class	Hazard statements for health hazards	Hazard category
Acute toxicity – oral	Fatal if swallowed	1, 2
	Toxic if swallowed	3
	Harmful if swallowed	4
	May be harmful if swallowed	5
Aspiration hazard	May be fatal if swallowed and enters airways	1
	May be harmful if swallowed and enters airways	2
Acute toxicity – dermal	Fatal in contact with skin	1, 2
	Toxic in contact with skin	3
	Harmful in contact with skin	4
	May be harmful in contact with skin	5
Skin corrosion/irritation	Causes severe skin burns and eye damage	1A, 1B, 1C
	Causes skin irritation	2
	Causes mild skin irritation	3
Sensitization – skin	May cause an allergic skin reaction	1
Serious eye damage/eye irritation	Causes serious eye damage	1
	Causes serious eye irritation	2A
	Causes eye irritation	2B
Acute toxicity – inhalation	Fatal if inhaled	1, 2
	Toxic if inhaled	3
	Harmful if inhaled	4
	May be harmful if inhaled	5
Sensitization – respiratory	May cause allergy or asthma symptoms or breathing difficulties if inhaled	1
Specific target organ toxicity – single exposure; respiratory tract irritation	May cause respiratory irritation	3
	May cause drowsiness or dizziness	3
Germ cell mutagenicity	May cause genetic defects	1A, 1B
	Suspected of causing genetic defects	2
Carcinogenicity	May cause cancer	1A, 1B
	Suspected of causing cancer	2
Reproductive toxicity	May damage fertility or the unborn child	1A, 1B
	Suspected of damaging fertility or the unborn child	2
Reproductive toxicity – effects on or via lactation	May cause harm to breast-fed children	Additional category
Specific target organ toxicity – single exposure	Causes damage to organs	1
	May cause damage to organs	2
Specific target organ toxicity – repeated exposure	Causes damage to organs	1
	May cause damage to organs	2

Environmental hazards		
GHS hazard class	Hazard statements for environmental hazards	Hazard category
Hazardous to the aquatic environment – acute toxicity	Very toxic to aquatic life	1
	Toxic to aquatic life	2
	Harmful to aquatic life	3
Hazardous to the aquatic environment – chronic toxicity	Very toxic to aquatic life with long-lasting effects	1
	Toxic to aquatic life with long-lasting effects	2
	Harmful to aquatic life with long-lasting effects	3
	May cause long lasting harmful effects to aquatic life	4

Appendix II

List and status of international labour standards and other instruments on occupational safety and health by subject ¹

General provisions

Up to date instruments

- Occupational Safety and Health Convention, 1981 (No. 155), and Recommendation (No. 164) [50 ratifications]
- Protocol of 2002 to the Occupational Safety and Health Convention, 1981 (No. 155) [four ratifications]
- Occupational Health Services Convention, 1985 (No. 161), and Recommendation (No. 171) [26 ratifications]
- Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187) [one ratification] and Recommendation (No. 197)
- Protection of Workers' Health Recommendation, 1953 (No. 97)
- Welfare Facilities Recommendation, 1956 (No. 102)
- List of Occupational Diseases Recommendation, 2002 (No. 194)

Instruments with interim status

- Prevention of Industrial Accidents Recommendation, 1929 (No. 31)

Replaced Recommendations

- Occupational Health Services Recommendation, 1959 (No. 112)

Protection against specific risks

Up to date instruments

- Radiation Protection Convention, 1960 (No. 115) [47 ratifications] and Recommendation (No. 114)
- Occupational Cancer Convention, 1974 (No. 139) [36 ratifications] and Recommendation (No. 147)
- Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (No. 148) [44 ratifications] and Recommendation (No. 156)
- Asbestos Convention, 1986 (No. 162) [31 ratifications] and Recommendation (No. 172)
- Chemicals Convention, 1990 (No. 170) [15 ratifications] and Recommendation (No. 177)
- Prevention of Major Industrial Accidents Convention, 1993 (No. 174) [11 ratifications] and Recommendation (No. 181)

¹ International labour standards by subject, OSH, ILO Internet site: <http://www.ilo.org/ilolex/english/subjectE.htm#s12> . Ratification status of ILO Conventions as of 12 September 2007, at <http://webfusion.ilo.org/public/db/standards/normes/appl/index.cfm?lang=EN>

Instruments to be revised

- White Lead (Painting) Convention, 1921 (No. 13) [63 ratifications]
- Guarding of Machinery Convention, 1963 (No. 119) [51 ratifications] and Recommendation (No. 118)
- Maximum Weight Convention, 1967 (No. 127) [25 ratifications] and Recommendation (No. 128)
- Benzene Convention, 1971 (No. 136) [37 ratifications] and Recommendation (No. 144)
- Anthrax Prevention Recommendation, 1919 (No. 3)
- Lead Poisoning (Women and Children) Recommendation, 1919 (No. 4)
- White Phosphorus Recommendation, 1919 (No. 6)

Withdrawn instruments

- Power-driven Machinery Recommendation, 1929 (No. 32)

Protection in specific branches of activity

Up to date instruments

- Hygiene (Commerce and Offices) Convention, 1964 (No. 120) [50 ratifications] and Recommendation (No. 120)
- Safety and Health in Construction Convention, 1988 (No. 167) [20 ratifications] and Recommendation (No. 175)
- Safety and Health in Mines Convention, 1995 (No. 176) [21 ratifications] and Recommendation (No. 183)
- Safety and Health in Agriculture Convention, 2001 (No. 184) [eight ratifications] and Recommendation (No. 192)

Instruments with interim status

- Underground Work (Women) Convention, 1935 (No. 45) [98 ratifications]

Outdated instruments

- Safety Provisions (Building) Convention, 1937 (No. 62) [30 ratifications]

Replaced Recommendations

- Safety Provisions (Building) Recommendation, 1937 (No. 53)
- Co-operation in Accident Prevention (Building) Recommendation, 1937 (No. 55)

Codes of practice related to hazardous substances

- Occupational exposure to airborne substances harmful to health, 1980
- Safety and health in coal mines, 1986
- Safety, health and working conditions in the transfer of technology to developing countries, 1988
- Safety and health in opencast mines, 1991
- Prevention of major industrial accidents, 1991
- Safety and health in construction, 1992

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- Technical and ethical guidelines for workers' health surveillance, 1992
 - Safety in the use of chemicals at work, 1993
 - Recording and notification of occupational accidents and diseases, 1995
 - Protection of workers' personal data, 1997
 - Safety and health in forestry work, 1998
 - Use of synthetic vitreous fibre insulation wools (glass wool, rock wool, slag wool), 2000
 - Guidelines on occupational safety and health management systems, 2001
 - Ambient factors in the workplace, 2001
 - Safety and health in the non-ferrous metals industries, 2003
 - Safety and health in shipbreaking: Guidelines for Asian countries and Turkey, 2004
 - Guidelines for labour inspection in forestry, 2005
 - Safety and health in underground coalmines, 2006

Appendix III

Provisions covered in the Conventions and/or Recommendations concerning occupational safety and health in relation to hazardous substances ¹

Convention No. Recommendation No.	General standards					Protection against specific risks								Specific branches			
	31	97	155 164	161 171	187 197	6	13	136 144	139 147	148 156	162 172	170 177	174 181	120 120	167 175	176 183	184 192
Provisions	Industrial accidents	Workers' health	General	Health services	Promotional framework	White phosphorus	White lead	Benzene	Cancer	Air pollution	Asbestos	Chemicals	Hazard installations	Offices	Construction	Mines	Agriculture
National OSH system					B												
National OSH programme					B												
National OSH profile					R												
National preventive safety culture					B												
International cooperation					R												
National OSH policy			C	B	B							C	B			C	C
Consultation on policy			C	C	B				C	C		C	C			C	
Periodic review	R		B	B	B				R		C	C	C		C	C	C
Scope of application																	
Branches of economic activity			B	C	B					B	C	C	C	B	B	B	B
Occupational hazards		R	B		B	R	B	B	B	B	B	B	B	B	B	B	B
Specific categories of workers			R	B	R		C	B		R	B	B			C		B
Gender specific					R		C	B				R				R	B
Preventive and protective measures																	
Risk identification and assessment			C	B	B				B	B	R	C	C		R	C	B
Prohibition, limitation, notification, authorization, replacement or other measures of control	R		B			R	C		B	B	B	C	C	C	B	B	
Surveillance and monitoring and exposure limits		R		B	B		C	B	B	B	B	B				R	R
Classification and labelling			R		R			B				B			R		B

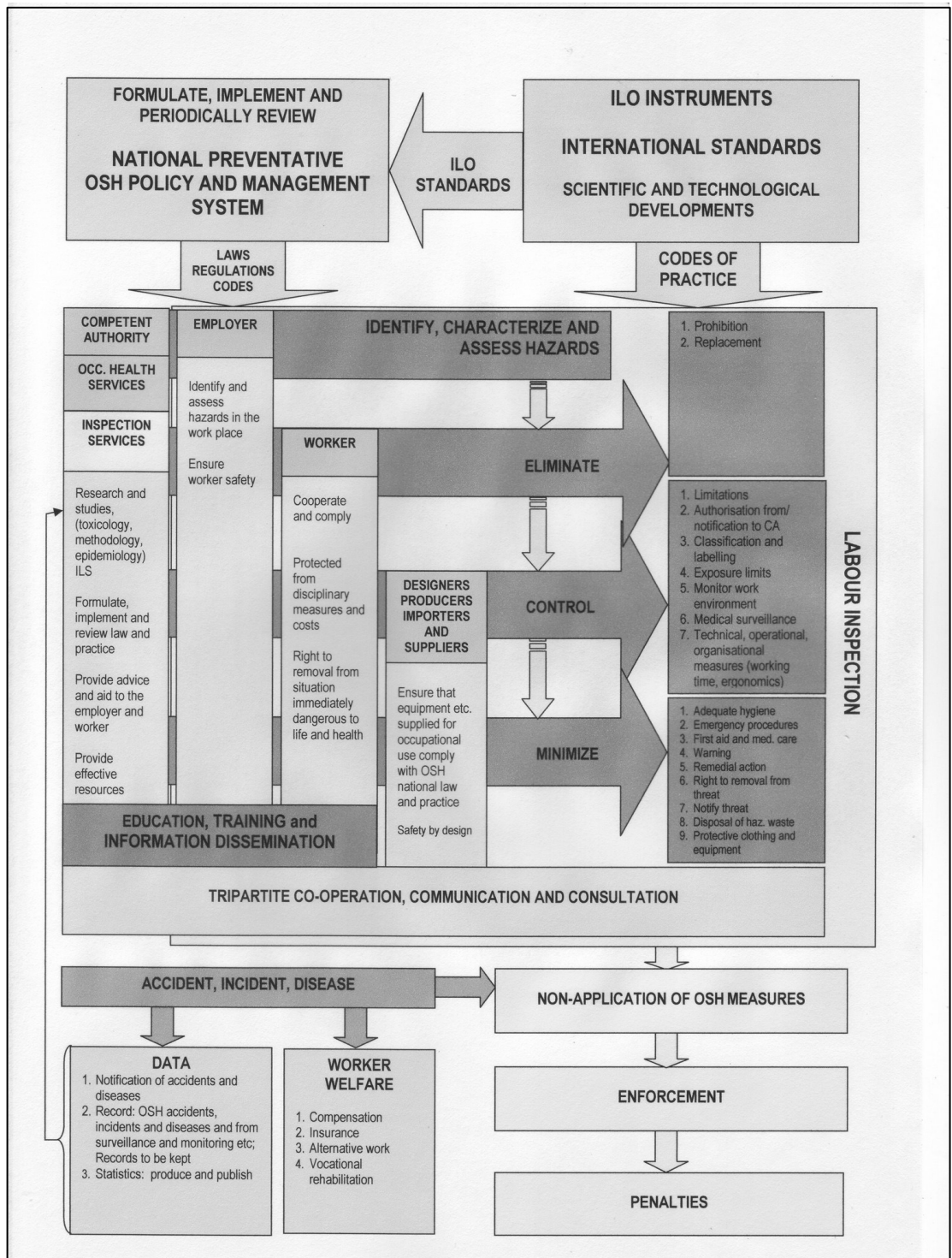
¹ Adapted from tables compiled in the context of preparations for the general discussion on ILO standards-related activities in the area of OSH, ILC, 91st Session, 2003.

Convention No. Recommendation No.	General standards					Protection against specific risks								Specific branches			
	31	97	155 164	161 171	187 197	6	13	136 144	139 147	148 156	162 172	170 177	174 181	120 120	167 175	176 183	184 192
Provisions	Industrial accidents	Workers' health	General	Health services	Promotional framework	White phosphorus	White lead	Benzene	Cancer	Air pollution	Asbestos	Chemicals	Hazard installations	Offices	Construction	Mines	Agriculture
Preventive and protective measures (cont.)																	
Safe methods for the handling, collection, recycling, storage and disposal of hazardous substances		R	R		R			R	R		B	B		R	B	R	B
Personal protective equipment	R	R	B	C	R		C	B		C	B	C	C	C	B	B	R
Organizational frameworks, mechanisms and measures																	
Competent authorities			B		B											C	C
Inspection systems	R		B		B		C	B	B	C	B		C	B	C	B	B
Occupational health services			R	B	B												R
Health surveillance, medical examinations, first aid and emergency preparedness and treatment	R	R	B	B	B			B	B	B	B	B		B	B	B	R
Consultation, cooperation and coordination	R	R	B	B	B			R	R	B	B	B	C	R	B	B	B
Studies and research	R	R	B	R	B			R		B	R			R		R	
Information, education, qualifications, training and advice	R	R	B	B	B		C	B	B	B	B	B	C	R	R	B	B
Recording, notification, investigation and compilation of statistics	R	R	B	B	R		C	R	R	R	B	B	C		B	B	B
Systems management					R												
Powers, responsibilities and rights																	
Enforcement			C		B		C			C	C	C	C	R	C	C	C
Employers' responsibilities	R		B	R	B					C	B	C	C	R	B	B	C
Workers' rights and responsibilities	R	R	B	B	B			B		B	B	B	C		B	B	C
Rights and responsibilities of workers' representatives	R		B	B	B					B	C	B	C		C	B	C
Responsibilities of designers, producers, importers and suppliers			C								B	B			B	R	C

Legend: C = Provision found in Convention R = Provision found in Recommendation B = Provision found in both Convention and Recommendation

Appendix IV

National occupational safety and health system modelled from provisions in ILO-OSH instruments



Source: ILO.