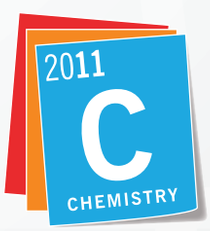
OPCW Conference on International Cooperation and Chemical Safety & Security

Outcome Document



International Year of
CHEMISTRY
2011

12-13 September, 2011
OPCW, The Hague

Organisation for the Prohibition of Chemical Weapons
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OPCW CONFERENCE ON INTERNATIONAL COPERATION AND CHEMICAL SAFETY & SECURITY

Compiled and edited by the Government Relations and Political Affairs Branch
External Relations Division

Group photograph taken on the occasion of the OPCW Conference on International Cooperation and Chemical Safety and Security

FOREWORD BY THE DIRECTOR-GENERAL

2011 was another productive year for the OPCW which continues on its path to strengthening the global norm against chemical weapons. A particular highlight of our work during the year was the OPCW Conference on International Cooperation and Chemical Safety and Security held on 12-13 September 2011. I wish once again to thank all our States Parties for their enthusiastic participation in this event and to acknowledge with appreciation the generous voluntary contributions that made it possible.

The Conference was organised to mark 2011 as the International Year of Chemistry and as a contribution of the Organization to that commemoration. The purpose of the Conference was twofold: to underscore the critical importance of chemistry's use for exclusively peaceful purposes; and, to further strengthen support for the only legal instrument, namely, the Chemical Weapons Convention that can assure international guardianship of this objective.

The themes selected for the Conference were of contemporary interest and importance. Chemical safety and security are both disciplines where considerable work has been done, and methods and procedures developed that are increasingly being integrated in operations in the chemical industry. However there is also recognition that further work in these areas is necessary together with making such programmes more widely accessible.

It takes time and effort to develop any institution. The work of the OPCW with National Authorities and with the chemical industry has matured to a point where the advantages of these cooperative links can be used to their full potential. Safety and security vis-à-vis chemical plants, their operations and in the context of transportation are issues that are of increasing interest.

The OPCW with its strong multilateralism and a culture of cooperation is uniquely placed to offer opportunities to its States Parties to engage, to share best practices and to implement agreed programmes. The Conference enabled participants to discuss international cooperation in the context of chemical safety and security and to explore ways and means of coordinating activities and programmes that States Parties regard as beneficial.

I believe the Conference was a success in terms of attracting wide participation with a variety of expertise from governments, chemical industry, the academia and the scientific community that made valuable contributions and enriched its proceedings.

This volume presents in a consolidated form the presentations and contributions made at the Conference together with some concluding thoughts and recommendations. It is my hope that the publication would serve as a useful resource and reference to our States Parties who have generally been highly supportive of the Conference and have indicated a desire for continuing this dialogue.

BACKGROUND

By its resolution 63/209 of 19 December 2008, the United Nations General Assembly proclaimed 2011 as the International Year of Chemistry.

The objectives of designating 2011 as the International Year of Chemistry (IYC 2011) are, inter alia, to celebrate the achievements of chemistry and its contributions to the well-being of humanity as well as to increase the public appreciation and understanding of chemistry in meeting world needs.

Considering that advancements in chemistry have been used not only for progress, but also for military use and to the detriment of humankind, the Chemical Weapons Convention (hereinafter "the Convention") represents the singular legal instrument comprehensively banning chemical weapons and the misuse of chemistry, while seeking to ensure that it is used only for peaceful purposes.

The Organisation for the Prohibition of Chemical Weapons (OPCW) hosted the OPCW Conference on International Cooperation and Chemical Safety and Security on 12 and 13 September 2011 as a contribution to the activities organised during the year. This event was designed to ensure that, of the several objectives identified for the celebration, the work of the OPCW under the Convention to guide progress in chemistry towards exclusively peaceful ends finds adequate coverage and international support.

This compilation offers the contributions and presentations made at the Conference in one volume. It, therefore, serves as an aide memoire to those who participated in the Conference and a ready reference for others.

CONFERENCE PROCEEDINGS

The Conference was attended by more than 400 participants from 129 States Parties; 64 participants were sponsored by the Technical Secretariat. Speakers and participants represented a broad and diverse range of expertise including government institutions, industry, and science and academia.

The Opening Session of the Conference, held in the Peace Palace in The Hague, was attended by high-level representatives from governments, international and regional organisations and other stakeholders. H.E. Mr Uri Rosenthal, Foreign Minister of the Netherlands, H.E. Mr Ahmet Üzümcü, Director-General of the OPCW and Professor Dr Paul Crutzen, Nobel Laureate in Chemistry (1995) addressed the Opening Session followed by senior officials and experts belonging to various fields.

The Conference focused on three core subject areas: International Cooperation, Chemical Safety and Chemical Security. The panel discussions during the working sessions were characterized by a constructive and multi-disciplinary approach, and were interactive and fruitful. Participants considered existing programmes and initiatives in the areas of International Cooperation, Chemical Safety and Chemical Security in the context of a forward-looking approach. The key findings, conclusions and recommendations may be summed up as follows in the section “Conclusions and Recommendations” (pp. 6-7).

CONCLUSIONS AND RECOMMENDATIONS

A. International Cooperation

- International cooperation provides a framework for strengthening the role of the Organisation in such areas as Chemical Safety and Security;
- There is a need to build directly on the output from the Article XI workshop and establish concrete and practical measures for the further implementation of Article XI;
- Consider the future direction and evolution of the OPCW's role and goals;
- Continue to develop a strategy for International Co-operation in the field of Chemistry;
- There is a demand for a more regional focus in OPCW Technical Co-operation activities, so that both national and regional needs can be addressed;
- The OPCW should keep up to date with new developments in chemistry. These include the development of new potentially toxic chemicals and related hazards. It needs to be able to respond quickly to emerging threats and to assist in training with respect to handling such materials at a practical and cooperative level;
- Engage in the training of young chemists and engineers, not directly but by 'catalysing' links among the OPCW's stakeholders in academia, industry and government;
- The OPCW could benefit from the experience of other international organisations engaged in International Co-operation activities, including the experience of the IAEA.

B. Chemical Safety

- Chemical Safety Management has become an internationally accepted discipline that requires continuous efforts to achieve a high level of safety performance.
- Current activities, including regulations, regional voluntary organizations, various industry programmes, are not comprehensive enough – more work needs to be done.
- A need remains for global governmental and private leadership on chemical safety issues.

The OPCW can contribute to addressing these issues:

- Raising awareness about the norms of the Convention that comprehensively prohibits the misuse of toxic chemicals.
- The global acceptance of the Convention and the ability of the OPCW to work with national authorities, and through them with such stakeholders as the industry, creates opportunities to further enhance its contribution in the context of chemical safety
- OPCW role: The OPCW is in a unique position to promote chemical safety.

- OPCW track record: The OPCW has an excellent track record in dealing effectively and globally with chemical issues and can make use of these structure and resources to address these related issues.

- OPCW clearinghouse function: OPCW has the capacity to bring together stakeholders, including regulators, industry and scientists, to identify safety risks and hazards and to support the development and design of safety and control mechanisms and prevention strategies.

- Opportunities for the OPCW:

    - The use of existing structures to promote, educate, exchange information, share good practices and lessons learned;

    - Provision of guidance on new methods and approaches and the development of practical tools for use in decision-making on chemical safety issues;

    - Development of a plan to address these issues systematically.

C. Chemical Security

- The Conference highlighted the commitment by OPCW States Parties and other stakeholders to further strengthen efforts related to chemical security issues and to develop a chemical security culture;

- It was noted that support from chemical industry will be critical in this regard due to the key role of industry practice in preventing access to toxic chemicals for hostile purposes;

- It was recognised that many States lack the resources to put expansive programs in place and will seek support from the international community;

- While many large companies have their own chemical security procedures in place, support might be requested from small and medium sized companies that lack the expertise and resources to take effective action;

- Above activities should be implemented with due regard to the competencies of other international organisations, so as to avoid duplication.

D. Forward-looking recommendations

- Recommendation 1: Organize seminars to raise awareness, educate and facilitate the exchange of information and good practices.

- Recommendation 2: Develop guidance on how to encourage all stakeholders to adopt good practices in chemical safety management.

- Recommendation 3: Develop and make available guidance on reference sources and technical applications for good practices in chemical safety management.

The Technical Secretariat looks forward to ideas and suggestions in the context of future work related to the subject matters of the Conference. There are additional items that can be regarded as future proposals contained in the final section of this document.

PROGRAMME OF WORK

THE OPCW CONFERENCE ON INTERNATIONAL COOPERATION AND CHEMICAL SAFETY AND SECURITY THE HAGUE, THE NETHERLANDS 12 AND 13 SEPTEMBER 2011

Time	Activity
Monday, 12 September 2011	
08:30 – 09:15	Registration of participants Location: Peace Palace Academy Hall
09:30 – 10:30	**Session 1: Opening plenary session, Peace Palace Academy Hall** H.E. Mr. Ahmet Üzümcü, Director-General, Organisation for the Prohibition of Chemical Weapons (OPCW) H.E. Mr. Uriël Rosenthal, Minister of Foreign Affairs, The Netherlands *Prof. Dr. Paul J. Crutzen*, Nobel Laureate, Chemistry (1995)
10:30 – 10:50	Coffee break
10:50 – 12:30	**Session 1 (continued)** H.E. Mr. Kassym-Jomart Tokayev, Director-General, United Nations Office at Geneva H.E. Maj. Gen. J.K. Bansal, VSM, Chikitsa Ratan, Honourable Member of National Disaster Management Authority, India H.E. Mrs. Mara Marinaki, Managing Director for Global and Multilateral Issues, European External Action Service (EEAS) Mr. Zhuye Zhou, Vice-Chairman, China Petroleum and Chemical Industry Federation (CPCIF), China Dr. Nancy B. Jackson, President, American Chemical Society (ACS): "Chemistry for Sustainability" Prof. Berhanu Abegaz, Executive Director, African Academy of Sciences (AAS): "Chemical Sciences in Africa – Historical Insights and Future Prospects" Prof. Shintaro Furusaki, Professor Emeritus, University of Tokyo: "Role of Chemistry and Chemical Engineering in Human Life and Society" Prof. David Black, Secretary-General, International Union of Pure and Applied Chemistry (IUPAC): "The International Year of Chemistry – IYC 2011" Mr. René van Sloten, Executive Director Industrial Policy, European Chemical Industry Council (CEFIC): "CEFIC/ICCA support for the Chemical Weapons Convention – past, present and future" Dr. Robert Parker, CEO, Royal Society of Chemistry (RSC): "The Role of the RSC in the promotion of Chemistry"
12:30 – 13:30	Reception
13:40	Transportation of participants to the OPCW Headquarters

14:00	Photo opportunity at the OPCW Headquarters
	Working Sessions
14.30 – 15:30	**Session 2: International cooperation, Ieper Room, OPCW HQ** Moderator: H.E. Mrs. Bhaswati Mukherjee, Permanent Representative of India. Panel Members Dr. David Faraday, Lead Team, UK: "The CWC and International Cooperation" Prof. Ameenah Gurib-Fakim, Centre for Phytotherapy and Research (CEPHYR), Ebene, Mauritius: "Women in Chemistry" Prof. Ramlan Aziz, Director, Institute of Bioproduct Development, University Teknologi, Malaysia: "Industry Applications from Natural Products Chemistry" Prof. Ana María Cetto, National Autonomous University of Mexico: "Enhancing the Effectiveness of International Cooperation Programmes" Mr. Santiago Oñate, Director, Office of the Legal Adviser, OPCW: "Effective implementation of the CWC – Genesis and Implementation of the Action Plan on Article VII" Panel discussion
15:30 –16:30	**Session 3: Chemical safety, Ieper Room, OPCW HQ** Moderator: H.E. Mr. Paul Arkwright, Permanent Representative of the United Kingdom. Panel Members Mr. Bernard Thier, CEFIC: "Responsible Care and Small Scale Enterprises" Dr. Barry Kistnasamy, National Institute of Occupational Health, South Africa: "Emerging Areas in Chemistry – from the Informal Sector to Frontier Science" Mr. Neil Harvey, Chemical Industry Association, UK: "Some issues in international chemical management cooperation" *Prof. Alastair Hay*, University of Leeds, UK: "Ethics in Chemistry" Mr. Ravi Kapoor, Heubach Colours, India: "Challenges in Implementing Responsible Care in India" Mr. David Moore, AcuTech, US: "Chemical Industry and Safety Management" Panel discussion
16:30 – 16:45	Coffee/tea break
16:45 – 18:00	**Session 4: Chemical security, Ieper Room, OPCW HQ** Moderator: H.E. Mr. Aizaz Ahmad Chaudhry. Permanent Representative

	of Pakistan. Panel Members Amb. Bonnie Jenkins, Coordinator for Threat Reduction Programmes, Bureau of International Security and Nonproliferation, US State Department: “The Role of Chemical Safety and Security in International Global Security Engagement Efforts” Dr. Kersten Gutschmidt, Department for Public Health and Environment (PHE), WHO: “WHO International Health Regulations and Health security” Ms. Ann-Margreth Eriksson Eklund, IAEA: “IAEA experience in the development of nuclear security standards and practices at relevant facilities and in transportation” Mr. Matteo Guidotti, Italian National Research Council, CNR, Italy: “Nanosystems and Chemical Weapons: Considerations about the potential risk of illicit use of nanosized materials” Dr. John R. Walker, Arms Control and Disarmament Research Unit, Foreign and Commonwealth Office, UK: “Verification since entry into force of the CWC: lessons learned for preventing the misuse of toxic chemicals at Other Chemical Production Facilities (OCPFs)” Panel discussion
Tuesday, 13 September 2011	
09:00 – 13:00 11:00 – 11:15 Coffee break	**Session 5: Interactive sessions** Choice between: Panel discussion A: “International cooperation” Moderator: H.E. Mr. Jorge Lomónaco Tonda, Permanent Representative of Mexico. Prof. Nelson Torto, Rhodes University, South Africa: “International Cooperation for Promoting Centres of Excellence” Prof. Volodymyr Zaitsev, Chair of the Analytical Chemistry Department, Taras Shevchenko National University of Kyiv, Ukraine: “Regional Cooperation” Mr. Philippe Louvet, Chemical Expert, Deputy Head of Chemical Synthesis Department, Laboratory of Analytical Chemistry, Centre d’Etudes du Bouchet (CEB): “The French single small scale facility: A focus on chemical safety” Panel discussion B: “Chemical safety” Moderator: H.E. Mrs. Ruthie Chepkoech Rono, Permanent Representative of Kenya. Prof. Jonathan Okonkwo, Tshwane University of Technology, South Africa: “Green Chemistry: Equipping and Strengthening Chemical Sciences for Sustainable Development” Dr. Mark Cesa, IUPAC Committee on Chemistry and Industry: “IUPAC Safety Training Programme” Mr. Bertrand Giry, Director, Safety Department, Groupe Rhodia: “Chemical industry by-products: impacts and experience sharing”

	Panel discussion C: “Chemical security” Moderator: H.E. Mr. Vaidotas Verba, Permanent Representative of Lithuania. Ms. Nohemi Zerbi, Chemical Sector Specific Agency, US Department of Homeland Security: “US Chemical Sector Specific Agency – Voluntary Chemical Sector Security Programs” Mr. J van Vugt, Dutch National Coordinator for Counter-terrorism: “Strengthening chemical security: creating Public Private Partnership” Ms. Anne-Marie Fry, Policy Lead Hazardous Sites and Substances, CBRNE Unit, Office for Security and Counter-Terrorism, UK Home Office: “UK Engagement Programme on Chemical Security” Ms. Kathryn Insley, Deputy Director, Office of Cooperative Threat Reduction, Bureau of International Security and Nonproliferation, US Department of State: “The experience of the United States in the implementation of the Chemical Security Engagement Program” Mr. W. Wielezynski, President of Polish Chamber of Chemical Industry/PIPC: “Cooperation between stakeholders in promoting chemical safety and security” Mr. Wicher Mintjes, Emergency Services & Security Expertise Center Dow Benelux B.V.: “Security Code for Chemical Facilities”
13:00 – 14:00	Lunch break
14:00 – 15:30	**Session 6: Closing plenary session** Reports from the panels

LIST OF PRESENTATIONS

SESSION 1: OPENING PLENARY SESSION, PEACE PALACE ACADEMY HALL

KEYNOTE STATEMENTS

OPENING PLENARY SESSION CONTINUED

H.E. Mr Ahmet Üzümcü, Director-General of the Organisation for the Prohibition of Chemical Weapons (OPCW)

His Excellency Mr Uri Rosenthal, Minister of Foreign Affairs of the Kingdom of The Netherlands,

Professor Dr Paul Crutzen, Winner of the 1995 Nobel Prize in Chemistry,

Excellencies,
Ladies and Gentleman,
It is a great honour for me to welcome such a distinguished group of participants to this OPCW Conference on International Cooperation and Chemical Safety and Security. I thank you for your keen response to my invitation to attend the Conference, and I am very pleased to see so many eminent experts and specialists with us today.

I also warmly welcome all those who are viewing this session online as this is the first time an OPCW event is to be broadcast live.

We are holding this event to mark 2011 as the International Year of Chemistry as proclaimed by the United Nations General Assembly.

We owe a debt of gratitude to all those States Parties and the European Union who made generous contributions to make this Conference possible.

I am in particular grateful to the Foreign Minister who decided to honour this occasion with his presence.

Last but not least, I sincerely thank Professor Paul Crutzen, the distinguished Nobel laureate whose participation lends special significance to this event.

Excellencies,
Ladies and Gentleman,

The International Year of Chemistry is intended, inter alia, 'to celebrate the achievements of chemistry and its contributions to the well-being of humanity' and 'to increase the public appreciation and understanding of chemistry in meeting world needs'. This OPCW Conference will highlight the unique and essential role that the Chemical Weapons Convention (CWC) plays in ensuring that chemistry is used exclusively peaceful purposes and in the service of humankind.

The OPCW motto "Working together for a world free of chemical weapons" embodies a moral imperative. Founded as a treaty to eliminate chemical weapons, the CWC has many achievements to its credit. It is the only international treaty that has actually led to a verified destruction of an entire category of weapons of mass destruction. It has established a unique regime to prevent their re-emergence.

The OPCW represents a model of multilateralism. It succeeded at a time when many other multilateral initiatives in the field of disarmament and arms control suffered set-backs. 188

States Parties to the CWC can take rightful credit for the cooperative spirit that enabled the CWC regime to grow from its infancy in 1997 to what it is today.

We are all however, aware that the future will be different from the past. There are critical and enduring goals that will outlive the attainment of destruction which is within our sights. Our Organisation needs to be responsive to the challenges of the future.

Contemporary global challenges are complex. They require coordinated responses both by nations and specialised international institutions that they have established. Identification of challenges and coordination of actions to address them are the essence of international cooperation for strengthening peace and security.

The agenda for this Conference revolves around the theme of international cooperation. International Cooperation in the field of peaceful uses of chemistry is indeed an important goal of the CWC. For many countries it was a major incentive to join the Convention. It will remain so for them to stay engaged. The training and various other activities in this context also helped the OPCW to raise awareness about the Convention. We hope to develop a global network of what I could call ‘friends of the OPCW’. We intend to enrich this program based on the expectations and needs of States Parties. We will promote a regional approach to achieve as an effective and sustainable capacity as possible.

Our States Parties also believe that they can and should play a more active role in promoting a global culture of safety and security.

The success in banning an entire category of weapons of mass destruction represents the triumph of multilateralism. It follows a long period of repeated tragedies involving the use of chemical weapons that reinforced the resolve to find a comprehensive solution.

The Chemical Weapons Convention is a legal document that serves a common security objective. It is a treaty of a technical nature that requires for its effectiveness the active political support of its States Parties. The Convention was negotiated nearly two decades ago. Since then, science and technology have advanced by leaps and bounds.

While reaffirming its core objective of disarmament, it is crucial to also take stock of the current state of science and the production technologies that the Convention covers.

Today the challenge before us is to ensure that the legal prohibitions of the Convention are considered comprehensive enough to extend the reach of verification to new chemicals and new means and methods of production.

Similarly, as a guarantor of security against chemical weapons, the OPCW is regarded as a forum to harmonise the actions of its members against contemporary and future threats including the threat of terrorism.

The need to draw upon the knowledge and expertise of a variety of stakeholders becomes increasingly evident as we respond to an ever-evolving economic, political and technological environment. Opportunities have multiplied with globalization but so have the risks. To clearly identify both represents the first step in comprehending and preparing to deal with the challenges of the future.

Sustaining our achievements demand preparing for the future - a future in which both the Organisation and the environment that it operates in will undergo significant changes.

I would also like to refer to another theme of the conference, namely chemical safety. This is an area which is of increasing importance for both the chemical industry and governments. In this context we are involved in supporting the understanding and adoption of the Responsible Care programme which was established following one of the biggest chemical disasters. The programme has wide support across the chemical industry and with governments of Member States. As we are dealing with that sector of the chemical industry which produces some of the most toxic chemicals, it is important that we not only work towards preventing their misuse but also focus on safety issues.

The importance of chemical industries in many emerging economies is on the rise. We are seeing increasing consumption and productions capacity because of availability of feedstock and new markets. In many countries production capacity is being increased through small and medium enterprises. It would be expedient to bring them into the ambit of initiatives that promote chemical safety management.

To ensure that safety is kept at the forefront, all sectors of the Chemical Industry should understand and adopt the best practices in this field. Forums at the national, regional and international levels to share experiences and lessons learnt can contribute significantly to promote safety.

Among the many changes in the security environment is the threat posed by non-State actors seeking to produce or acquire chemical weapons. These new threats highlight the need for vigilance and for States Parties to enact and enforce effective controls covering the manufacture, transfer and use of dual use materials. The safety net needs to be anchored within the internal legal systems, and the prohibitions under the Convention translated into domestic rules and regulations that apply to any individual or organization that operate within their jurisdiction or control. Industry self governance is also important to ensure that no loopholes exist that could be exploited to use chemicals for hostile purposes.

Enhancing safety and security in the areas of commercial production, transportation and use of chemicals and biochemical materials is becoming ever more important. Promoting a chemical security culture will provide greater assurances. The national chemical security systems could perform their functions of preventing, detecting and responding to theft, sabotage, unauthorized access, and illegal transfer of chemical materials from their associated facilities or during transportation.

As the singular international organization devoted to preventing the hostile uses of toxic chemicals, and with close ties to the chemical industry, the OPCW is well-placed to serve as a forum for governments and industry to discuss concerns related to chemical security. Working in partnership with many of you here today, the OPCW can develop a platform for raising awareness and disseminating best practice in the chemical industry. Only by working together as multiple stakeholders, including with the chemical industry, the scientific community and NGOs can we accomplish the goals of the Chemical Weapons Convention.

Learning from the grave tragedies of the 20th century, the international community embarked on a path to create a global system based on the rule of law, human rights, peace and security, equal rights of nations large and small. At the OPCW, we remain committed to play our part in strengthening multilateral cooperation in the service of peace and security.

We join the celebration of the IYC with the resolve to ensure that chemical warfare is forever confined to the annals of history and that chemistry will remain a science dedicated to peace and human progress.

H.E. Mr Uriël Rosenthal, Minister of Foreign Affairs, The Netherlands

Director-General Üzümcü, Professor Crutzen, Your Excellencies, ladies and gentlemen,

Let me start with the words of a famous man of peace:
'You have been summoned by history and you have answered its call. One of the most monstrous tools of warfare has been ruled intolerable by all States Parties. We who have gathered here in The Hague need look no farther than to the fields of Flanders or to the streets of Halabjah to see proof of how our century has been scarred and shamed by the use of chemical weapons. What we can do at its close, however, is to help ensure that they never again can become part of any nation's arsenal, never again the scourge of any battlefield, never again the silent but certain doom of a civilian population.'

I have just quoted former UN Secretary-General Kofi Annan at the First Conference of States Parties to the Chemical Weapons Convention in The Hague in 1997, 15 years ago.

Promoting international peace and stability has always been and will continue to be an important component of Dutch foreign policy. The Peace Palace, where we are gathered today, bears witness to our long tradition of international law and our active role in its practice. This goes back to Grotius' 'Mare Liberum'.
The Netherlands is particularly proud to host the Organization for the Prohibition of Chemical Weapons, the OPCW. The Organization has had its seat in The Hague since 1997, the year in which the Chemical Weapons Convention came into force. It is a great pleasure to welcome you to the Peace Palace, and to this OPCW Conference on Cooperation in Chemical Safety and Security.

Ladies and gentlemen,
The Chemical Weapons Convention is a great example of effective multilateralism. It is the first multilateral agreement that bans an entire category of weapons of mass destruction. The Netherlands was an active player in its development. What's more, with 188 States Parties, the Convention is close to becoming a universal one. Including South Sudan, only eight states are missing.

The Organization for the Prohibition of Chemical Weapons oversees the implementation of the Convention. Since its start in 1997 it has made impressive progress. Firstly, in the elimination of chemical weapons: so far, two thirds of all declared stockpiles of possessor States Parties have been destroyed under strict international verification. This is a total of more than 46,000 metric tonnes. Secondly, a unique feature of the Convention is the verification mechanism for the chemical industry. Last April, the OPCW completed its two-thousandth inspection of a declared chemical facility.

Of course, the core objective of the Chemical Weapons Convention is the complete and permanent elimination of all chemical weapons. The destruction of 100% of the declared stockpiles and of old or abandoned chemical weapons at the earliest possible date must remain the key priority. As the former US Secretary of State Madeleine Albright once said,

‘Chemical weapons are inhumane. They kill horribly, massively and – once deployed – are no more controllable than the wind.’ [1]

With the destruction of stockpiles well under way, now is also the time to start thinking about how to make sure that chemicals weapons will never reappear. With this in mind, I welcome Director-General Üzümcü’s initiative to establish an independent advisory panel. Its recently published report contains valuable recommendations. The key question is how we can prevent the development of new chemical weapons or the use of toxic chemicals for hostile purposes? And how can we foster the development of chemistry for the well-being of people?

In my view, stepping up cooperation between public and private partners, and between States Parties’ governments and the chemical industry, is crucial indeed.
Ladies and gentlemen,

The world has changed considerably since 1993, when the Chemical Weapons Convention was opened for signature. Science and technology are advancing rapidly, creating new opportunities but also new risks. The scale and regional landscape of the chemical industry have changed dramatically. Our security has become increasingly tied to regional and international developments. To protect ourselves from today’s transnational threats, such as terrorism, organised crime, proliferation of weapons of mass destruction and cyber attacks, we need more unity of purpose and action than ever before. International security is in our common interest. Cooperative security, as stressed in NATO’s new Strategic Concept, is our joint responsibility.

The threat of ‘traditional’ chemical warfare, as seen for the first time on the battlefield of Ypres in Belgium in the First World War, has declined significantly. But other forms of chemical weapons have meanwhile been used for their capacity to cause terror. The attack on the Tokyo subway by the Aum Shinrikyo cult in 1995 proved that non-state actors can and do not hesitate to use chemical weapons. The attack, using the nerve agent sarin, killed 13 innocent civilians and injured over 6,000. In fact, the leader of Aum aimed to kill more people than the Kobe earthquake. We must at all cost prevent Al Qa’ida or any other international terrorist organisation from acquiring such weapons. NATO’s new Strategic Concept clearly states that ‘modern technology increases the threat and potential impact of terrorist attacks.’ This threat concerns us all – governments, the private sector, the military and civilians alike.

To implement the Convention, all States Parties adopt and enforce legislation to ensure that toxic chemicals and their precursors are not used for prohibited purposes. This is a major challenge – especially in view of modern technological developments. Measures to regulate trade and the chemical industry must be constantly updated and upgraded. We have to prevent know-how, materials and equipment for making toxic chemicals from falling into the wrong hands. Through international cooperation the OPCW provides assistance to States Parties to ensure that the right regulations and enforcement measures are coming into place.

We cannot achieve compliance with the Convention merely through regulation by governments and verification by the OPCW. Support is needed from all stakeholders in the chemical industry, as well as the research and academic communities, and other relevant players in society, including civil society.

[1] Washington DC, 1997.

I understand there are concerns in the chemical industry about the administrative burden of the verification mechanism. The Netherlands is a strong advocate of minimising these burdens as much as possible. We are glad that, together with Malaysia, we have helped changing the way the OPCW selects sites for inspection. The result should be that it can focus on sites which are more relevant for the Convention.

The chemical industry is also concerned about uneven regulation in different countries. We should preserve a level playing field. In my view, this is exactly why closer cooperation between governments and the industry is crucial.

Director-General Üzümcü has already said that OPCW inspections have become accepted as a norm in the chemical industry. So closer cooperation is also an opportunity. Promoting equal security and safety standards all over the world will help to create the necessary level playing field and create a better environment for economic development and international exchange. Improving cooperation between governments and industry will definitely benefit us all.

Ladies and gentlemen,
Today's conference on cooperation in chemical safety and security brings together all the relevant stakeholders: international and regional organisations, governments, the chemical industry, NGOs, academics and think tanks.

UN Secretary-General Ban Ki-moon once said, 'As we recall the unspeakable horror endured by victims of chemical weapons, let us all reaffirm our common commitment to eliminate the dangers posed by such instruments of mass destruction. And let us redouble our efforts to build a chemical weapons-free world.' [2]

I call on all of you to present here in The Hague action-oriented ideas on how States Parties and the industry can work together on equal safety and security standards. We also need concrete proposals on how to involve the scientific community more in the work of the OPCW. Preventing the proliferation of chemical weapons is our joint responsibility and is in our common interest. I wish you a productive and action-oriented conference.

Thank you.

H.E. Mr. Kassym-Jomart Tokayev, Director-General, United Nations Office at Geneva

Director-General Mr. Üzümcü
Distinguished Participants:

It is a privilege for me to be with you for this unique conference on chemical safety and security. I thank the Government of the Netherlands for their support and commend the leadership of the OPCW Director-General Mr. Ahmet Üzümcü in promoting cooperation on chemical safety and security.

The Secretary-General of the United Nations, Mr. Ban Ki-moon, attaches particular importance to the work of the Organisation for the Prohibition of Chemical Weapons. Therefore, it is my privilege to deliver his message to you on this occasion.

The message goes as follows:

"I am pleased to send my greetings to this Conference on International Cooperation and Chemical Safety and Security. I thank the Organisation for the Prohibition of Chemical Weapons for organizing this important event.

Whether you are participating in person or online, you can use this gathering to give concrete meaning to the International Year of Chemistry by exploring how the Chemical Weapons Convention can promote the peaceful, safe and secure applications of chemistry worldwide.

The Convention, adopted in response to humankind's tragic history of chemical warfare, comprehensively bans chemical weapons, prevents the misuse of chemistry and promotes its benefits for peaceful purposes.

With 188 parties, the Convention is the cornerstone of international efforts to eliminate the dangers posed by one of the deadliest weapons of mass destruction. It serves the goals of complete disarmament and non-proliferation while fostering a broad range of activities that facilitate chemistry's manifold peaceful applications.

This International Year marks the centenary of the awarding of the Nobel Prize in Chemistry to Marie Curie. Her immense legacy includes an abiding faith in science to serve the greater public good. As she said, "To foster and safeguard the scientific vocation is a sacred duty for each society which has the interests of its future at heart."

All of you are carrying out this sacred duty for the sake of our common future. I wish you great success in this important endeavour."
That wastheendoftheSecretary-General'smessage.

The OPCW forms an important part of the international community's disarmament and non-proliferation efforts for a safer and more secure world. As Secretary-General of the Conference on Disarmament and the Personal Representative of the United Nations Secretary-General to the Conference, it gives me particular pleasure to deliver this message to an organization which deals with a convention negotiated by the Conference on Disarmament.

The example of the Chemical Weapons Convention shows the true potential of the world's single multilateral disarmament negotiating body. Indeed, it gives cause for optimism about the future of the Conference.

I am deeply concerned about the continuing stalemate but at the same time urge the Member countries not to let frustration dominate expectations and commitments. I hope that the same spirit of compromise and collaboration that led to agreement on the Chemical Weapons Convention may again prevail.

Ladies and Gentlemen:

The International Year of Chemistry is a reminder of the need to integrate scientific perspectives and the views of scientists in policy debates. The response to many of today's challenges – from terrorism and cyber-security, to sustainable development and climate change – requires a scientific basis.

I hope that this conference will also serve to bring the scientific and policy communities closer together in pursuit of our common objectives.

I join the Secretary-General, Mr. Ban Ki-moon, in extending my best wishes for a successful meeting.

Thank you very much.

Prof. Dr. Paul J. Crutzen, Nobel Laureate, Chemistry (1995)

Atmospheric Chemistry and Climate in the Anthropocene

Paul Crutzen

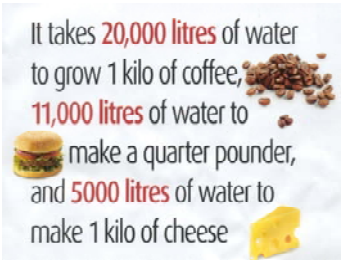
Conference on International Cooperation and Chemical Safety & Security

The Hague, 12 September 2011

- During the past 3 centuries human population has increased tenfold to 6000 million and fourfold in the 20th century
- Cattle population increased to 1400 million (one cow/family); by a factor of 4 during the past century
- There are currently some 20 billion (20,000 million) of farm animals worldwide
- Urbanisation grew more than tenfold in the past century; almost half of the people live in cities and megacities
- Industrial output increased 40 times during the past century; energy use 16 times
- Almost 50 % of the land surface has been transformed by human action

- Fish catch increased 40 times
- The release of SO_2 (110 Tg/year) by coal and oil burning is at least twice the sum of all natural emissions; over land the increase has been 7 fold, causing acid rain, health effects, poor visibility, and climate changes due to sulfate aerosols
- Releases of NO to the atmosphere from fossil fuel and biomass burning is larger than its natural inputs, causing regional high surface ozone levels
- Several climatically important "greenhouse gases" have substantially increased in the atmosphere, eg. CO_2 by 40 %, CH_4 by more than 100 %.

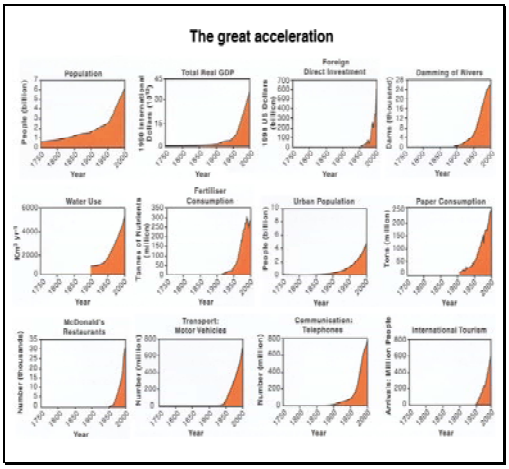
Water use increased 9 fold during the past century to 800 m^3 per capita / year; 65 % for irrigation, 25 % industry, ~10 % households



1 kg meat → 16000 l water

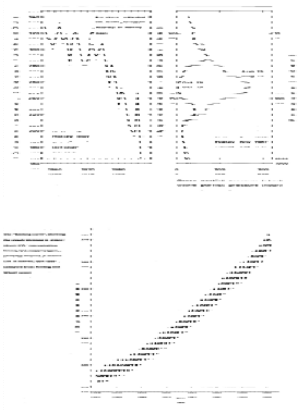
1 kg grain → 1000 l water

Anthony Allen



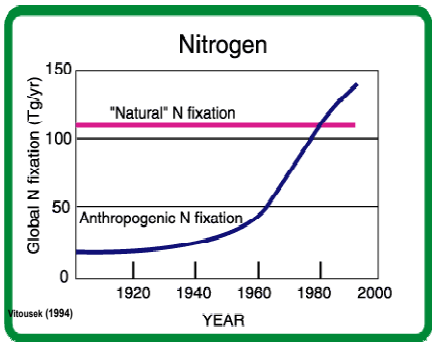
•Humanity is also responsible for the presence of many toxic substances in the environment and even some which are not toxic at all, but which have, nevertheless, led to the ozone hole.

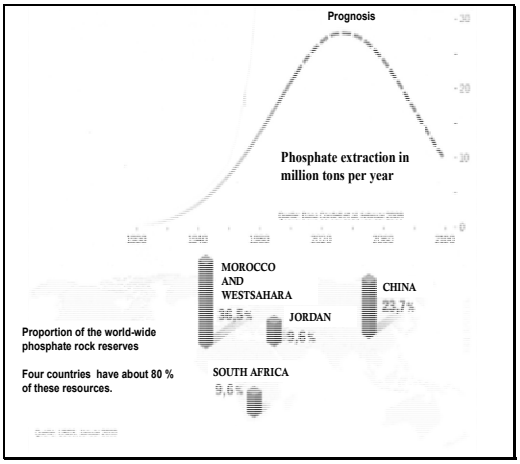
•Among the „greenhouse gases" are also the almost inert CFCs (chlorofluorocarbons) gases. However, their photochemical breakdown in the stratosphere gives rise to highly reactive chlorine and bromine gases (radicals), which destroy ozone by catalytic reactions. As a consequence UV-B radiation from the sun increases, leading for instance to enhanced risk of skin cancer.



•E.O. Wilson "Before humans existed, the species extinction rate was (very roughly) one species per million species per year. Estimates for current species extinction rates range form 100 to 10,000 times that, but most hover close to 1,000 times prehuman levels (≈ 10% per century)

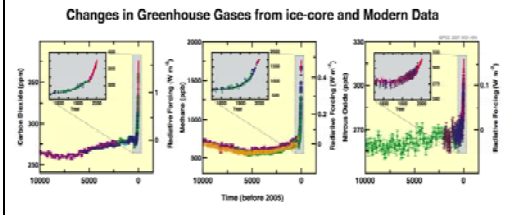
•Palumbi (Science, 7 September 2001): mankind also effects evolutionary change in other species, especially in, commercially important, pest and disease organisms, through antibiotica and pesticides. This accelerated evolution costs at least $33 billion to $50 billion a year in the United States.





Since the beginning of the 19th Century, by ist own growing activities, Mankind opened a new geological epoch: the Anthropocene.

We are clearly affecting climate and can deliberately do so.



IPCC (2007):
Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.
Average global surface temperature rise 2.0 - 4.5 °C (1.1 - 6.4 °C) by 2100.
Sea level rise 19 – 58 cm by 2100; S.Rahmstorff: 0.5 – 1.4 m by 2100

Redistribution of precipitation
Enhanced risk for extreme weather (flooding, desertification)?
Increase in heat waves in Europe, as in the summer of 2003?
Too rapid climate changes, so that ecosystems cannot adapt.

Melting permafrost: Additional release of CO_2 and CH_4?

W. Broecker: super-interglacial?

Stabilisation of Atmospheric Concentrations. Reductions in the human-made emission required to stabilise concentrations at current levels

Greenhouse Gas	Reduction Required
Carbon Dioxide	> 60%
Methane	(achieved, but long term stabilisation is uncertain for instance by thawing of permafrost)
Nitrous Oxide	70-80%
CFC-11	Achieved
CFC-12	achieved

Geology of Mankind, Nature

Wastes: **Only 20-30 % of N fertilizer is taken up by plants.**
Only about 50 % of food produced is consumed.

Future agriculture: Loss of agricultural soil through erosions is a serious problem.
Even worse is the loss of phosphorous. Some studies indicate dangerous depletion in agricultural regions (tropics).

From generation to generation the effect of human activities is accumulating and even accelerating. No other specie has developed in this matter.

Mankind only species that produces weapons of mass destruction (nuclear, chemical, biological).
Mankind will remain a major environmental force for many millennia. A daunting task lies ahead for scientists and engineers to guide society towards environmentally sustainable management during the era of the Anthropocene. This will require appropriate human behaviour at all scales.

Just add water. SFP's combination of technologies coaxes crops, electricity, and fresh water from unproductive desert.

H.E. Maj. Gen. J.K. Bansal, VSM, Chikitsa Ratan, Honourable Member of National Disaster Management Authority, India

Good morning Ladies & Gentlemen, warm Greetings from India. His Excellency Mr. Ahmet Director General OPCW, His Excellency Mr. Uri Rosenthal, Minster of Foreign Affairs, The Netherlands, Prof. Dr. Paul J. Crutzen, Nobel Laureate, Chemistry, Distinguished Dignitaries, Distinguished Speakers, Distinguished Delegates, Ladies and Gentleman.

It gives me immense pleasure to be here on the occasion of The OPCW Conference on International Cooperation and Chemical Safety and Security. Chemicals are an integral part of our life, no one can exist without chemicals. Development of a rich base of chemical industries to produce pesticides, insecticides, fertilizers, polymers, textiles, petroleum products & pharmaceuticals is very essential for the benefit of mankind. However it is very important to understand that no chemical is safe, there are only safe ways to use the chemicals. The peaceful use of chemicals has increased dramatically due to the economic growth and development in various sectors including industry, agriculture and transport. Consequently the probability of chemical hazards due to industrial accidents is also growing.

Under prevailing circumstances there is great possibility of chemical agents falling in the hands of terrorists. Terrorists may use a chemical in the form of a dirty bomb. Once released in the environment, chemical agent enters the body by inhalation or through eyes, skin, food, & water. Destructive potential of chemical agents is enormous. Instantaneous release of 50 tons of chlorine in a densely populated area would immediately kill 300 to 400 people and nearly 2000 will require observation in the hospital. Prolonged low-level exposure to various chemicals may result in chronic adverse effects on nervous and immune systems, and will cause impairment of reproductive function, cancer, and organ-specific damage.

A Chemical disaster scenario may arise due to an accident in the chemical industry. For example, the 1984 Bhopal Gas tragedy in India, which was the worst industrial disaster in human history. In addition to causing physical disabilities, it had a most horrendous psychological impact on the victims. Accidents may also occur during transportation of chemicals. In addition to dispersal of chemical agents through a dirty bomb, terrorists may sabotage a chemical plant, or gas pipelines. Overt use of chemical weapons in war is unlikely, because of OPCW efforts in this direction.

Whatever may be the scenario, chemical agents would cause tremendous devastation to human and other living beings, flora, fauna and environment including air, water & soil. It is a well know fact that prevention is better than cure, therefore preventive measures against chemical agents are of paramount importance. At the same time there is need of preparedness for prompt and effective response to chemical emergencies.

I would like to emphasize that zero tolerance to Chemical Accidents & Chemical Terrorism is the need of the hour. Therefore, stringent measures are required to be

taken for Chemical Safety and Security. Chemical Security, specifically that of dual use chemicals is extremely important. Dual use chemicals have important industrial applications and may also act as potential precursors of chemical warfare agents and are identified in schedule 2 & 3 of CWC list of chemicals. Therefore chemical safety & security needs to be tightened both at the national and international levels. This would only be possible with total commitment from the international community. National Authority CWC in India is playing a pivotal role in this direction.

India is deeply concerned about the safety & security of hazardous chemicals. We also attach great importance to preparedness for prompt and effective response, to minimize the impact of chemical emergencies. National Disaster Management Authority of India has formulated National Guidelines for prevention, mitigation, capacity development, preparedness & response for any chemical industrial as well as chemical terrorism disasters. The guidelines were prepared by a core group consisting of renowned experts from Defence Research & Development Organization, National Authority, Chemical Weapons Convention, leading national institutions and apex industrial associations.

Our guidelines focus on chemical plant installation and hazardous chemical storage in terms of good engineering practice for safety, accidents reporting, investigation and analysis, check lists and safety promotional activities. Guidelines also emphasize on security & surveillance measures for installation, manufacturing, storing and safe transportation of hazardous chemicals.

Based on these guidelines action plans including onsite & offsite plans have been prepared to handle any chemical emergency. Awareness campaigns, training of stakeholders and workshops on chemical disaster management are being conducted in various part of India. National Disaster Response Force is trained and equipped to handle chemical disasters. Mock drills are being carried out regularly to test the plans; any gaps noticed during mock drills are being rectified for further improvement. India has ensured full preparedness to handle any chemical emergency, if it happens at all.

India is fully committed to ensure safety and security against chemical terrorism. Prevention is further ensured by establishing mechanisms for assessing risk and vulnerability, a surveillance based environmental monitoring system, intelligence gathering, and a secure information dissemination system for chemical security, development of indicators for early warning systems and mechanisms for preventing illegal trafficking of hazardous waste.

For prompt and effective emergency medical response quick response medical teams consisting of doctors, chemists & paramedical staff have been trained. Specialized facilities consisting of decontamination room, CBRN filter fitted ward and disposal of contaminated biowaste like sputum, urine, stool & blood have been established in ear marked hospitals for management of chemical casualties.

To ensure prompt response in case of any chemical eventuality, a mechanism has been established to activate the emergency functionaries by sending alert signals to the first responders, rescue team, hazmat van, fire services, police, emergency medical services, and district authorities.

During Common Wealth Games 2010 India made foolproof, CBRN Security arrangements alongwith comprehensive preparedness for prompt & effective emergency response in case of any eventuality. For strict CBRN preventive measures, 1500 CBRN trained personnel of National Disaster Response Force were deployed at all venues. They were well equipped with CBRN protection, detection, decontamination & medical treatment facilities. A team from the UK visited National Disaster Management Authority of India and highly appreciated CBRN security arrangements for the Common Wealth Games 2010.

Effective prevention, mitigation, and preparedness for Chemical Disasters is not possible without international co-operation. Best practices in the world are to be adopted for industrial safety to avoid any accident. Chemical Security in national and international arenas is very important to deny access of hazardous chemicals to terrorists. OPCW has been playing an important role in this direction. OPCW can further strengthen interaction, sharing technology & information, cooperation and coordination amongst state parties. India is committed to international cooperation on chemical safety and security. In this regard India's National Authority is working in close association with the OPCW towards the common goal of a world free form the horrifying menace of chemical weapons. In achieving this goal, India has contributed significantly and some of our contributions are as follows:

In 1997 India ratified the CWC and declared its available facilities for inspection. India has totally fulfilled its commitment to the Safe and timely destruction of its stock piles of toxic chemicals.

Vertox (verification of toxic chemicals) lab at Defense Research & Development Establishment (DRDE), Gwalior India has achieved the status of a designated laboratory by the OPCW. Vertox lab has secured 'A' grade in six proficiency tests conducted by OPCW. Vertox laboratory has also contributed more than 200 mass spectra to the OPCW Central Analytical Data Base (OCAD). India offers vertox lab facilities as the international training centre for the analytical skills development programme of the OPCW. India has two other designated laboratories.

India has conducted a number of courses on inspections under CWC. In all these courses, participation was not only from India, Asian countries, but also from Europe, South America, Africa, Australia, USA and Russia.

Large contingent of experts from India participated in Assistex 3 organised by OPCW in Tunisia in October, 2010. The role of the Indian team was well appreciated. A variety of products developed by Defence Research & Development Organisation of India for detection, protection & decontamination of chemical warfare agents were show cased during the Assistex-3 programme 2010.

India has stored 100 sets of Individual Protective Equipments (NBC suits, Gas masks Canisters, Over boots, Gloves, etc), 2 Nos AP 2C. Which can be air lifted to the African states Parties during the chemical emergencies at the intimation by OPCW.

Assistance and protection course on chemical safety management was jointly conducted by NACWC New Delhi and OPCW at Defense Research & Development Establishment, Gwalior, India during March, 2011. Twenty participants from 17

African states parties participated in the course. The course was a great success and was graded as excellent by all participants.

These are just a few examples of India's close cooperation with OPCW.

I am pleased that OPCW has organised this conference and, I am confident that the conference will be very useful and beneficial for safety and security of chemical industries prevention, mitigation & preparedness to handle any eventuality of chemical terrorism. The conference will provide an appropriate platform to international chemical experts for deliberations, sharing knowledge and shall strengthen further chemical safety and security. In the end I would like to reiterate that to achieve the goal of Chemical Safety & Security, International Cooperation for exchange of information, experience, best practices, modern technology, equipments & skill between state parties through OPCW is the need of the hour.

H.E. Mrs Mara Marinaki, Managing Director for Global and Multilateral Issues, European External Action Service (EEAS)

Excellencies, Ladies and Gentlemen,
First and foremost, I would like to thank the Organization for the Prohibition of Chemical Weapons (OPCW) for organising this important conference to mark the celebration of the International Year of Chemistry. I thank, in particular Ahmet Üzümcü, for his invitation to Pierre Vimont, the EEAS Executive Secretary General, who unfortunately could not be present here today. This gave me personally a first - but certainly not last - opportunity to pay a visit to The Hague and establish my contact with the OPCW. I am therefore particularly delighted to be here today, among so many distinguished guests and experts, to represent the European Union.

The International Year of Chemistry represents a unique opportunity for the OPCW to build closer ties with the related global community of academia, industry and science. We support, in particular, this timely initiative because we are convinced it will contribute to raise the image of OPCW as an agency actively engaged in the promotion of international cooperation in peaceful uses of chemistry, enhancement of security at chemical plants, and support for prevention, preparedness and response against misuse of toxic chemicals. The European Union looks at OPCW as an ideal platform for an active cooperation in this important field.

The chemical industry continues to grow rapidly all over the world, which requires increased attention to the aspects of safety and security at chemical plants and of transportation of chemical agents. Furthermore, advances in science and technology progress exponentially, including in the area of convergence between chemistry and biology. The potential of recent discoveries in this field is not yet fully comprehensible. The threat of misuse of toxic chemicals for illegal purposes is not only present but it is growing. These developments add to the unpredictability of the future security landscape. The proliferation of dangerous chemicals and the possibility of them falling into the wrong hands are real threats that we should not underestimate since they relate directly to the implementation of the Convention and the work of OPCW. Those threats should be addressed promptly and should also be taken into due consideration in the ongoing process of reform of the Organization so that its future activities would be adequately re-directed.

EU Principles and strategic choices
Excellencies, Ladies and Gentlemen,
Proliferation of weapons of mass destruction was identified by European Heads of States and Governments in 2003 as the greatest threat for the people in the European Union and around the world. This assessment was at the heart of the adoption of the European Security Strategy in December that year. In parallel to the adoption of this Strategy, the European Council adopted a specific WMD Strategy, which can be seen as a set of instructions for the implementation of the European Security Strategy in the field of non-proliferation.

What are these strategic choices for EU action? Our choice is guided by the global nature of the threat coming from WMD. Acting bilaterally or in small groups is often not sufficient. Therefore, the European Union strongly believes that multilateral action and cooperation with the widest possible number of countries is the best response to meet these challenges and threats.

For the European Union, effective multilateralism in the area of WMD means two things:
(1) Widen the membership to multilateral non-proliferation and disarmament instruments;
(2) Enhance the efficiency of these instruments by ensuring that they are fully implemented at national level.

Against this background, the principle of effective multilateralism has been translated into very tangible EU initiatives in support of all the existing multilateral non-proliferation / disarmament instruments and of relevant international agencies, in addition of course to major support to the UN. The Chemical Weapons Convention, the only international treaty which bans an entire category of WMD, and the OPCW are cornerstones of the disarmament and non-proliferation regime recognised by the EU WMD Strategy.

The past and present
Since the European Union equipped itself with a WMD Strategy, the Council of the European Union has adopted four Decisions in support of the OPCW and is currently negotiating a fifth Decision, which should be finalised and adopted before the end of the year. In financial terms, we have allocated since 2005 around € 7 million to the OPCW to implement projects put forward by its Technical Secretariat, in particular in the areas of universalisation, national implementation and international cooperation. In general, the EU support for the OPCW has concentrated on providing assistance for CWC national implementation in developing countries, and the development of areas in which further progress should be made in the future, namely the fight against chemical terrorism and the prevention of chemical weapons from falling in the hands of terrorist and non-state actors, chemical safety and security. The European Union has supported the following Technical Secretariat activities: developing readiness of OPCW Members to further streamline the CWC verification system and national implementation; developing the OPCW Africa Programme; enhancing the OPCW role in the fight against WMD terrorism, including table-top exercises; raising the direct engagement of all the relevant stakeholders (mainly industry and scientific communities) in the CWC implementation, and in safety and security at chemical plants.

The future
The European Union stands ready to continue its support to the OPCW and to play a leading role in the discussions on the shaping of the future of the organisation. It is time now to focus on how the OPCW can further enhance its contribution to the global security. The European Union considers that for the purposes of international peace and security, it is of paramount importance to prevent toxic chemicals from being misused. Therefore, particular attention will have to be given in the future to the non-proliferation aspects of the CWC. Full implementation of all provisions of the Convention, as well as the strengthening of the verification regime and the fostering

of universal adherence to the Convention, together with assistance, protection and international cooperation, pave the way forward.
The European Union actively participated in the seminar organised in April 2011 by the Technical Secretariat on the OPCW's contribution to security and non-proliferation of chemical weapons. The Seminar, financed by the European Union, succeeded in broadening both the audience, which included all stakeholders, and the debate on the OPCW by covering major areas of relevance to the Organization, including national implementation, convergence between chemistry and biology, chemical terrorism and chemical safety and security. The Seminar contributed significantly to the understanding of the challenges that lie ahead; it provided new insights as to how to meet these obstacles; it outlined important issues and programs for its future consideration and activities. We are looking forward to continuing the process of structured feedback with all the relevant stakeholders on those issues.
Furthermore, the European Union welcomes the comprehensive report by the Advisory Panel established by the Director-General on the Future Priorities of the OPCW. The Panel reviewed the implementation of the Convention and made important recommendations for future OPCW priorities. We look forward to a broad discussion on the Panel's findings.

Excellencies, Ladies and Gentlemen,
in concluding my intervention, allow me to briefly touch upon five areas of action we consider crucial for the future from the EU's point of view.

Firstly, the European Union will continue to support the continued implementation and completion of chemical weapons destruction, which should remain a priority of the Convention. We encourage all possessor states to take every necessary measure to accelerate their destruction processes with a view of the 29 April 2012 deadline. The chemical weapons destruction should continue to be conducted in sincere and transparent fashion, and within the framework of the existing verification regime. In this context, the European Union considers it important that the relevant possessors regularly provide information about their plans for completing destruction, including progress against schedule, significant difficulties encountered, and measures taken to accelerate planned destruction.

The recent case of Libya should also make us reflect on the difficulties related to State in transition and their ability to fulfil commitments undertaken by previous regimes, particularly in a post-conflict scenario. While Libyan national authorities remain formally responsible for securing and destroying the remaining stockpile of chemical weapons and the OPCW is left with only a mandate to verify the destruction of stockpiles, who can effectively ensure their security in the meantime?

Secondly, we should continue to work towards achieving universality of the Chemical Weapons Convention. Great progress has already been accomplished; only seven States remain outside the Convention. We hope South Sudan will soon subscribe to all obligations previously undertook by Sudan. We appreciate that several of these States not-Parties have shown increased interest in the work of the OPCW but we also recognise that some of them have been less cooperative. We commend the Technical Secretariat's efforts in engaging on every possible occasion with all States not-Parties to the Convention and in bringing to their attention the importance of universal adherence to the CWC.

Thirdly, besides striving for universal adherence to the Chemical Weapons Convention, States Parties must make every effort to fully implement all the provisions of the CWC. The European Union considers of utmost importance the full implementation of the Convention at national level by all its Member States and urges all States Parties to put in place and enforce all the necessary legislative and administrative measures in accordance with Article VII.

Fourthly, we reiterate the need for the enhancement of the industry verification regime. We are of the view that the selection of Other Chemical Production Facilities to be inspected should be done on the basis of directing verification efforts towards those sites of greatest relevance to the object and purpose of the Convention, while at the same time striving to ensure an equitable geographic distribution.

Fifthly, we also attach great importance to the implementation of Article X. We emphasize the importance of national programs related to protective purposes and the importance of capacity building on prevention and preparedness against misuse of toxic chemicals. Along the same lines, we strongly subscribe to the need for international cooperation as enshrined in Article XI of the Convention. Programs which promote international cooperation in peaceful use of chemistry, strengthen national controls of toxic chemicals, and enhance security and safety of chemical industry and transportation of chemical agents, must be invested in and supported by all of us.

I thank you all for your attention and wish you a successful continuation of this Conference, which I am sure will help strengthening further our cooperation.

Mr Zhou Zhuye, Vice Chairman, China Petroleum and Chemical Industry Federation (CPCIF), China

Your Excellency Director-General Mr. Üzümcü,
Ladies and Gentlemen,
I am greatly honored to be invited to take part in the Conference on International Cooperation and Chemical Safety and Security, which fully expresses the purpose of international cooperation in bringing achievements made in chemical industry into the benefit of humanity that is advocated by the Chemical Weapons Convention. I would like to express my appreciation to the OPCW technical secretariat and all parties involved which helped to make this conference possible.

International cooperation on chemical industry is one of the pivotal pillars of the Convention. As a developing country, China has always been expecting that OPCW actively promote international cooperation in the field of chemical industry. By doing so, all State Parties could share the development achievements in chemical industry, and this is beneficial to developing countries in perfecting their chemical industry and improving their economy. As a result of that, the chemical achievements could be enjoyed by every ordinary people. Therefore, we support this conference and sincerely wish it a full success.

Today I would like to take this opportunity to give a brief presentation about the secured management of China's petroleum and chemical industry and would also like to probe into relevant issues with you concerning sensible and sustainable development of chemical industry.

Petroleum and chemical industry is a pillar industry which provides energy and raw materials for China's national economy. Through decades of years of development, it now consists of 50 major business lines of oil and gas exploitation, refinery, basic chemical raw materials, fertilizer, pesticides, special chemicals, rubber products, etc., which is a integrated industry system covering all the fields in the national economy. Overcoming the impact of the international financial crisis and severe natural disasters, China achieved notable achievements in petroleum and chemical industries from 2005 to 2010. The growth rate of the gross output value of the industry reached 21.3%, and this period witnessed greatest investment, quickest speed and strongest intensity in Chinese history.

China's economic aggregate in petroleum and chemical industry has developed by leaps and bounds, and with their rapid growth, production safety has always been put first among all work. Efforts have been made in the practice of "responsible care" which gained remarkable achievements.

Firstly, safety record has been persistently improving and there has been a remarkable progress in production safety**.** China's development of petroleum and chemical industry has always been integrated, intensified and in large scale. China has constructed and put into production a batch of technically advanced and rationally

planned projects of refinery-chemical integrated plants, coal-based chemical plants, ultra-large oil depots, etc. and their capacity has gradually been increased. In the mean time, a batch of backward production facilities has been closed down. With the ceaseless improvement of the technical facilities and the logical planning to turn them into industrial parks, they are remarkably more on the side of intrinsic safety. The total amount of accidents caused by dangerous chemicals has been gradually cut down and so have been their casualties. Consequently, major accidents and main safety targets have notably improved.

Secondly, the promotion of “responsible care” has been increased and its impact has been increasingly enhanced. “Responsible care” is a concept which has been vigorously introduced in chemical industry in the world, and it is also the commitment of the petroleum and chemical enterprises to consistently improve health, safety, environment and quality. This concept expresses the intention of putting people’s interest first and scientific development. With the support from the government departments, China Petroleum and Chemical Industry Federation attaches great importance to and promotes “responsible care” in a big way. It strengthens “responsible care” training, establishes trade standard of “responsible care”, encourages Chinese enterprises to communicate and cooperate with their foreign counterpart, and in recent years, this concept is accepted by more and more enterprises and has become popular. China’s effort in this respect has been recognized by domestic enterprises in petroleum and chemistry, and has also been praised in the world, and of which the international chemical federation has a high opinion.

Colleagues, ladies and Gentlemen,
Petroleum and chemical industry is an industry concerning energy and raw materials, and it is also an industry which involves a high energy consumption and emission, and faces great risks. China’s strategic target in the future is to make the petroleum and chemical industry a sustainable one which is resource-efficient, environment-friendly and intrinsically safe. And we will focus on the organization and implementation of “responsible care” in the industry. We have taken the following measures to this end:

Firstly, we take the “International Chemical Year” as an opportunity for the promotion and social cognition of the concept.

The year 2011 is of significance. It is not only the first year of China's twelfth Five-year Plan for the development of national economy and society, but also the "International Chemical Year" proposed by the UN. To respond to this proposal, China Petroleum and Chemical Industry Federation actively participates in the series of activities of “International Chemical Year” held by international community. Also, according to the practical conditions in China, the Association organised a series of major activities called “International Chemical Year in China”, inviting institutions of higher learning, scientific research institutes, enterprises and public institutions to participate. Activities such as science and technology exchange, experiments and design competitions and popularization of science are to be properly scheduled, so as to introduce and popularize the great achievement gained in petroleum and chemical industry in China, guide enterprises in the implementation of "responsible care", strengthen resource saving management, carry out green activities of chemical industry, help all the communities have a better understanding about chemistry, get to

know it and love it, promote the social image of Chinese enterprises in chemical industry and facilitate a healthy and fast development of petroleum and chemical industry in China.

Secondly, strengthen safety research, and international exchange and cooperation, and promote production safety.

China has issued and amended Regulations on Safe Management of Dangerous Chemicals, and formulated planning for supervision on the safety and environmental protection of dangerous chemicals. In the next five years, through strengthening system construction and safety management, increasing production safety investment, improving process technology and adopting advanced equipment for production safety, the whole industry will enhance production safety, increase security capability, and bring down safety and environmental risks. Meanwhile, the industry actively conducts research on production safety of dangerous chemicals, facilitates international exchange and cooperation, introduces advanced ideas on production safety from overseas enterprises, promotes the execution of Globally Harmonized System of Classification and Labeling of Chemicals（GHS）, strengthens the guidance and training of production safety and GHS execution, popularizes the special equipment and technology for safe production, and strengthens intrinsic safety of enterprises.

Thirdly, comprehensively advance "responsible care" concept and promote the scientific development of chemical industry and improve international impact.
Enterprises should be encouraged to fulfil their social responsibility by taking "responsible care" as the main approach, which can be integrated in the enterprises' general development plan and objectives. This concept should go through the whole process of production, management, R&D, marketing and service, so as to provide quality products, improve staff health and safety, and promote the enterprises impact home and abroad. Based on the practical conditions of the petroleum and chemical industry in China, we will draw advanced international experience, combine "responsible care" with GHS, strive to build a “responsible care" system with Chinese characteristics, formulate its standards, assessment criteria and evaluation methodology, explore the evaluation authentication of "responsible care", facilitate a healthy, standardized and orderly development of "responsible care". In October, we will hold the fourth China "Responsible Care" Promoting Conference with the theme of "Green Chemical Industry, Responsibility and Contribution," which elaborates chemistry’s contribution to human life, social development, environmental protection, production safety and occupational health, and further facilitates petroleum and chemical industry to better fulfil its social responsibilities, such as health, safety and environmental protection.

Colleagues, ladies and gentlemen,
China is willing to continue its exchange and cooperation with OPCW and all State Parties in the field of chemical industry, share experiences and tackle challenges together. We will make our contributions to the full implementation of the Convention and make chemical industry benefit humanity. Finally, once again, I wish a great success of this conference.

Thank you.

Dr. Nancy B. Jackson, President, American Chemical Society (ACS)

The American Chemical Society is the world's largest professional scientific society with 163,000 members, 24,000 of them outside the United States. As President of ACS during the 2011 International Year of Chemistry, I have had the extraordinary privilege of meeting chemical scientists and engineers throughout the world, hearing about their science, finding out their concerns, and learning about their dreams.
If there is one unifying theme, it is that chemists are worried about the future and would very much like to do what they can to serve humanity and make the human technological enterprise sustainable.

As I have been reminded over and over again in my travels for IYC, the world is predicted to reach 9.2 billion people by the year 2050. The question of how we will feed everyone, provide enough clean water, medicine and energy, and how we will do it in a way that will allow the next generation to also thrive – meaning how we will do sustainably - is a question that at present, has no answer.

Chemistry plays such a central role in addressing these challenges we face. In fact, I believe the chemical enterprise is one of the essential keys to sustainability.

For the global challenge of clean water, chemists can contribute by, for example, developing new membranes and membrane systems for desalination or through devising new even cheaper ways of providing chlorine for on-site purification without requiring large tanks of chlorine to be stored or transported long distances. Chemists have already made huge strides in this effort. Have you seen what chemists at Proctor and Gamble have developed? They have little packets of water purifier which they call Pur. You can pour the Pur powder into 10 liters of water and in 15 minutes you can see muddy contaminated river water turn into clean, clear, drinkable water. In the packets there is chlorine to kill bacteria, parasites and viruses and flocculants to allow the small dirt particles to coagulate and settle. Proctor and Gamble has distributed billions of Pur packets on a not-for-profit basis since 2004 through P&G's philanthropic effort called the Children's Safe Drinking Water Program. This has saved the lives of countless children.

And energy. Clearly we need to develop and rely on renewable energy. For long term sustainability, there really isn't any other option. Scientists will tell you that there is plenty of sunlight and wind and tidal wave energy to provide all 9 billion of us with what we need. But then there is that small problem regarding the intermittent and often remote nature of those renewable energy sources and the steady need we humans have for energy. How do we store that energy for when we need it? Energy storage is one of our biggest challenges to sustainable energy. Batteries use chemical means to store energy. But it is looking like batteries are not enough for our storage challenges. However, there is no reason why we can't mimic nature. How did nature store solar energy over the years? In hydrocarbons – petroleum. There is no more efficient storage of energy than a gallon of gasoline. Volume for volume, kilogram for kilogram, liquid fuel is the most compact and efficient means for energy

storage. And we chemical types know how to make liquid fuels from just about anything - carbon dioxide, plants, trash, waste. We just need some support, some commitment and some time to innovate the engineering.
And food. We need more efficient crops we need ways of enriching the soil without causing environmentally damaging run off. We need ways to control pests and prevent soil erosion. Chemistry has much to contribute to feeding the world, from the seeds in the ground to the packaging in which our food arrives at our table.

Health and medicine. Whether it is prevention – through clean water – or pharmaceuticals to treat disease, chemistry has an enormous role to play. Already many pharmaceutical companies are thinking sustainably. The pharmaceutical roundtable of the American Chemical Society's Green Chemistry Institute has been very active in addressing sustainable, green chemistry syntheses and processes. Many of the American Chemical Society's green chemistry awards have gone to the pharmaceutical industry for developing green synthesis techniques for their medicines.

These challenges we face as the world swells to over 9 billion humans are enormous. They are bigger than one discipline and cross all national boundaries.

I have heard the call over and over again this year: We, as chemical scientists and engineers, must join with all scientists across throughout the globe and work together to address our urgent needs for water, food, energy and sustainability.

Working globally to solve a problem is not without precedence.
In fact, the Chemical Weapons Convention is a successful example of when the world came together and did something that was good and life-affirming.

There are also examples where scientists have come together for the good of the world. The ozone hole discovered above Antarctica brought scientists together to study what was happening, identify the cause, and then recommend a remedy. The vaccination and eradication of smallpox is another example.

The United Nations International Panel on Climate Change – IPCC – is a living example where scientists have come together, across national borders and scientific disciplines and worked together to understand a complex and global problem. Their work brought unquestioning certainty to the profound climate disruption we can expect to see if we continue to pour greenhouse gases into our atmosphere.

The time has come for scientists to work closely together again. But of course, we scientists and engineers can't do it alone. The political infrastructure and civil society need to play their part. Scientists may have discovered the smallpox vaccination, but governments, industry, and civil society plaid crucial roles in smallpox's eradication. Scientists may have discovered the ozone hole and developed innovative materials to replace the fluorochlorocarbons responsible for creating the ozone hole, but government, civil society and industry were instrumental in making the necessary changes.

The OPCW is an organization that promotes the international cooperation in the pursuit of chemistry for peaceful purposes. (Clearly an organization after my own

heart.) Although OPCW's mandate may be limited to the prevention of the use of chemicals in war, those bodies involved with OPCW – governments, civil societies, and industry – would benefit from extending their vision of chemistry to actively promote the pursuit of chemistry through international collaboration to address the global challenges looming ahead of us. Because it is only if we work together, peacefully, with the best of our scientific and engineering capabilities, that we will be able to use the transforming power of chemistry to guide our world towards a sustainable and peaceful path for our future and our children's future.

Thank you.

Prof. Berhanu Abegaz, Executive Director, African Academy of Sciences (AAS)

Chemical Sciences in Africa – Historical Insights and Future Prospects

Berhanu M. Abegaz
African Academy of Sciences
Nairobi, Kenya
b.abegaz@aasciences.org

The OPCW Conference on International Cooperation and Chemical Safety and Security, The Hague, The Netherlands, 12 and 13 September 2011

Egypt– the Cradle of Civilization

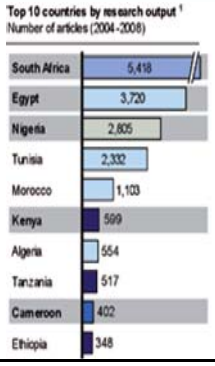
Archaeological evidence dating 3500 years ago

Ebers papyrus - 110 pages and other drawings

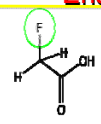
Mining and processing of gold in Ancient Egypt, and evidence for various metallurgical processes

Top 10 countries by research output

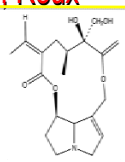
South Africa
Egypt
Nigeria
Tunisia
Morocco
Kenya
Algeria
Tanzania
Cameroon
Ethiopia



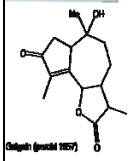
Theiler, du Toit, Marais, Warren, Enslin, Roux

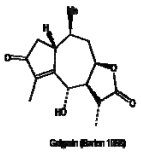


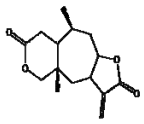
Fluoroacetin acid
Marais 1944



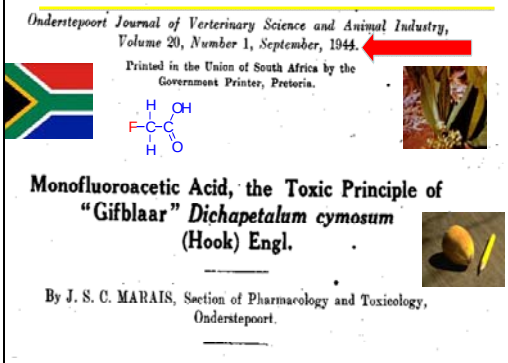
Warren 1945







Mulholland D, Drewes, S. 2004 Phytochemistry 65, 769-782



Onderstepoort Journal of Veterinary Science and Animal Industry, Volume 20, Number 1, September, 1944.

Printed in the Union of South Africa by the Government Printer, Pretoria.

Monofluoroacetic Acid, the Toxic Principle of "Gifblaar" *Dichapetalum cymosum* (Hook) Engl.

By J. S. C. MARAIS, Section of Pharmacology and Toxicology, Onderstepoort.

Chemistry Pioneers from Ghana

Torto (PHD 1947, London) was the first African to become a member of staff of the University College of the Gold Coast when it was founded in 1948 (now University of Ghana),

The Chemistry building in UG now named after him

F. G. Torto
Died in in 1983

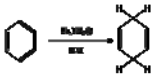
FGT started pioneering research to find metabolites that may provide cure for sickle cell anemia

Chemistry Pioneers from Ghana

J.A.K Quartey

1927-2007

A. J. Birch (1915-1995)



D. A. H. Taylor
1927 - 2008

Bevan C.W. L.
The founding
HOD at Ibadan

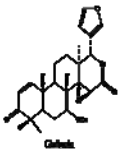
Donald E Ekong 1974

Bevan, Taylor, Akinsanya, Ekong, Ogan, Powell, Nwaji, Arene, Eshiet, Adesogan, Olagbemi, Okogun, Sofowora

Hundreds of natural products: West African Timbers. Part II*; Part III**

*Akinsanya A, Bevan CWL, Hirst J. 1959. *J Chem. Soc.* 2679-81

**Akinsanya A, Bevan CWL, Hirst J, Halsali TG, Taylor DAH. 1960. *J Chem. Soc.* 3827-29



[1959] *Akinsanya, Bevan, and Hirst.* 2679

537. *West African Timbers. Part II.* Heartwood Constituents of the Genus* Pterocarpus.

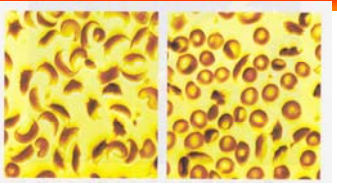
By A. Akinsanya, C. W. L. Bevan, and J. Hirst.

Four West African species, *Pterocarpus osun, P. erinaceus, P. mildbraedii, and P. santalinoides*, have been examined. Homopterocarpin, pterocarpin, angolensin, santal, and acetyldesoxic acid were isolated, but not pterostilbene. *P. santalinoides and P. mildbraedii*, which show very little resistance to decay, gave no phenolic compounds. The phytochemical significance of the results is discussed.

Bevan CWL, Ekong DEU, Taylor DAH. 1965. *Nature*, **1965**, 206, 1323-1325.

*NICOSAN – an a*nti-sickling phytomedicine developed in Nigeria

Charles Wambebe



Control Nicosan 0.5 mg/ml

Patented in Nigeria, USA, England, India and 42 other countries in Europe, Africa, West Indies

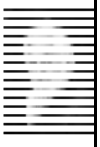
NICOSAN

Pioneers from East Africa

Ntamila

Aklilu Lemma
1934-1997

Thomas Odhiambo
1931-2003



Carl Djerassi

W. J. Horton

Koji Nakanishi

Pioneers from Cameroon

Zaccharia Fomum – (deceased) synthetic chemist later phytochemist

Ayafor (deceased)

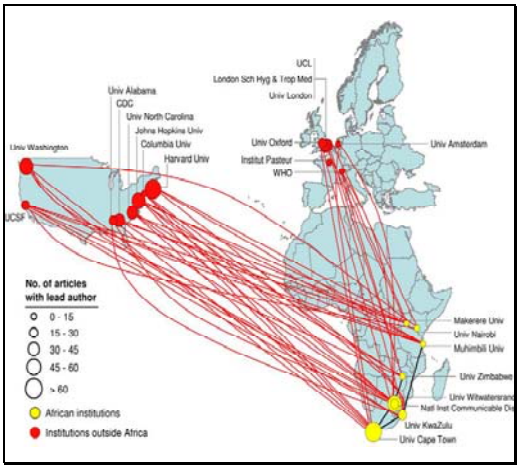
B.L. Sondengam – Pioneer Phytochemist – student of D. Ekong

As we celebrate the IYC

- We should critically review the past
- Pose and examine where we are
- Decide where we want to go
- Is Chemistry a sustainability science?

Key issues for the future in Africa

- Promote intra-African collaboration

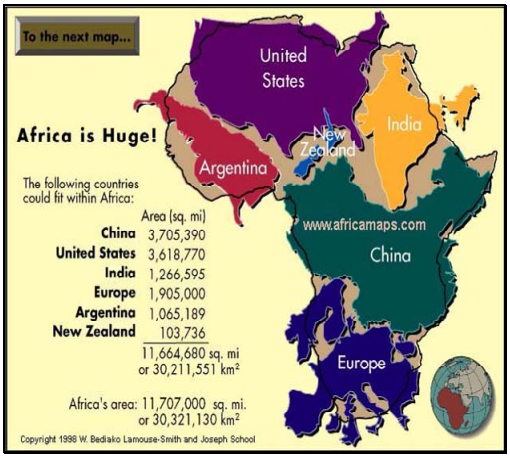


Key issues for the future in Africa

- Promote intra-African collaboration
- Engage in high quality science with high relevance
  - Speak out, convince governments to put more money into science.
  - Revisit curricula to address MDGs
- Be innovative!
  - Recognize the plurality of knowledge systems

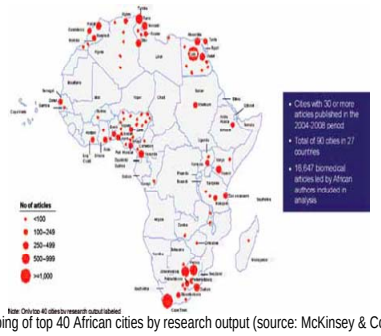
Key issues for the future in Africa

- Address the love-hate relationship of chemistry
  - Embrace "green" approaches
- Move into trans-disciplinary science
- Find ways of engaging the youth in science and stabilizing them in Africa
  - Africa has a population of ca 900 million and 71% are under the age of 25



THANK YOU

As we celebrate the IYC



Mapping of top 40 African cities by research output (source: McKinsey & Co.)

Prof. David Black, Secretary-General, International Union of Pure and Applied Chemistry (IUPAC)

Background and Concept

The concept of IYC 2011 started with the recognition by IUPAC that a number of scientific disciplines have achieved significant benefits from securing designation by the United Nations of an international year pertaining to their field.

The idea of holding a year of chemistry was first discussed in 2006, during the April meeting of the IUPAC Executive Committee.

- IUPAC Endorsement – August 2007
- UNESCO Support – April 2008
- UN Declaration – December 2008

Chemistry – our life, our future
www.chemistry2011.org

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International Year of Chemistry 2011

At its General Assembly in 2007 IUPAC unanimously approved a resolution in favour of the proclamation of 2011 as the Year of Chemistry.

The year 2011 marks the one-hundredth anniversary of the Nobel Prize in Chemistry awarded to Marie Sklodowska Curie, recognizing her discovery of the elements radium and polonium.

It is also the one-hundredth anniversary of the famous Solvay conference in Brussels, which led to the formation of IUPAC in 1919.

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Chemistry – our life, our future
www.chemistry2011.org

International Year of Chemistry 2011

On 30 December 2008 - The 63rd General Assembly of the United Nations has adopted a resolution proclaiming 2011 as International Year of Chemistry, placing UNESCO and the International Union of Pure and Applied Chemistry (IUPAC) at the helm of the event.

IYC 2011
International Year of CHEMISTRY

Chemistry – our life, our future
www.chemistry2011.org

Objectives of the International Year of Chemistry

- Increase the public appreciation and understanding of chemistry in meeting world needs
- Encourage interest of young people in chemistry
- Generate enthusiasm for the creative future of chemistry
- Celebrate the role of women in chemistry and major historical events in chemistry, including the centenary of Marie Sklodowska Curie's Nobel Prize, recognizing her discovery of the elements radium and polonium.

Chemistry – our life, our future
www.chemistry2011.org

IYC 2011

All known matter – gas, liquid and solid – is composed of the chemical elements or of compounds made from those elements. Humankind's understanding of the material nature of our world is grounded in our knowledge of chemistry. Indeed all living processes are controlled by chemical reactions.

The International Union of Pure and Applied Chemistry (IUPAC) and UNESCO strongly believe that *it is time to celebrate the achievements of chemistry and its contributions to the well-being of humankind*.

Chemistry – our life, our future
www.chemistry2011.org

IYC 2011

Molecular transformations are basic to production of foodstuffs, medicines, fuels and materials – essentially all manufactured and extracted products. We will rely on this science to maintain a sustainable, wholesome environment for all the earth.

Chemistry is the key to sustainable development.

*IYC 2011 is a unique opportunity for **everyone** to celebrate the central contributions of chemistry.*

Chemistry – our life, our future
www.chemistry2011.org

United Nations Millennium Goals

Goal 1: ***Eradicate extreme poverty and hunger***
Goal 2: ***Achieve universal primary education***
Goal 3: ***Promote gender equality and empower women***
Goal 4: ***Reduce child mortality***
Goal 5: ***Improve maternal health***
Goal 6: ***Combat HIV/AIDS, malaria and other diseases***
Goal 7: ***Ensure environmental sustainability***
Goal 8: ***Develop a Global Partnership for Development***

CHEMISTRY is vital to achieving these goals!

Chemistry – our life, our future
www.chemistry2011.org

Global Partners

IUPAC and UNESCO – *Organizing Partners*

- United Nations
- Federations of Chemical Societies
  FACS, FASC, FLAQ, EuCheMS
- National Chemical Societies
- **Industry**
- NGOs
- Educational and Research Institutions
- Individuals

Chemistry – our life, our future
www.chemistry2011.org

Making an Impact

- highlight the nature, beauty and relevance –both economic and environmental– of chemistry to the modern world
- use the media effectively to enhance the profile of chemistry, as viewed by pupils, the general population and politicians
- work together to achieve these goals

IYC is a chance that will not come again for some time . . .

Chemistry – our life, our future
www.chemistry2011.org

Cornerstone Events

Opening Ceremony
under the aegis of the UN, UNESCO, and IUPAC
Jan 27-28, 2011 – Paris, France
theme - Chemistry and the UN Millennium Goals

IUPAC World Congress - "Chemistry Bridging Innovation among the Americas and the World"
Jul 30 - Aug 7, 2011 – San Juan, Puerto Rico

Closing Event - under the patronage of the Chemical and Pharmaceutical Industry
Dec 1, 2011 – Brussels, Belgium

Global Water Experiment

- Students around the world (elementary, secondary and/or tertiary) measure, collect samples or data, e.g., water samples for isotopic composition and pH, send to a collective database
- Topic related to IYC themes – chemistry and sustainability ; likely focus on water supplies

Activities – some examples

- African Conference - Science, education and capacity building challenges related to SAICM (UN's Strategic Approach to International Chemicals Management) implementation.
- Numerous national proposals from commemorative postage stamps, open days and specific celebrations, for example, for Madame Curie at the Sorbonne/ L'Oreal award for women in science
- Celebrating stories of chemistry

Activities – more examples

- Re-energising existing national/regional outreach activities
- Social networking (facebook, YouTube) on chemistry-related questions
- Video clips (existing and new) to promote the contributions of chemistry
- Providing real expertise through an "ask a scientist" program
- Educational resources – chemistry board game, Australian chemistry quiz, videos of famous chemists, science fair participants

Other Key Events

Pacifichem 2010 – Pre-inaugural reception publicizing the International Year for Pacific Rim participants
Dec 15-20, 2010 – Honolulu, Hawaii, USA

Chemistry – the key to Africa's future
Congress of the Federation of African Societies of Chemistry (FASC)
Jan 16-21, 2011 – Johannesburg, South Africa

CHEMRAWN - Symposium on Biofuels
Sep 2011 *(date tba)* – Kuala Lumpur, Malaysia

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Conversation between Chemistry and Society about the future shape of chemistry for sustainability set in the context of chemistry's achievements

SESSION 2: INTERNATIONAL COOPERATION

Dr. David Faraday, Lead Team, United Kingdom

International Co-operation and the CWC

Dr. David Faraday
BSc PhD CEng MIChemE FHEA
Director, Evolve Leadteam Ltd.

Introduction

- The CWC is an excellent example of International Co-operation in itself.
- Specifically, Article XI promotes and encourages the peaceful use of chemistry amongst Members State.

OPCW International Co-operation

- Conference Support Programme
- Programme for Support of Research Projects
- Laboratory Assistance Programme
- Equipment Exchange Programme
- Internship Support Programme
- Associate Programme
- Analytical Skills Development Programme
- Information Service
- Programme for Africa
- Industry Outreach

OPCW International Co-operation

- **Conference Support Programme**
- Programme for Support of Research Projects
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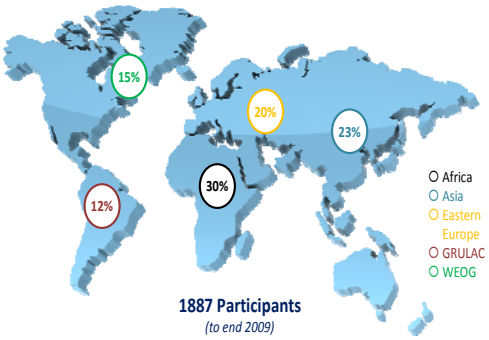
Conference Support Programme



1887 Participants
(to end 2009)

Conference Support Programme

- Started in 1997
- Largest programme by participation
- Areas of particular interest *(not exclusive)*:
  - ✓ Natural products chemistry;
  - ✓ Analytical chemistry;
  - ✓ Risk assessment and management of toxic chemicals;
  - ✓ Environmental chemistry and toxicology; and,
  - ✓ Prophylaxis and treatment of intoxications.

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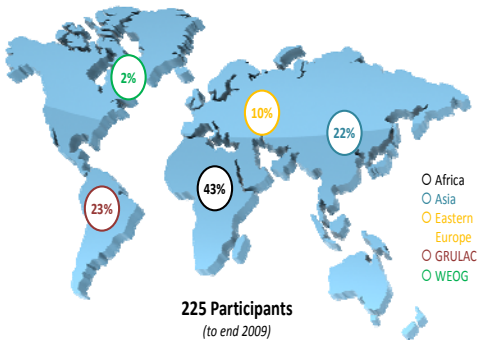
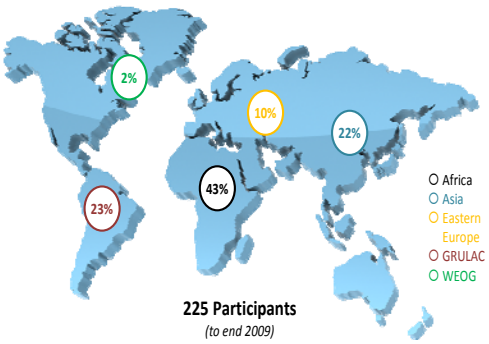
Analytical Skills Development Programme



225 Participants
(to end 2009)

Analytical Skills Development Programme



225 Participants
(to end 2009)

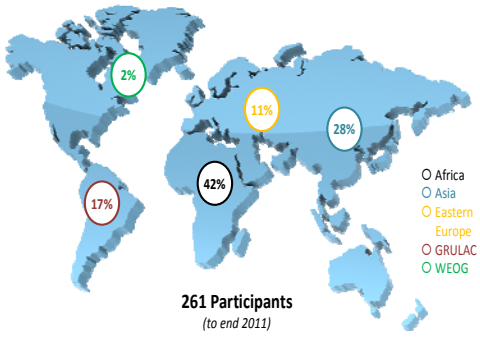
Analytical Skills Development Programme

- Started 2003
- Courses: 4-days to two weeks
- GC and GC-MS
- Developing specific national capability in support of the Convention

OPCW International Co-operation

- Conference Support Programme
- Programme for Support of Research Projects
- Laboratory Assistance Programme
- Equipment Exchange Programme
- Internship Support Programme
- **Associate Programme**
- Analytical Skills Development Programme
- Information Service
- Programme for Africa
- Industry Outreach

Associate Programme



261 Participants
(to end 2011)

Associate Programme

- Started 2000
- 10 Weeks Intensive Programme
  - ✓ 4 weeks of activities and projects at the OPCW
  - ✓ 3 Week Industrial Placement
  - ✓ 3 Week University-based Training
- Intensive, in-depth and covering many aspects of good practice in the Chemical Industry
- Innovative Chemical Business Simulation

Associate Programme
Chemical Business Simulation







- Complete chemical manufacturing process operated against production targets - 3 shifts per day.
- A process development laboratory – live projects requiring samples from the process plant.
- A full 'business audit'.
- Business planning and scheduling, quality, environmental and H&S management.
- Dealing with customers, H&S inspectors, the media and the OPCW!

Article XI Workshop: November 2010

- Over 130 participants from more than 60 member states
- Discussions were based around the following themes:
  - ✓ National capacity building;
  - ✓ Promoting exchange and networking; and,
  - ✓ Facilitating full exchange.
- Almost 50 potential concrete measures, across six areas:
  - ✓ Regional Initiatives;
  - ✓ National Authority Initiatives;
  - ✓ Working with other Organisations;
  - ✓ Supporting and Developing Existing Programmes;
  - ✓ Networking and Promotional Initiatives; and,
  - ✓ Strategic Planning and Trade Issues.

Article XI Workshop: November 2010

- Notable initiatives include:
  - ✓ The creation of regional OPCW offices with designated ICB staff;
  - ✓ The training and licensing of customs officials;
  - ✓ The creation of 'centres of excellence in chemistry';
  - ✓ The development of a distance learning course on the safe management of chemicals;
  - ✓ Establishing and database of expertise; and,
  - ✓ Establishing a committee to explore options for reassurance and a transparency mechanism.

The Future

- Understanding, and helping to meet, the needs of nations in economic transition.
- How to influence on-going and anticipated developments in the practice of chemical manufacturing in the developed world's chemical industry.
- Promoting leadership of, and helping ensure leadership in, the on-going peaceful use of chemistry across the globe.
- Understanding on-going, and anticipated, developments in international quality standards, management systems and processes, and industrial standards and practice.
- Understanding the role of chemistry with respect to global environmental issues

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The Future

- Influencing the chemistry professionals of the future
- Promoting, representing and upholding the needs and interests of the chemical industry – regionally and globally – to relevant stakeholders.
- Raising the general public's awareness and understanding of the peaceful role played by chemistry in the development of the world's economy.
- Anticipating and accommodating future developments in chemical knowledge, practice and application.
- Facilitating the ultimate removal of all barriers to free-trade in chemical materials, equipment and knowledge.
- The Organisation for the Prohibition of Chemical Weapons becomes the Organisation for the Promotion of Chemical Wisdom!

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Thank You

Prof. Ameenah Gurib-Fakim, Managing Director, Centre for Phytotherapy Research (CEPHYR), Mauritius

Women in Chemistry – Women in Science

Reflections on Progress and Prospects for Africa's Future

Ameenah Gurib-Fakim, PhD
Managing Director,
Centre for Phytotherapy Research,
Ebene, Mauritius
afakim@cephyr-recherche.com

Outline

- Women in Chemistry and Science: core issues
- Africa in the Global Context
- Strengthening Women's Roles in Science
- Some Reflections
- Way Forward

Women in Chemistry and Science: core issues

- Marie Curie
  - Polish-French chemist-physicist
  - Only female winner of two Nobel Prizes
- Barbara McClintock
  - 1983 Nobel Laureate, Physiology or Medicine
  - Cytogeneticist
  - Theory of jumping genes in maize
- Rosalind Franklin
  - Her work on X-ray diffraction was used to formulate Francis Crick and Watson's hypothesis on structure of DNA which won them the Nobel Prize

Core issues

- Pervasive "gender gap"
- Sexism, science as a male-dominated profession
- Insecure nature of science disadvantages women
  - Career growth
  - Family responsibilities
- In UK over 70 percent of women science graduates opt for non-science careers
- World's leading society, The Royal Society, only began accepting female members in 1945

Africa in the Global Context

- **Africa is world's fastest-growing continent**
- **Population trends**
  - 7 billion by October 2011, not Spring 2012
  - May still be rising in 2100, past 10 billion
- **Sub-Saharan Africa**
  - 856 million
  - One-fifth of Asia, but could be three quarters of the size of Asia in 2100
  - Little more than Europe, could be 3 times larger by 2050

Source:http://www.economist.com/blogs/dailychart/2011/05/world_population_projections

Africa Today and Tomorrow

Today

- $1.6 trillion – Africa's collective GDP in 2008, roughly equal to Brazil or Russia
- $860 billion, Africa's combined consumer spending in 2008
- 316 million of new mobile phone subscribers signed up in Africa since 2000
- 20 the number of African companies with revenues of at least $3 billion

Tomorrow

- $2.6 trillion, Africa's collective GDP in 2020
- $1.4 trillion, Africa's combined spending in 2020
- 1.1 billion the number of Africans of working age in 2040
- 128 million African households with discretionary income in 2020
- 50 percent the portion of Africans living in cities by 2030

Source: McKinsey Global Institute, Lions on the Move: The progress and potential of African Economies, June 2010, downloadable at www.mckinsey.com/mgi

Strengthening Women's Role in Science

Tackling humanity's most pressing problems requires global, multidisciplinary expertise:
-**Biodiversity**
-Climate change
-**Population and health**
-Security (energy, food, nutrition and water)

Science needs to find solutions that are **economically viable**, **socially relevant** and **environmentally benign**, and for all of these, the will from decision makers is needed

A critical focus area is to increase the participation of women in science, and in gender terms, make **women** as equal partners in **promoting science-based sustainable development**

Science and Indigenous Knowledge

- **Africa**: fast urbanising and suffering erosion of indigenous knowledge
- Research increasingly focusing on the interface between indigenous knowledge and other knowledge systems such as science to generate a third way that would be mutually beneficial and supportive of sustainable development
- Interface between science and indigenous knowledge could help unleash potential, and add value to existing efforts that are addressing core issues like **Biodiversity Conservation**, and **Adaptation** and **Mitigation** of **Climate Change**
- This could strengthen efforts in **key security-related issues** such as energy, food and health, nutrition and water among others

Some Reflections

- **UNESCO**: Africa has a pernicious gender gap in science with only 33% researchers being women
- Yet Africa is largely agrarian with 48% female farmers
- Only 69% receive visit from agricultural agents compared to 97% male farmers
- World Bank's Development Report 2012, 'Gender, Equality and Development' argues that '*gender equality must become a core development goal in itself*'.
- It must be recognised that progress is being made but needs to be expanded and deepened

Personal Research Area

•**Overarching objectives**: Promote sustainable use and management of biodiversity, especially herbal and medicinal plants; indigenous/endemic to the Indian Ocean region

•Specifically, this has involved multidisciplinary team and has led to:

-**Documenting traditional practices** with a view to creating the first ever database of medicinal plants and their uses for Mauritius and the islands of the Indian Ocean;

-**Validating data from a phytochemical perspective** with a view to developing cheaper alternatives to allopathic medicines as well as creating opportunities for sustainable cultivation and utilisation of medicinal plants;

-**Disseminating information**, including production of an African Herbal Pharmacopoeia with a focus on pharmacology, phytochemistry and toxicology' and,

- **Educating the younger generations** on the value and efficacy of local medicinal plants, with a view to raising awareness and fostering a science-based culture of conservation.

Challenges

•Deep scepticism about the value of herbal and traditional medicine and the low value assigned to indigenous knowledge in scientific circles

•Multidisciplinarity of this research theme: Working at the interface of traditional knowledge and science as two knowledge systems that should feed into each other

•Having assessed the power of making a difference with applied science as opposed to basic sciences in a developing state university

•With gender being a cross-cutting theme for me from 1 to 3 has not been easy in the initial days. However learning to believe in yourself and in what one does IS key

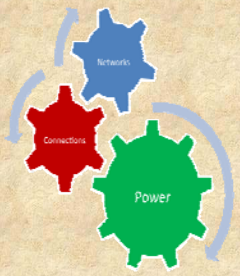
Girls ace Google's Science Fair

- **First Science Fair, 2011**
  - 91 countries, 10,000 students
  - 60 semi-finalists, 15 finalists
- **Three American girls won top prizes**
  - Ages 17-18, 15-16 and 13-14
- **Nobel Laureates, tech visionaries and household names were judges**
- **First prize, grand prize winner: Shree Bose**
  - Experiment provides proof that AMP-activated protein enzyme (AMPK) plays a role in developing resistance to cisplatin, a common drug used to fight ovarian cancer
- **Second prize: Naomi Shah**
  - Air pollution and asthma
- **Third prize: Lauren Hodge**
  - Research on limiting exposure to cancer-causing Heterocyclic amines (HCAs) found in grilled chicken.

http://www.google.com/events/sciencefair

Connectedness as power

- **Carol Gilligan, Psychologist**
  - Conducted seminal research about differences between the genders in their modes of thinking
- **Men**
  - Tend to see the world as made up of hierarchies of power and seek to get to the top
- **Women**
  - Tend to see the world as containing webs of relationships and seek to move to the center



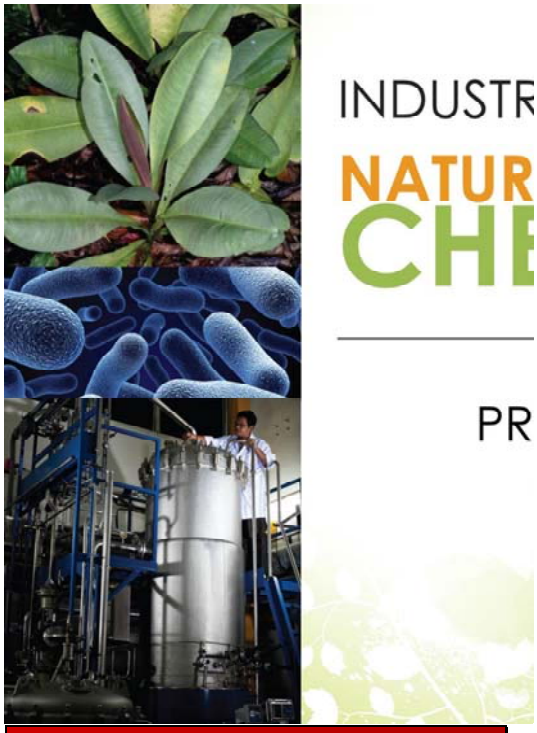
Source: America's Edge: Power in the Networked Century by Anne-Marie Slaughter, Foreign Affairs, p. 94, January-February 2009, www.foreignaffairs.org

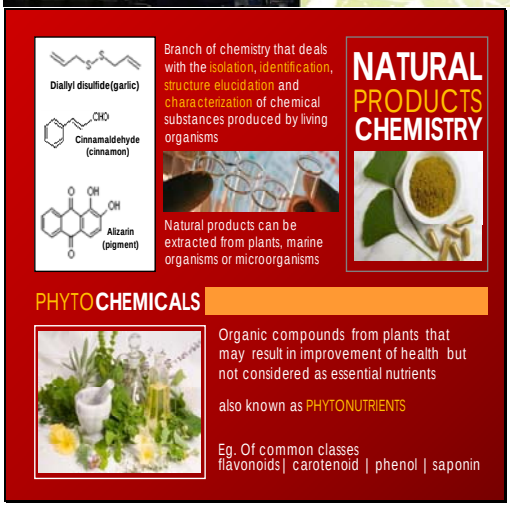
Way Forward:
Some closing thoughts for Africa

- Africa must become a producer of knowledge, not just a consumer
- Africans must be activists - not pacifists - in generating ideas, spurring research and mobilizing knowledge for socially-relevant developmental purposes
- We should all – men and women - collaborate to generate Africa-centric, indigenous development solutions that draw upon the best knowledge available from an increasingly connected world
- In all of these areas, women can and must become the drivers of change!

Thank you for your attention!

Prof. Ramlan Aziz, Director, Institute of Bioproduct Development, University Teknologi, Malaysia: "Industry Applications from Natural Products Chemistry"





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Universiti Teknologi Malaysia

Wellness Products


HERBAL & PHYTOCHEMICALS


COSMECEUTICALS


FLAVOUR & FRAGRANCE


NUTRACEUTICALS


BIOPESTICIDES


BIOFERTILIZERS


FERMENTATION


PROBIOTICS

KEY MARKET DRIVERS

- Increasing aging population with increasing interest in healthy living
- An emphasis on preventive measures to control health care costs
- An increase consumer interest in alternative medicines
- Increased acceptance among doctors, pharmacists and other health professionals
- Increasing awareness about adverse effects of synthetic drugs
- Herbal extracts and powder are comparatively cheaper than synthetic drugs

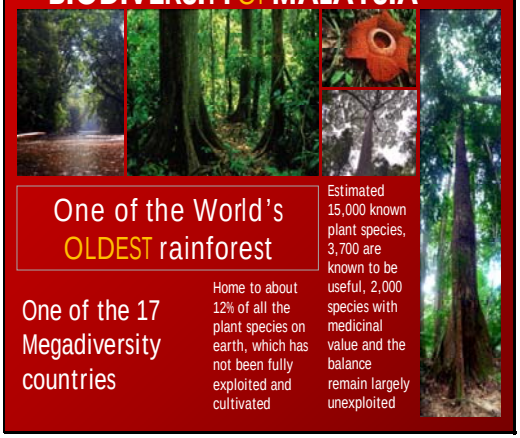
- Increase demand of HALAL based products

ESTIMATED GLOBAL MARKET

ADAPTED From Dr.John W.Travis's Wellness Illness Continuum

Ref: Spas and the Wellness Market: Synergies and Opportunities May 2010 , SRI International

BIODIVERSITY OF MALAYSIA



One of the World's OLDEST rainforest

One of the 17 Megadiversity countries

Home to about 12% of all the plant species on earth, which has not been fully exploited and cultivated

Estimated 15,000 known plant species, 3,700 are known to be useful, 2,000 species with medicinal value and the balance remain largely unexploited

MALAYSIA FOREST HERITAGE

BIODIVERSITY

- 10th In the World
- 4th In Asia

- 165sp amphibian
- 700sp birds
- 1200 spesies with medicinal values
- 350sp reptiles
- 15,000 flowering plants
- MICRO organism
- 300sp fish
- 300sp mammals
- MILLIONS invertebrate

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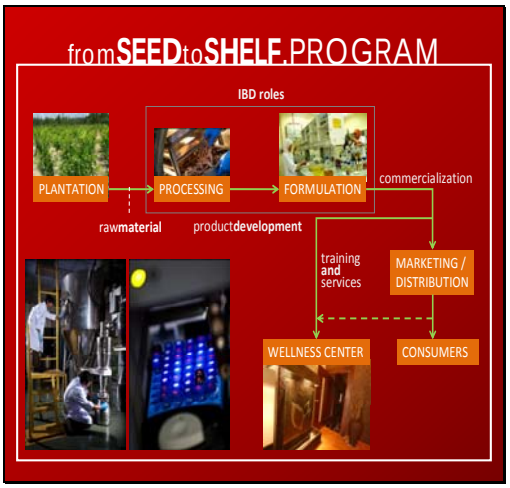
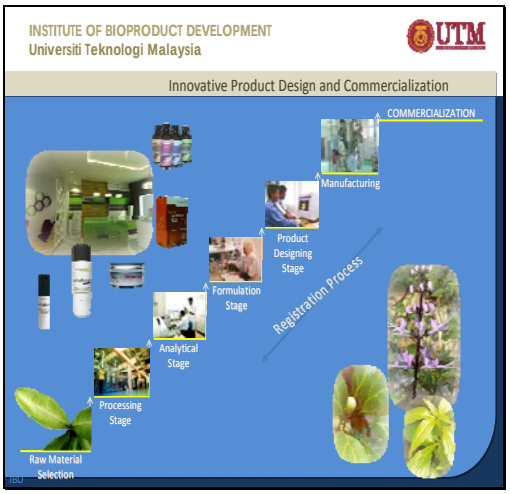
Equipments & Facilities


fromSEEDtoSHELF.PROGRAM
IBD roles
PLANTATION
PROCESSING
FORMULATION
commercialization
rawmaterial
productdevelopment
training and services
MARKETING / DISTRIBUTION
WELLNESS CENTER
CONSUMERS


ORGANIC HERBAL FARM
ROSELLEFIELD
PEGAGAFIELD


MISAI KUCING HERBAL FARM (PALOH4) GUA MUSANG, KELANTAN


PLANTING . POSTHARVEST OR FEED PREPARATION AND PACKAGING
CASE STUDY: MISAI KUCING
REF: PROF. ZHARI, Universiti Sains Malaysia


INSTITUTE OF BIOPRODUCT DEVELOPMENT
Universiti Teknologi Malaysia
UTM
Innovative Product Design and Commercialization
COMMERCIALIZATION
Manufacturing
Product Designing Stage
Formulation Stage
Analytical Stage
Processing Stage
Raw Material Selection
Registration Process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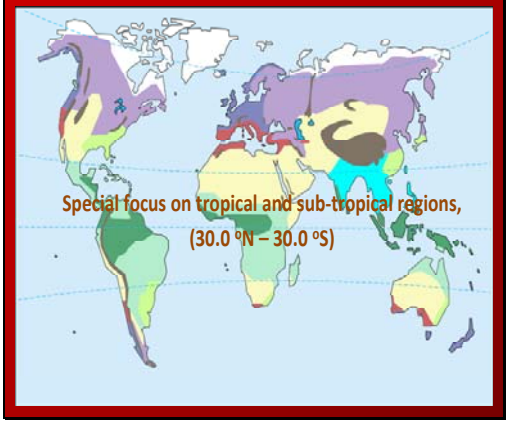
Universiti Teknologi Malaysia
UTM
Wellness Products (commercialization)
Providing wellness solution for healthy living...

DEVELOPING TRAINING PROGRAMMES UNDER OPCW



Special focus on tropical and sub-tropical regions,
(30.0 ^{o}N – 30.0 ^{o}S)

CONCLUSION

"Natural product industry is a multibillion dollar industry and offers solutions for the livings esp. to the wellbeing of soil, plants, animals and human beings. This industry will also create economic opportunities utilizing the rich flora and fauna, and ensure our future generations will have the same or better opportunities to live in a *peaceful* and *sustainable* environment."

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UTM

Thank You

To explore your research and commercial opportunities please contact :

INSTITUTE OF BIOPRODUCT DEVELOPMENT
Universiti Teknologi Malaysia
81310 UTM Skudai
Johor Darul Takzim.

Tel : +607-5532499 Fax : +607-5569706
E-mail : ramlan@ibd.utm.my /marketing@ibd.utm.my

Prof. Ana María Cetto, Research Professor, Institute of Physics and lecturer at the Faculty of Sciences, Universidad Nacional Autónoma de México (UNAM)

Current international cooperation scene

- Variety of new products that can be used for both peaceful and non-peaceful purposes;
- Many countries having a capacity to design and create new processes, materials and substances;
- Larger number and more diverse actors participating in use (and misuse) of such products;
- Production and consumption of chemicals with ever more negative impact on the environment;
- Safety and security concerns have grown considerably.

Need to revise the approach *to international cooperation*

Taking stock of the lessons learned in the past.

- Capacity building remains a central objective
- Top-down approach does not work any more (if it ever did)
- Replace by a horizontal approach
- Forge partnerships for sustained collaboration

Working principles *to guide the new approach*

1. Definition of a common vision and purpose
2. Shared objectives
3. Realistic goals
4. Relevance
5. Respect for diversity
6. Definition of roles and responsibilities

Working principles *to guide the new approach*

7. Transparency and accountability
8. Shared resources and shared benefits
9. For the public good
10. Sustainability
11. A learning experience.

Facing reality

Implementation of the working principles:

- Depends on the nature of the cooperation programme
- Depends on the context in which it is developed and executed.

"Atoms for Peace"

http://www.iaea.org/

The International Atomic Energy Agency, funded in 1957,

- Is a specialized organization within the UN system
- Works for the safe, secure and peaceful uses of nuclear S&T
- Contributes thus to international peace and security
- and to the world's development goals.

The IAEA TC Programme

http://www-tc.iaea.org/

- Is developed jointly by the Secretariat and the Member States
- In accordance with the TC Strategy
- Is based on an assessment of the priorities and conditions in each specific country or region
- Comprises national, regional and interregional projects
- Is approved by the IAEA Board of Governors
- Is funded by Member States ('voluntary' contributions + EB)
- Has an annual budget of ca. $ 100 m.

Thank you!

ana@fisica.unam.mx

SESSION 3: CHEMICAL SAFETY

Bernard Thier, Responsible Care Manager, European Chemical Industry Council (CEFIC)

Who is Cefic?

European Chemical Industry Council: http://www.cefic.org/

Cefic is the voice of the European chemical industry in the European Union and the world. We represent 27,000 chemical companies in Europe that produce 24% of the world chemical products and employ over 1.2 million employees.

Staff & network

150 staff members
4000 industry experts from companies & federations
(150 Sector Groups, Strategy Implementation Groups and Issue Teams)

Members & Affiliates

28 national federations in Europe
50 major international companies
Ca. 450 business members

Partner of

Global sponsor of

International Year of CHEMISTRY 2011

Responsible Care

- Global Initiative for the continuous improvement in the chemical industry (launched 1985 in Canada)
- Involves everybody from top management to plant worker

- Core Principles:

1. Improve the safety, health and environmental performance
2. Use resources efficiently and minimise waste
3. Report openly on achievements and difficulties
4. Engage in dialogue with stakeholders, in particular with the local communities who live and work around our sites
5. Cooperate with regulators, set standards that go beyond regulation
6. Provide help and advice to foster the responsible management of chemicals throughout the value chain

Major chemical accidents

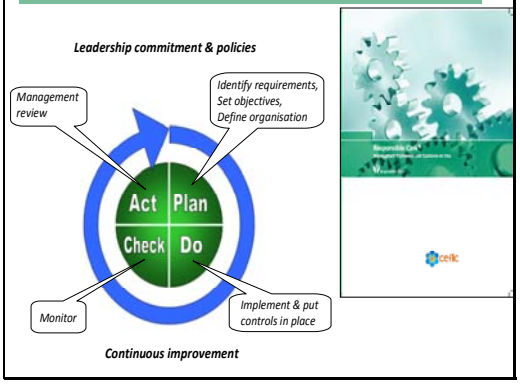
1976	Seveso (Italy) release contaminates area with dioxin
1979	Missisauga (Canada) chlorine train derailing, more than 200.000 evacuated
1984	Bhopal (India) methyl isocyanate release kills up to 25.000
1986	Schweizerhalle (Switzerland) warehouse flare causes mass death of fish in Rhine river
2001	Toulouse (France) fertilizer plant explosion kills 31
2005	Texas City (US) petroleum refinery explosion kills 15; Buncefield (UK) oil storage explosion largest in peacetime Europe

Next?

Responsible Care value

- **Responsible Care Companies**
  - ✓ Save time and money
  - ✓ Improve performances and processes
  - ✓ Reduce risks and liabilities
  - ✓ Enhance reputation and license to operate
  - ✓ Improve worker, customer and environmental protection
- **Associations**
  - ✓ Increase their leverage in policy debates
  - ✓ Enhance their reputation and that of the industry which they represent
  - ✓ Create mechanism to derive value for members

RC management system



Cefic RC priorities 2011

- Support capacity building in SMEs
- Promote process safety performance & metrics
- Advance security as an element of RC
- Promote resource efficiency (energy, water, wastes)
- Strengthen verification processes
- Address sustainability

Cefic RC priorities 2011

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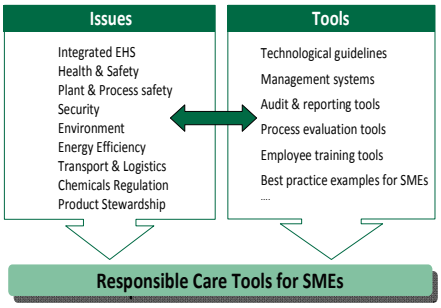
Support capacity building in SMEs

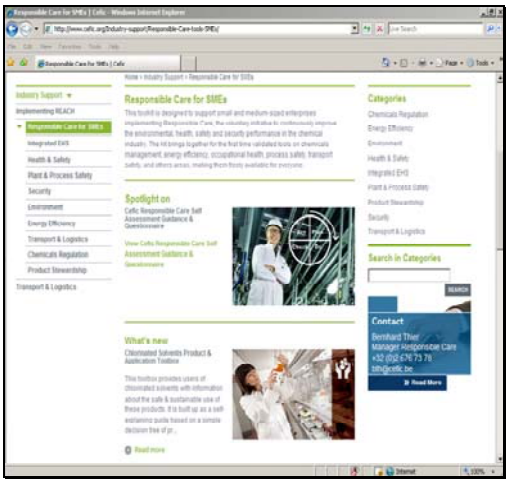
EU project
"Promoting Responsibility in SMEs"

- Stakeholder involvement: trade unions
- Initiate/strengthen RC networking with SMEs
- Training of SMEs in free of charge workshops
- Providing management instruments on RC issues
- Sharing of large company expertise with SMEs
- RC contribution to competitiveness
- Reach out to management and workforce

prisme²
Responsible Care

Responsible Care tools for SMEs





Tools: EU-OHSA campaign on maintenance

- **Target: 25% reduction of accidents rate by 2012**
- **Maintenance workers at increased risk:**
  - 10-15% of all fatal accidents at work and 15-20% of all accidents related to maintenance

HEALTHY WORKPLACES
GOOD FOR YOU, GOOD FOR BUSINESS

- **The EU-OSHA campaign messages:**
  1. Maintenance = essential to keep the working environment safe & healthy
  2. Maintenance = high-risk activity that has to be performed in a safe way
- **Higher exposure of maintenance workers to dangerous substances**
- **Higher exposure to noise, vibration and radiation**
- **Maintenance workers often perform physically demanding work**
- **Indications of higher risk of occupational diseases (e.g. musculoskeletal disorders)**

Maintenance: risks & subcontracting

Maintenance-specific risks

- Working alongside a running process and in close contact with machinery
- Involves disassembly and reassembly of complicated machinery
- Non-routine tasks & exceptional conditions
- Changing tasks and working environments
- Working under time-pressure

Subcontracting (maintenance is very often subcontracted)

- Aggravating factor in terms of safety and health
- Maintenance operations are often carried out on customer sites which are unfamiliar to the workers
- Workers carry out operations very independently, making decisions by themselves
- Working alone, working during the nights
- Many subcontracting companies to operate simultaneously on sites

Subcontracting: permit to work system

Main goals:

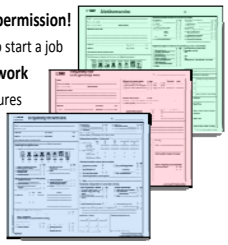
- Assess all specific hazards
- Document necessary measures before the work can start
  → reduce risks to a minimum
- Specify necessary measures to be taken during the work
  → protect workers from residual risks

NO maintenance job without a written permission!

- Production always gives permission to start a job

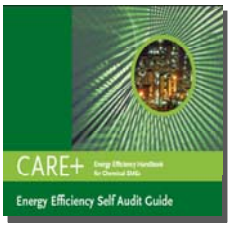
Different permits for different types of work

- Suggesting specific hazards and measures
  - Normal work and line breaking
  - Hot work
  - Work in confined spaces
  - Excavation work
  - …



Tools: energy efficiency in SMEs

- To save resources & costs
- To reduce CO_2 emissions
- Self Audit Guide
  - Step 1: scope calculation
  - Step 2: information gathering
  - Step 3: analysis & evaluation
  - Step 3: report of audit results
- Best Practice Brochure
- Workbook for assessments of energy performance
- www.cefic.org/careplus



Cefic RC priorities 2011

- Support capacity building in SMEs
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Process Safety

Incidents with huge impact

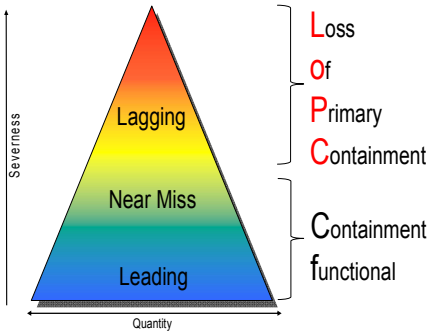
2005 Texas, USA:
15 killed, 170 injured

2005 Buncefield, UK:
Biggest explosion in peacetime

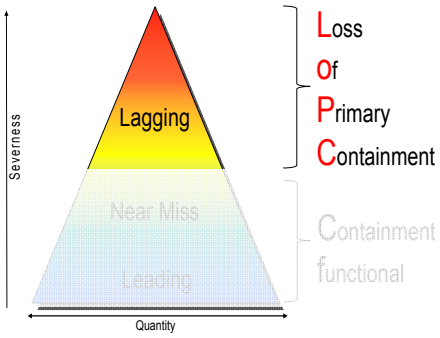
Cefic guidance on process safety

Keep the hazard potentials contained! Handle inevitable hazard potentials professionally that the likelyhood of their activation and adverse effects to environment, people and assets is as low as practicable

Indicators & categorization



Lagging indicator definition



Reportable Process Safety incident

Unintended release of substance or energy (= Loss of Primary Containment, LoPC) in production, distribution, storage, utilities or pilot plants and laboratories with

a) Employee / contractor lost time injury (≥1d) and/or fatality or hospital admission and/or fatality of a third party *or*

b) Fires or explosions resulting ≥ € 20,000 of direct cost *or*

c) Substance release ≥ defined release threshold quantities from primary containment (i.e., vessel or pipe)

Cefic RC priorities 2011

- Support capacity building in SMEs
- Promote process safety performance & metrics
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- Promote resource efficiency (energy, water, wastes)
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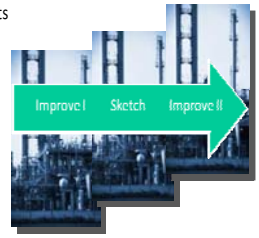
Security: risks from criminal & terror acts

European RC code on security

- Describes fundamental management practices of protection against any kind of criminal, malicious and cyber acts
- Affects production, storage, distribution and transportation of products as well as liaison with suppliers and customers
- Designed to help companies to identify, assess and address vulnerabilities, prevent or mitigate incidents, enhance training and response capabilities
- Shared responsibility requiring actions also by other parties such as customers, suppliers, service providers and governmental security agencies

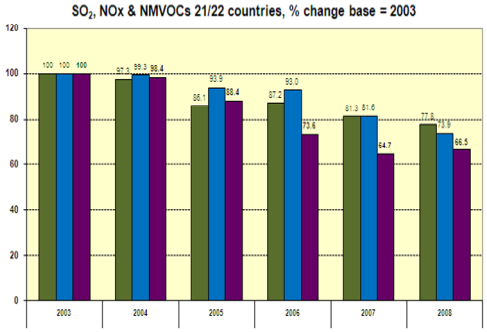
Security vulnerability assessment tool

- Security vulnerability assessment in 6 steps (incl. worked example)
- Guidelines for an operator security plan including a template
- Blank worksheets to fill in results during assessment
- Overview of security legislation and best industry practices

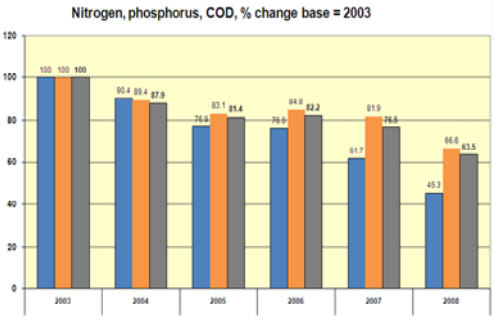


Measuring progress: LTIR Europe

Measuring progress: emissions to air Europe

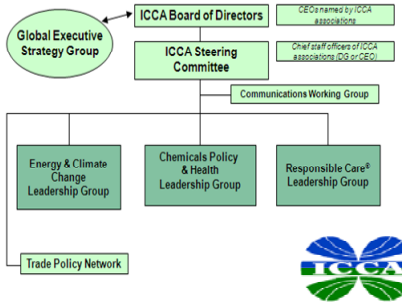


Measuring progress: emissions to water Europe



International Council of Chemical Associations

- ✓ Established 1989
- ✓ Represents 70% of chemicals production



United Nations on Sustainable Development

Earth Summit in Rio 1992
Agenda 21 (chapter 19 on chemicals)

WSSD Johannesburg 2002
2020 Goal: "Chemicals will be used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment."

ICCM-1 Dubai 2006
Strategic Approach to Chemicals Management (SAICM)

ICCA-UNEP involvement

ICCA cooperates with UNEP on the Strategic Approach to International Chemicals Management (SAICM).

2010 ICCA-UNEP cooperation agreement, focus on industry capacity building in emerging regions

ICCA-UNEP event 2009

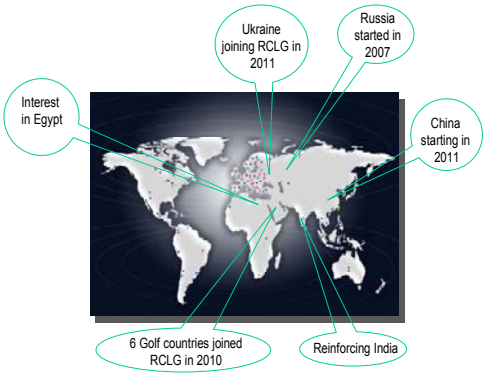
Responsible Care Global Charter

"An inspiring model of self-regulation that other industries should consider following." (K. Annan, 2006)

Global Charter Key Elements
- Commit to advancing Sustainable Development
- Continuously improve and report performance
- Enhance the safe management of chemicals worldwide
- Facilitate the extension of RC along the value chain
- Actively support national and global RC governance processes
- Provide appropriate resources to effectively implement RC

✓ *55 associations worldwide*
✓ *90% of largest chemical companies*

Responsible Care worldwide



Responsible Care at the Gulf

- Gulf Petrochemical & Chemical Association
  (Saudi Arabia, Kuwait, UAE, Qatar, Bahrain, Oman)
- Supported by Cefic & American Chemistry Council
- 54th RCLG member association (approved in 2010)

الرعاية المسئولة
التزامنا نحو الاستدامة
RESPONSIBLE CARE®
OUR COMMITMENT TO SUSTAINABILITY

Responsible Care in the Ukraine

- Ukraine Chemists Union (UCU)
- MoU with Cefic since 2010
- 2010 workshops in Kiev, Yuzhne, Cherkassy, Severodonetsk
- 55th ICCA RCLG member association (approved in 2011)

Odessa Port Plant, Yuzhne

UCU General Assembly

Start of Responsible Care in Egypt

- Egyptian Chamber of Chemical Industries
- MoU signed with Cefic in 4/2011
- Egyptian RC Board established 8/2011

Dialogue on Responsible Care

Many Thanks for Your Attention! Questions?

(contact: bth@cefic.be)

Responsible Care®
OUR COMMITMENT TO SUSTAINABILITY

cefic

Dr. Barry Kistnasamy, National Institute of Occupational Health, South Africa

NATIONAL HEALTH LABORATORY SERVICE
NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH

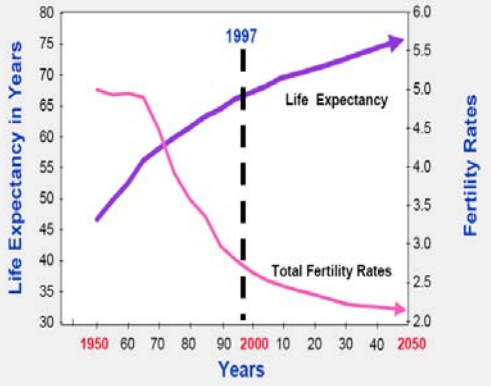
Emerging Areas in Chemistry – From the Informal Sector to Frontier Science

Barry Kistnasamy, South Africa

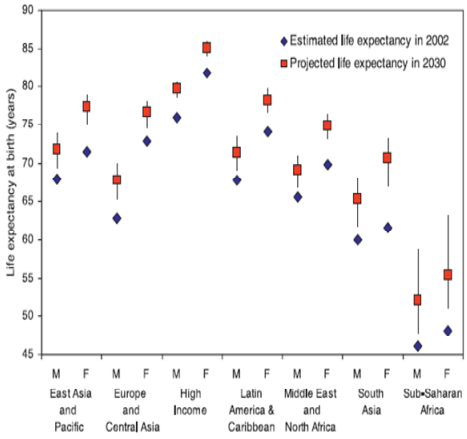
Overview

- What are the achievements & issues
- What tools do we have
- Way forward

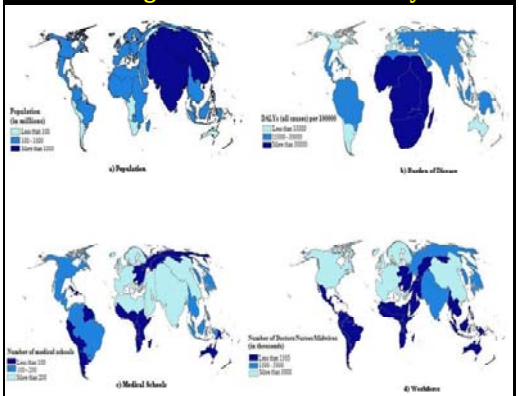
A Century of Unparalleled Improvement



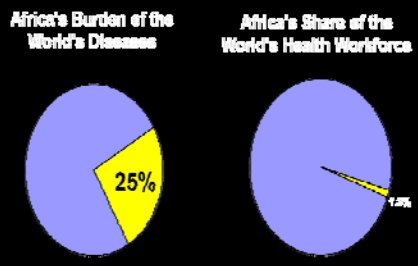
Life Expectancy 2002, 2030 (WHO, GBD)



Looking at the World differently…

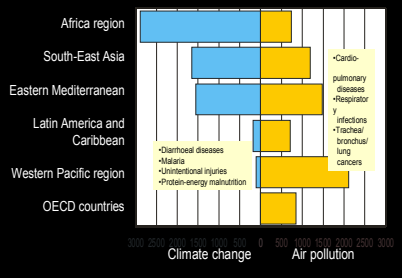


More Illness and Fewer Health Workers in Africa



WHO: Human Resources for Health, 2006

Quantifying Health Impact of Climate Change



Burden of disease by region: Climate change and air pollution Disability Adjusted Life Year / million. World Health Report 2002.

Across the world…

- 6300 workers die every day
- 2.3m deaths a year
- 337m accidents in workplaces
- 4% of world GDP lost

"staying alive while earning a living"

http://www.ilo.org/global/topics/safety-and-health-at-work/

Chemicals

- Part of everyday life & work
- 5 to 7 million known; 400 million tons produced
- 2001- 80% of all chemical produced in 16 countries (North)
- By 2020, countries of the 'South' will lead production

Environmental Outlook for the Chemicals Industry, OECD, 2001

The Informal Sector

The Second Economy

Use of Mercury in Small Scale Mining

Chamber of Mines Dust Committee 1914

SOUTH AFRICA

1930 Int. Silicosis Conf

1959

AJ Orenstein's pioneering work on dust

Mesothelioma (1960)

Asbestos and Diamonds

Wagner et al. Difuse pleural mesothelioma and asbestos exposure in the North Western Cape Province. Brit J industr Med. 1960

Nanotechnology

- Nanotechnology is the creation of **USEFUL/FUNCTIONAL** materials, devices and systems (of any useful size) through control/manipulation of matter on the nanometer length scale and exploitation of novel phenomena and properties which arise because of the nanometer length scale

Meyyappan M.
NASA AMES Research Center

Nanometer

- One billionth (10^{-9}) of a meter
- Hydrogen atom 0.04 nm
- Proteins ~ 1-20 nm
- Feature size of computer chips 90 nm (in 2005)
- Diameter of human hair ~ 10 µm

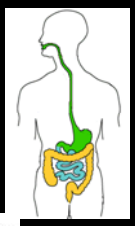
Occurrence of Nanoscale Particulate Materials

- Naturally occurring "ultrafine particles"
  - *Virus – 10 nm to 60 nm*
  - *Bacteria – 30 nm to 10 µm*
  - *Dust from deserts - ~100 nm*
  - *Volcanic ash, Forest fire smoke*
- "Ultrafine particles" from established technologies or by-products of conventional processes
  - *Combustion soot – 10 nm to 80 nm*
  - *Paint pigments – 80 nm to 100 nm*
  - *Welding fumes – 10 nm to 50 nm*
  - *Diesel exhaust particles – (small mode) 7 nm to 40 nm*
  - *Carbon black for photocopier toner – 10 nm to 400 nm*
- Engineered nanoscale materials – "nanomaterials"
  - *Fullerenes - buckyballs – 1 nm; nanotubes – 1 nm to 5 nm X 10 µm*
  - *Quantum dots – 5 nm to 20 nm*
  - *Semiconductor wires*

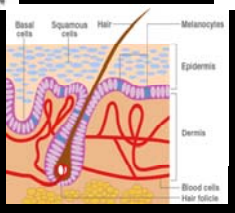
E. Clayton Teague, NNCO, April 2004

Routes of Exposure

Inhalation



Ingestion



Skin absorption

Potential Bio-uptake of Nanoscale Particulates

- Nanoparticles may enter living cells via:
  - Endocytosis
    - Receptor activation for initiation
  - Membrane penetration
    - Generally occurs with very hydrophobic particles
  - Transmembrane channels
    - May be seen with very small nanoparticles (< 5 nm)

Vicki Colvin, Rice University

Problem areas for Regulation of Particulates

- Lack of nomenclature for identifying and delineating nanomaterials
- Nanomaterials of same chemical but having different forms
  - E.g., carbon black, diamond, buckyball, nanotube
- Nanomaterials of same chemical but differing only by physical size
  - E.g., TiO_2 quantum dots (CdS or CdSe)
- No documentation of recommended "best practices" for working with the nanomaterials

E. Clayton Teague, NNCO, April 2004.

"In all things there is a poison, and there is nothing without a poison. It depends only upon the dose whether a poison is poison or not."

Paracelsus (1493 - 1541)

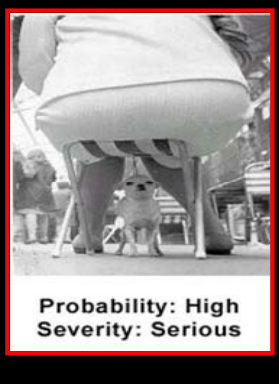
Working with Chemicals

- Single versus multiple exposure
- Users generally cannot measure / analyse hazards
- Need safety information for safe handling
- Information flow along supply chain (manufacturers, distributors, employers, workers)
- Storage & transportation
- Disposal

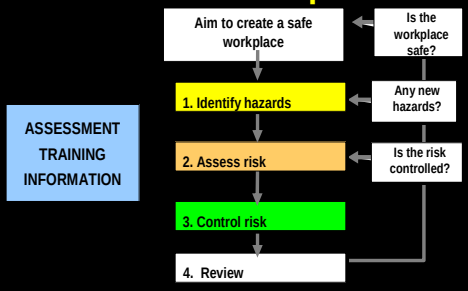
Hazard and Risk

- A risk is created by a hazard
- A toxic chemical that is a hazard to worker's health does not constitute a health risk unless there is exposure to that particular hazard

Risk ?



A Systematic Approach to a Safe Workplace



Exposure Assessment

Ambient monitoring

• Measuring the concentration of the agent in the workplace air

Biological monitoring

• Measuring concentrations of chemicals or its metabolites in biological fluids

Control Banding

- Stoffenmanager – a web based control banding tool
- Small & medium sized companies
- Allows workers / non-experts to conduct exposure assessments
- Exposure scores assigned to exposure bands

Marquart H. Et al. Annuals of Occ Hyg. Vol 52,No 6, 429 – 441. 2008

Interventions

The Hierarchy of Control

Level 1. Elimination

Level 2. "Safe place" options
- Substitution
- Isolation
- Engineering controls

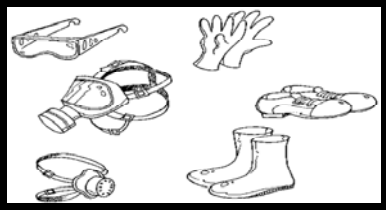
Level 3. "Safe person" options
- Administrative controls/ safe work practices
- Personal protective equipment

Personal Protective Equipment (PPE)

Only used:

- if you cannot reduce the risk by other means
- or as a temporary measure

TYPES OF PPE

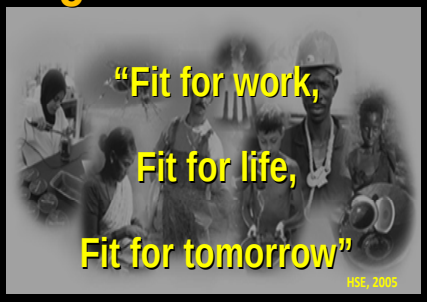


‘Fitness to wear’ respirator testing

As we go forward…

- Capacity building to take account of Safety, Health & the Environment
- Evaluation and analysis of the data eg.,REACH
- Infrastructure (analytic capacity, laboratories)
- Information sharing, cooperation and learning from each other
- Continued development of better methods for risk assessments & control

Together we can…



Barry.kistnasamy@nioh.nhls.ac.za

Mr Neil Harvey, Chemical Industry Association, United Kingdom

Good afternoon.

I am Head of International Trade at the Chemical Industries Association in London but I also manage the Issue Team on CWC and Dual Use goods for the European trade association Cefic.

As CWC destruction programmes move into their final phases the CWC spotlight will be redirected onto non-proliferation initiatives. The chemical industry has the equipment to make chemical weapons but does not do so. Chemical sites and laboratories are open to "anytime, anywhere" inspections by the OPCW and national authorities to ensure that only legitimate chemicals are being produced.

However, legitimate chemicals (the so-called chemical weapon precursors) may be converted into weapons of mass destruction or highly toxic chemicals could be used in a chemical attack. Before I explain how such risks are mitigated through chemical management let me briefly introduce my organisation.

I am employed by the largest chemical industry association in the UK. We are a private sector, not for profit organisation. We have 200 production sites in membership plus another 100 sales or research centres. Nearly all the major multinational chemical companies operating production sites in the UK are members of the association.

Our principal activities are:
Responsible Care
Developing National Policies
Guidance Notes to help companies comply with UK/EU chemical laws.
It is these security and safety aspects of the latter activity that I wish to talk about today.

In addition to obligatory national and international controls there is an overarching health, safety and environmental code. It is called Responsible Care. All members of my association in London are required to comply with the Guiding Principles of Responsible Care.

This is an obligation on them to continually improve environmental, health and safety performance independent of national or international legal requirements in a transparent and accountable way:
Companies and national associations produce periodic reports about performance (we need to measure performance so that we can improve) – workers safety and health, plant safety, transport safety are all covered

The environmental protection elements are being further developed by some national associations like mine to cover sustainability and product stewardship. Product

stewardship is about providing chemicals to customers that are able to handle them safely.

Chemical safety and security is taken extremely seriously in the chemicals industry. And for good reason. Exposure to toxic chemicals can have acute or chronic effects. An acute effect would be something immediate, like an acid burn. A chronic effect usually builds up from long term exposure to a toxic chemical, like contracting asthma.

It is important that people handling hazardous chemicals and their bosses know the risks involved. Hazardous chemicals need to be stored securely and transported carefully. Exposure to them should be minimised. Rigorous and regular maintenance and monitoring programmes need to be in place. As a last resort, personal protective equipment (like gloves, footwear, masks and protective suits) must be used.

Here is a picture of a work glove with a small puncture in it. This was worn by a worker on a chemical plant that contained a highly aggressive acid called Hydrogen Fluoride. We don't know whether the glove was punctured before the operator put it on or whether he snagged it whilst at work. When working with aggressive chemicals like hydrogen fluoride chemical all personal protective equipment must be checked before every use and decontaminated after use. All contact with such chemicals should be reported immediately. In this case acid contact was not reported for 2-1/2 hours. As a result the operator was burned and poisoned by skin contact with a tiny amount of Hydrogen Fluoride.

By not paying attention to detail the operator lost the top of his thumb. Here is a similar case concerning footwear.

In this instance the operator on a similar plant couldn't be bothered to change his industrial boots to do a small maintenance job. He was supposed to wear the special rubber boots provided by the company. Here is the actual boot that he wore.

It only took the smallest of gaps for the acid to get through and contaminate the operator's skin. His foot required a skin graft.

Now what you see here is very rare. The chemical industry has one of the best occupational safety records of any manufacturing industry. That is because if the chemical safety management systems are not robust or detailed enough then such incidents can and will happen. Paying attention to detail is in the mindset of production managers in chemical companies. Just by overlooking a pin-prick in a glove or a hole in a shoe can lead to injury to operators and maintenance crews. The learnings from these incidents are shared around the industry through Responsible Care networks so that safety management can get better and better.

These sorts of plant are required to have good perimeter and storage security with access restricted to authorised personnel only. So gate-house controls and on-site permit-to-work systems are used to stop people getting near hazardous chemical facilities. This attention to security and safety greatly reduces the risk of non-employees getting to or even attacking facilities containing hazardous chemicals.

So security and safety systems on chemical sites are developed by undertaking very detailed and thorough risk assessments. In the areas of safety and security this slide picks out the headline risk factors for safety and security.

All of the solutions lie in the hands of the chemical company. It is in their interest to protect their corporate reputations by selling to reputable companies. Theft is not good for business and efficient stock control frees up cash flow. Accidents involving unpermitted staff or contractors are very costly so it pays to have good on-site security and emergency response. Often these are a legal requirement.

Of all the slides that I have shown you this slide explains the basic premise of good chemical management systems. It is probably the most important slide in my presentation today. In addition to regulatory requirements companies will also have internal controls to make sure toxic chemicals are used properly. To do this properly the toxic properties and physical characteristics of each substance must be identified, its uses identified so that exposure can be calculated. Once you have this basic information a risk assessment can be performed for each use. This risk-based formula is the basis for many national and international health and safety controls on chemicals. And there are many such controls already in place as the next slide will show.

A large minority of States Parties have not yet introduced national implementation regulations or have set up national authorities to implement the provisions of the CWC. The OPCW can help with CWC national implementation measures but many countries will already have at least some rules in place relating to the safe handling of chemicals. The purpose of showing this slide is to illustrate that there are already many trade-related controls on the chemicals sector in Europe, some of which implement international trade and production control regimes (Chemical Weapons Convention, Australia Group, drug precursors, Rotterdam Convention, Montreal Protocol).

This diagram represents a simplified supply chain for a chemical product and the various European TRADE regulations that have to be followed. There are of course many other regulations covering high hazard sites, explosive materials as well as consumer and environmental requirements such as REACH and waste treatment regulations.

There are also new regional initiatives that are looking to controlling access by potential terrorists to explosive precursor chemicals. Some of these regulations require the collection of data, inspection visits and often have overlapping objectives. Regulation usually imposes costs on industry which is why, wherever possible we want to eliminate regulatory duplication. This means that any new monitoring, reporting or inspection requirements relating to chemical weapon precursors or toxic chemicals should take into account complementary chemical management measures required by other policies.

Globalisation requires industry and regulators to progress or regress together. At the heart of some of these regulations lies the new international system for classifying and labelling chemicals, particularly toxic chemicals.

These slide shows the international pictograms used on labels for chemicals. The manufacturer of the substance must put one or several of these internationally

recognised symbols on consignments of hazardous chemicals. This is an important safety measure. Also accompanying each consignment will be a materials safety data sheet which must the full hazard profile of the consignment. In order to spread this good practice in the sustainable and safe use of chemicals across the globe the United Nations has initiated a programme known as SAICM.

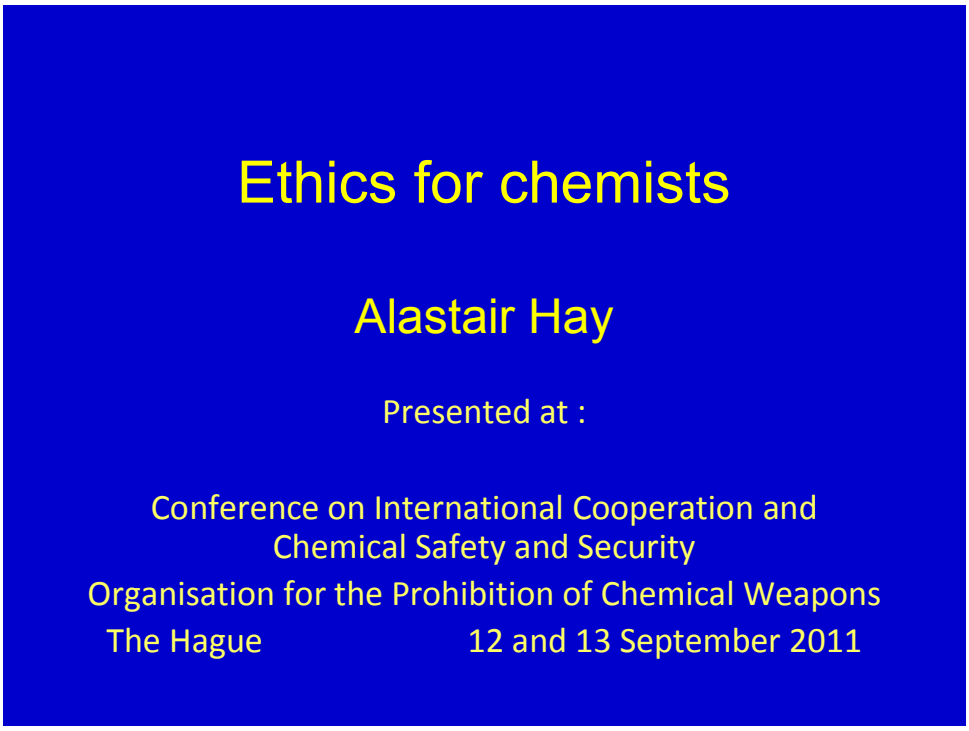
SAICM operates through regional focal points (Zambia for Africa, Poland for Central and Eastern Europe, India for Asia and the Pacific, Jamaica for Latin America and the Caribbean and the United States for Western Europe and the rest of the world) and is funded by donor countries. Its objective is to help countries that lack a comprehensive legal framework for the marketing and use of chemicals in their territories. The SAICM programme is extensive, both in geographical coverage and in subject matter.

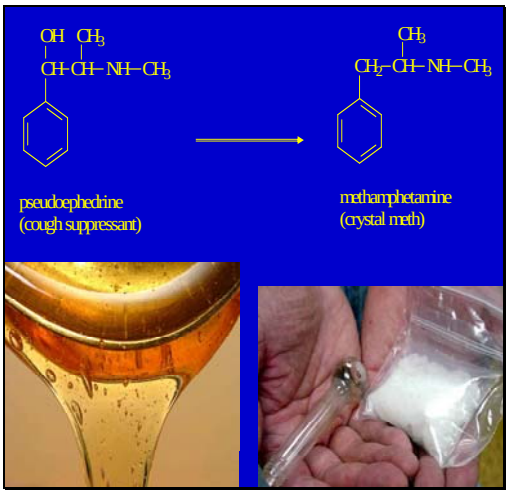
Chemical management issues are at the core of the SAICM programme. There is a global action plan covering 273 action points on all of these issues.

The second review meeting of SAICM takes place at the end of May next year. This, I believe, would provide a good opportunity for the OPCW and States Parties to share their learnings from the non-proliferation aspects of the CWC to an appreciative audience. The chemical industry will be there.

Thank you for you attention.

Prof. Alastair Hay, Professor of Environmental Toxicology, University of Leeds, United Kingdom





Error → Misconduct → Criminal

Non-intentional

Wrong observations
Wrong analysis
Undeclared conflict of interest
Curiosity
Can (suspect) chemical be made?
Suppress knowledge
Make it again
Sell some
Large scale manf.

Intentional

With apologies to M. Nylenna & S. Simansen Lancet 2006; 367: 1882-4

Control → Manage

Closed

Chemical company – need to expand
Require new plant to make hazardous chemical
Sited close to residential area
School within 500 metres
Expansion – good for jobs
Risk assessed – planning permission given
Local residents hostile
Establish liaison committee
Manage disputes
Amend plans?
Build?

Open

What's happening?

- US NAS report : education on dual-use issues
- IUPAC – chemicals/multiple uses; codes
- Individual disciplines (besides medicine) instituting ethical discourse ie synthetic biology; nanotechnology; law ; business; biology ; some in chemistry
- Research Councils in UK ask about dual-use

How might it help?

- Encourage openness
- Promote subject areas – no need to be defensive
- Reassure public
- Challenge students

Where ethics fits in

- Responsible conduct of research
- Research records; lab notebooks; publication bias; undeserved authorship, data suppression; plagiarism; falsification; fabrication;
- Safety; environmental protection; security
- Discuss 'dual-use' and law

Resources

- CETL database , for example Univ of Leeds www.idea.leeds.ac.uk/EthicalThinking
- IUPAC – material for chemists www.iupac.org/multiple-uses-of-chemicals.
- NAS – Education on dual use
- http://www.nap.edu/catalog.php?record_id=12958

Mr David Moore, President and CEO of the AcuTech Consulting Group, United States

ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS

Chemical Safety Management and OPCW

David A. Moore, PE, CSP
President & CEO
AcuTech Consulting Group, McLean, VA 22102 USA
www.acutech-consulting.com

Topics

- Chemical safety management
- Observations on status of this area
- Areas where OPCW can contribute to the field
- Specific initiatives/projects/activities that OPCW could develop in view of the emerging opportunities

2

Chemical Safety Management

- The global handling, storing, processing, and transportation of hazardous chemicals (especially at industrial facilities) must be managed in a holistic public/private risk management framework using a systems oriented management approach.
- Focus is on the management of accidental risk from design failures and operating actions leading to unnecessary hazards.
- There is a strong business case for implementing major hazards safety management systems – the value is in preventing the loss of lives, preserving the integrity of operations and protecting the environment.

3

Chemical Security Management Objectives

- A system to ensure the security of the chemicals to protect workers, the public, and the environment from harm
- A management system for preventing or minimizing the consequences of intentional malicious releases of toxic, reactive, flammable, or explosive chemicals
- Security of chemicals to reduce the risks of exposure from misuse of chemicals (theft, diversion, abuse)

Chemical Safety and Security Management

Convergence

Commonality and Synergies

- Common hazards
- Similar failure mechanisms (intent is different, accidental v. deliberate)
- Similar consequences
- Some similar strategies for prevention, detection, mitigation, response

Problem Statement

- Chemical safety requires continuous effort to achieve a high level of safety performance
- Current options (from regulations, to regional voluntary organizations and efforts, to various industry programs) alone do not reach as broadly as is necessary to produce the necessary support and change
- There remains a lack of global governmental/private leadership on chemical safety
- There needs to be an additional thrust, oversight, and support on this topic

6

Examples of Best Practices NGO Activity & Guidelines

- American Institute of Chemical Engineers (AIChE) established Center for Chemical Process Safety (CCPS) 1985 (www.aiche.org/ccps)
- Chemical Manufacturers Association's (CMA) established Responsible Care ®(1988) Program [now known as American Chemistry Council (ACC)] – voluntary program for Process safety
- European Process Safety Centre (EPSC) – 1992 (www.epsc.org)
- Other organizations developed conventions and guidance (ILO, C174 Prevention of Major Industrial Accidents Convention, 1993, OECD, etc.) www.oecd.org

Article XI Implementation
OPCW Role in Chemical Safety

- OPCW has the capacity to bring together regulators, scientists and stakeholders.
- OPCW has an excellent track record in dealing effectively and globally with chemical issues and can put the same structure, organization, and resources to bear on this related problem
- OPCW is well-positioned to tackle longer-term challenges like organizing through the existing structure a sustained effort to educate, exchange information, and provide guidance on new methods and approaches, and developing practical tools for use in decision-making on chemical safety.

Major Hazards Legislation and Guidance History

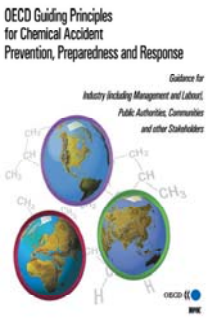
- A history of severe process industry accidents in the period from 1974 to 1989.
- This culminated in significant international governmental process safety and risk management regulations and private sector efforts to reduce catastrophic risks.
- The purpose of the regulations and directives issued by many Governments and Organizations:
  - to reduce the likelihood and intensity of major chemical safety impacts on workers, the public, and the environment
  - by mandating or recommending a management systems approach with a risk and performance basis.

9

Article XI Implementation
Recommendations

- Promotion of Chemical Safety Management requires:
  1. Greater education, directed to those decision-makers responsible for chemical manufacturing and use as well as the persons actually handling and using the chemicals
  2. A compelling business case for implementing process safety management systems – preventing the loss of lives, preserving the integrity of operations, competitive advantage, and protecting the environment.
  3. Definition of effective and internationally accepted safety management best practices
  4. Access to simple, reliable methods and tools for the analysis and management of hazards

Share Best Practices



11

Monitor Performance

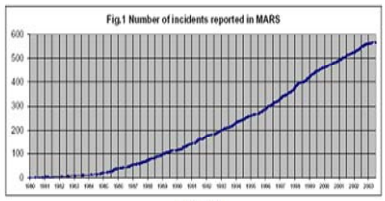
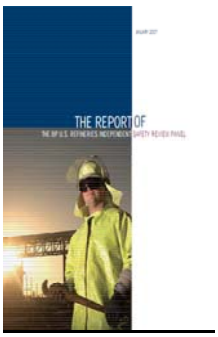
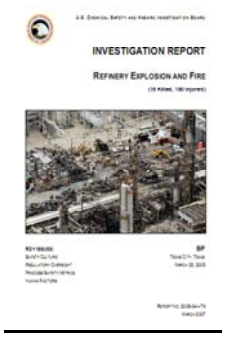


Figure 1
Sources: "Status of the Major Accident Reporting System"
(MARS, Michalis, 10th and 11th meetings of the Committee of the Seveso Competent Authorities)

12

Share Lessons Learned





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Article XI Implementation Recommendations

- ***Recommendation*** 1 – to continue seminars on a regular basis for awareness and education and exchange of information and best practices
  - Seminars oriented towards Member States to determine sensitize to the needs and to develop specific plans within their regions or countries and to discuss how to oversee and promote chemical safety management
  - Seminars oriented towards industry within the Member States or regions to promote real impacts on actual chemical safety practices at the user level
  - A training plan will then need to be developed to define the scope, types of training, approach, curriculum, training schedule, logistical information, responsibilities, and estimated resources necessary to meet the training objectives.
  - Involvement of industry, universities

OPCW Article XI Seminars to Date

- *Chemical Weapons Convention and Chemical Process Safety Management*, Japan, 11th and 12th November, 2009, involving 19 delegates from the Asia Group
- *Promoting Chemical- Safety Management*, Germany 16th to 20th November, 2009, involving 10 delegates from the Africa Group. (Executive Council, EC-59/DG.13)
- *Seminar on the Chemical Weapons Convention and Chemical Safety Management*, The Netherlands, on 5th to 6th July, 2010
- *Workshop of Article XI of the Chemical Weapons Convention*, The Netherlands, 24th-25th November, 2010
- *Workshop of Chemical Weapons Convention & Chemical Safety Management, Mumbai, India, 18-19 April 2011*
- *Workshop of Chemical Weapons Convention & Chemical Safety Management, Vadodara, India, 18-19 April 2011*
- *Workshop of Chemical Weapons Convention & Chemical Safety Management for African Member States, Johannesburg, SA, 11 to 13 May 2011*

Article XI Implementation Recommendations

- ***Recommendation*** 2 – to develop guidance on how to encourage all stakeholders to adopt best practices in chemical safety management
  - Public/private level
  - Particularly within the user community – the 'business case for chemical safety management' must be explained
  - Metrics and measurement
  - Leadership training and guidance

Article XI Implementation Recommendations

- ***Recommendation*** 3 – to develop guidance on sources of and technical applications of best practices in chemical safety management
  - References available
  - "Model" program(s)
  - *Prevention of Major Industrial Accidents (ILO, Geneva, 1991).*
  - *Safety in the Use of Chemicals at Work (ILO, Geneva, 1993).*
  - United Nations Conference on Environment and Development (UNCED): *Agenda 21 (Chapter 19 on environmentally sound management of chemicals). Rio de Janeiro, Brazil, 1992.*

Article XI Implementation Recommendations

- ***Recommendation*** 4 – to provide access to tools or sources of technical applications for simple, reliable methods and tools for the analysis and management of hazards
  - World Bank Hazards Analysis software (1985)

Conclusions

- Chemical Safety Management has become an internationally accepted safety management practice and yet there is much work to be done
- OPCW has an obligation and an opportunity to encourage the safe and secure use of chemicals
- OPCW is in a unique position in the world to promote chemical safety
- A specific plan for how to achieve Article XI with a focus on needs of the Member States seems appropriate

Questions?

David Moore, PE, CSP
President & CEO
AcuTech Consulting Group
1600 Tysons Boulevard
McLean, VA USA 22102
www.acutech-consulting.com

Article XI CWC

ECONOMIC AND TECHNOLOGICAL DEVELOP MENT

1. The provisions of this Convention shall be implemented in a manner which avoids hampering the economic or technological development of States Parties, and international cooperation in the field of chemical activities for purposes not prohibited under this Convention including the international exchange of scientific and technical information and chemicals and equipment for the production, processing or use of chemicals for purposes not prohibited under this Convention.

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Article XI CWC

ECONOMIC AND TECHNOLOGICAL DEVELOP MENT

2. Subject to the provisions of this Convention and without prejudice to the principles and applicable rules of international law, the States Parties shall:

(a) Have the right, individually or collectively, **to conduct research with, to develop, produce, acquire, retain, transfer, and use chemicals**;

(b) Undertake to facilitate, and have the right to participate in, the fullest possible **exchange of chemicals, equipment and scientific and technical information** relating to the development and application of chemistry for purposes not prohibited under this Convention; (c) Not maintain among themselves any restrictions, including those in any international agreements,

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Article XI CWC

ECONOMIC AND TECHNOLOGICAL DEVELOP MENT

(c) **Not maintain among themselves any restrictions**, including those in any international agreements, incompatible with the obligations undertaken under this Convention, which would restrict or impede trade and the development and promotion of scientific and technological knowledge in the field of chemistry for industrial, agricultural, research, medical, pharmaceutical or other peaceful purposes;

(d) Not use this Convention as grounds for applying any measures other than those provided for, or permitted, under this Convention nor use any other international agreement for pursuing an objective inconsistent with this Convention;

(e) Undertake to review their existing national regulations in the field of trade in chemicals in order to render them consistent with the object and purpose of this Convention.

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SESSION 4: CHEMICAL SECURITY

Dr. Kersten Gutschmidt, Department for Public Health and Environment (PHE), World Health Organisation (WHO)

Chemicals and Health:

The International Health Regulations and Health Security

OPCW Conference on International Cooperation and Chemical Safety and Security, The Hague, The Netherlands, 12-13 September 2011

Dr Kersten Gutschmidt
Technical Officer
Public Health and Environment Department

World Health Organization

Content

1. About WHO

2. Chemicals and health

3. International Health Regulations

4. Collaboration and coordination/chemical events

World Health Organization

About the World Health Organization

- WHO is the specialized organization for health within the United Nations System
- Leadership, research agenda, norms and standards, policy options, technical support, monitoring and assessing trends.
- 193 Member States
- Multiple levels, worldwide: Headquarters; 6 Regional Offices; 147 Country Offices
- Main chemical safety activities are undertaken by the WHO Departments of Public Health and Environment, and Food Safety.

World Health Organization

Content

1. About WHO

2. Chemicals and health

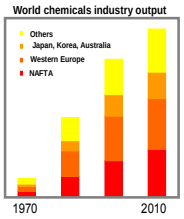
3. International Health Regulations

4. Collaboration and coordination/chemical events

World Health Organization

Chemical production and use

- Production and use of chemicals continue to grow worldwide.
- Increase in global production approx. ten-fold over the last four decades.
- Chemical production is quickly expanding in non-OECD countries.



World Health Organization

Chemical related disease burden

An estimated 8.3% of all deaths and 5.7% of all disease burden were attributable to exposure to selected chemicals in 2004.

Source: Knowns and unkowns on burden of disease due to chemicals, Prüss-Uestun et al., Environmental Health, 2011

World Health Organization

Chemical incidents

- During 1995-2004, 3000 technological disasters affecting more than 2.5 billion people *(Source: IFRC)*
- In 2005, 8603 chemical events in 15 US States with 2034 victims, 69 deaths, 481 evacuations *(Source: ATSDR)*
- In 2005, 1040 chemical incidents in England and Wales with 27000 people exposed, 3000 people showed symptoms, approx. 150 evacuations *(Source: HPA)*

➢ **100 000 to 500 000 events per year worldwide?!**

World Health Organization

WHO and Chemical Safety

- Establish the scientific basis for the sound management of chemicals (e.g. evaluation of chemicals)
- Strengthen national capabilities and capacities for chemical safety (e.g. guidance, capacity building)
- Strategic Approach to International Chemicals Management (SAICM)

8

World Health Organization

Content

1. About WHO
2. Chemicals and Health
3. **International Health Regulations**
4. Collaboration and coordination/chemical events

9

World Health Organization

Global Public Health Security

Activities required, both proactive and reactive, to minimize vulnerability to acute public health events that endanger the collective health of populations living across geographical regions and international boundaries.

Reference: World Health Report 2007

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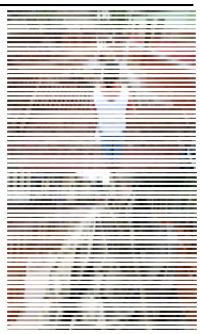
World Health Organization

Acute public health events threatening global health security

World Health Organization

Mud spill, Hungary, October 2010

- 9 people died and over 150 injuries from burns of skin and eye.
- Concern of transnational health impacts from transboundary movement of chemicals.
- 150 similar dumps along the Danube.



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World Health Organization

Mass bromide poisoning, Angola, 2007

- Disease outbreak of unknown cause.
- More than 450 victims; mainly children.
- Symptoms suggested toxic origin.
- Industrial chemical confused with table salt.

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World Health Organization

What are the International Health Regulations (IHR)?

http://www.who.int/ihr/en/

- IHR are the global, legally-binding framework against international spread of a wide range of diseases:
  - Biological, chemical or radio nuclear in nature.
  - Transmissible by persons, goods, animals, vectors or the environment.
  - Caused accidently, naturally or intentionally.
- Revised IHR were adopted in 2005 and entered into force in 2007.
- Binding on 194 countries, including all the Member States of WHO

World Health Organization

IHR provsions and chemical events

- Reporting (and verification) by States to WHO of chemical events with potential international public health implications.
- Public health information sharing on key chemical events/risks by WHO to States
- Regulation of public health measures applied to international trade, transport and travel for protection of public health.
- Required development of core public health capacities for surveillance, assessment and response in all States, as well as capacities at points of entry by 2012.
- WHO international public health surveillance and response, centred on a dynamic and shared risk assessment process.
- National IHR Focal Points in all States to coordinate internally on IHR and communicate with WHO

World Health Organization

IHR Implementation of Core Capacities

- Close to 50% of reporting States Parties have only **basic overall capacity** in place for surveillance, assessment and response to chemical events.
- 41% of reporting States Parties have **some overall capacity** in place concerning chemical events.
- Less than 50% of reporting States Parties have established **coordination** mechanism for intersectoral collaboration for chemical events.
- Only 37% of reporting States Parties have established **information exchange** mechanisms between relevant sectors.

World Health Organization

Content

World Health Organization

Sectors affected by IHR implementation concerning chemical events

- Health
- Environment
- Agriculture (and animal health)
- Food safety
- Labour
- Chemical industry / commerce
- Customs
- Ports, airports, ground crossings
- Security
- Human rights
- Civil protection
- …

World Health Organization

Areas of international cooperation and coordination

- Strengthening **capacity in countries**
  - Sound management of chemicals
  - Management of chemical incidents
  - Public health management of chemical incidents, including IHR core capacities
- Strengthening **international assistance and response** to chemical events
  - Toxicological and environmental laboratories
  - Technical experts (e.g. environmental experts)
  - Equipment (e.g monitoring devises, decontamination equipment, PPE)

World Health Organization

World Health Organization
http://www.who.int/

Public Health and Environment Department
http://www.who.int/phe

Environmental Health Emergencies
http://www.who.int/environmental_health_emergencies/en/

International Health Regulations
http://www.who.int/ihr/en

Chemical Safety
http://www.who.int/topics/chemical_safety/en

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World Health Organization

Ms Ann-Margreth Eriksson Eklund, International Atomic Energy Agency (IAEA)

RADIOACTIVE AND NUCLEAR MATERIAL TRANSPORT SECURITY

Ann-Margret Eriksson
Office of Nuclear Security
International Atomic Energy Agency
Vienna, Austria

IAEA

Control of Radioactive Material Transport

- Nuclear (fissile) material security – international transport subject to the binding requirements in CPPNM since 1979
  - INFCIRC/225 guidance published in 1972

- Radioactive material security – IAEA guidance published in 2008; now being implemented by Member States

IAEA

Radioactive Material Transport Security

- Following the events of September 11, 2001, the UN Committee of Experts adopted security measures for dangerous goods, including radioactive material (Class 7)
- Essentially two security levels – some security measures for all dangerous goods and additional measures for "high consequence" dangerous goods

IAEA

IAEA Review of Transport Security

- IAEA initiated an in-depth review of the transport security provisions to evaluate the
  - Definition of "high consequence" radioactive material in light of more recent developments
    - IAEA Code of Conduct for radioactive sources
    - Technical evaluations of the consequences of widespread dispersal of radioactive material
  - Specific security measures recommended by the UN Committee of Experts and how they compared to measures recommended for protection of radioactive material in other applications

IAEA

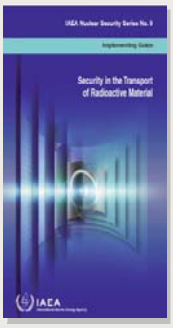
Review of "High Consequence" Definition

- Benchmark calculations were performed to determine the quantity (TBq) of various radionuclides required to cause a defined consequence event
- Many countries have adopted the IAEA Code of Conduct and its supporting categorization of radioactive sources
- Various multiples of the A-values and D-values were considered

IAEA

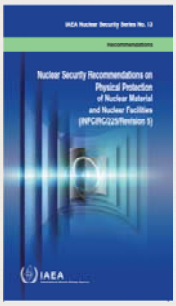
Security Levels for Radioactive Material

- Recommendations for transport of radioactive material have been published as an IAEA Nuclear Security Series "Implementing Guide", NSS No. 9
- The IAEA has presented the recommendations to the UN Committee of Experts



IAEA

Security of Nuclear Material During Transport



- Revision of INFCIRC/225/Rev. 4 was initiated in 2008
- A Transport Working Group was formed to update and, where possible, strengthen the transport security requirements
- Transport security plans have been recommended for Category II nuclear material (in addition to Category I material)

IAEA

Security of Nuclear Material During Transport (continued)

- "International transport" recommendations have been updated to reflect
  - Fundamental Principle B "Responsibilities during International Transport" of the Amended CPPNM
  - Current transport operations (carriage arrangements, physical protection responsibilities, etc.)
- Revision 5 is published as Nuclear Security Series Recommendations document

IAEA

Interface Between Nuclear and Radioactive Transport Recommendations

Since nuclear (fissile) material is also radioactive, both recommendations documents should be considered when transporting nuclear material



IAEA

The IAEA Assistance Program for Transport Security

Assistance is available to Countries upon request. The assistance is given at:

- National level (regulatory and other government agencies
- Operator level (shippers and carriers)

IAEA

Assistance Program content

Assistance to countries can include:

- Advisory Missions to provide advice and guidance
- Planning to identify and prioritize needs
- Training Courses
- Assistance in developing regulations
- Procuring and providing equipment


IAEA

Goals of Training

The training is intended to:

- Illustrate the need for adequate security during transport
- Define levels of security with appropriate security measures
- Enable States to effectively implement transport security programs

IAEA

Dr. Matteo Guidotti, Research Scientist, Institute of Molecular Sciences and Technology Institute (ISTM) of the Italian National Research Council (CNR)

Emerging disciplines and new trends

- Nanosciences
- Nanotechnologies
- Information Technology
- Biotechnology
- Cognitive Science

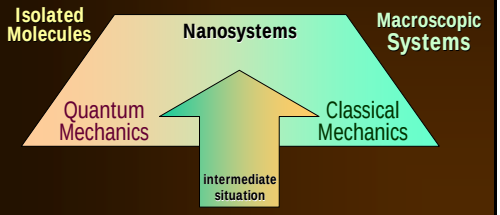
Nanosystems

nanometer 10^{-9} m

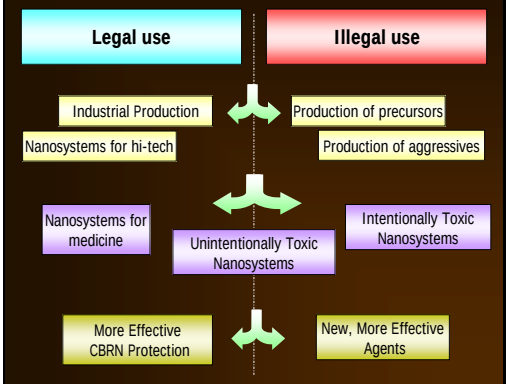
Chemical objects whose dimensions are included in the range:

1 nm < nanosystems < 100 nm

and which show **peculiar features** thanks to **quantum effects** and to the presence of wide **surfaces** and **interphasal domains**



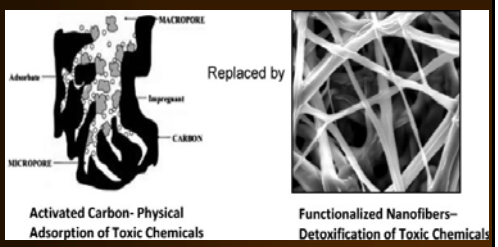
"Dual use" of nanoscience and nanotechnology



Nanosystems for protection

Self-cleaning catalytic polymer filter systems

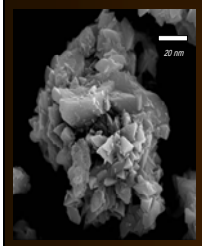
→for detoxification of breathable air
→ for purification of drinkable water



no accumulation

Nanosystems for decontamination

A commercially available chemical response system based on MgO and photocatalytically active nanosized TiO_2



NanoActive Magnesium Oxide Plus (powder, granule)

www.fast-act.com

MgO nanocrystals. Size **10 – 20** nm

*can destroy airborne bacterial spores, such as **anthrax**, even at room temperature*

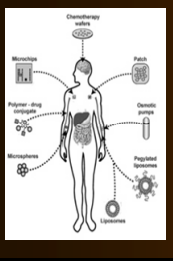
TiO_2 → use of energy from **sunlight**

*It can decompose **99.9%** of **VX** agent in **10 min***

The 'dark side' of science: nanosystems as unexpected threats

Breathable or swallowable nanoparticles

can be absorbed easily by the body (inhalation, skin absorption, ingestion)



At nano-scale their toxicological properties can change **dramatically**

Often they are not **considered as toxic agents** by law because they are **chemically identical** to non-nanosized parent materials

*Some '**hidden zones**' neglected by national and international laws **still exist***

Nanosystems as new aggressives

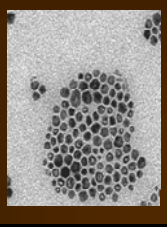
Determining toxicity of nanosized compounds

	LC_{50} (mg L^{-1})		
Organism	$CuSO_4$	CuO bulk	CuO nano
bacteria *Vibrio fischeri*	1.6	3811	79
crustaceans *Daphnia magna*	0.17	165	3.2
crustaceans *Thamnocephalus platyurus*	0.11	95	2.1

Chemosphere, 71 (2008) 1308

Which is the "real" toxicity?
What must we put in the tables?

CuO particle diameter ca. 30 nm



The new concept
Size-dependent toxicity

Nanosystems as new aggressives

Breathable or swallowable nanoparticles

Nanometric particle of debris containing Pb and Cr in a sweat specimen

can **cross** many **biological barriers** in living organisms

Often possess a **high biocompatibility** and interfere positively or **negatively** with metabolic processes

Nanoparticles of inorganic oxides with unusual composition (Pb, Cr, Au, Ag, Ba, etc.) have been found in physiological fluids (sweat) of the **fire-fighters** who worked at the Twin Towers during **9/11** and survived

Courtesy of Dr. A.M. Gatti, Univ. Modena, Italy

Nanosystems as new aggressives

The examples so far describe nanosystems whose toxicity was **unintentional** and studied **afterwards**

What might happen if someone wants to design an **intentionally toxic nanosystem**?
With an **enhanced** harming capability ?

Nanosystems as new aggressives

Risk of uncontrolled production of nanosized compounds

"Traditional" non-toxic compounds → *Uncontrolled manufacture* → **Nanoshaped or nanosized materials** → Novel **hazardous or toxic materials**

National or international "traditional" analytical control

Results **within** parameters

OK for production

NO VIOLATION OF REGULATIONS

No macroscopic difference in chemical composition between the "raw material" and the final product

Accessibility of critical technologies

Nanosciences and Nanotechnologies

'top-down' approach	'bottom-up' approach
based on **miniaturization** processes	based on **assembly and synthesis** processes
• microlithografic processes, microetching, etc. typically found in electronic industry	• chemical, biochemical or physico-chemical processes
- 'atom-by-atom' control - *quantum dots* - limited productivity - high costs - relevant technical know-how	- lower control at atomic level - high productivity - limited costs - simple (sometimes) equipment - variable technical know-how

*this is the classical approach of the **synthetic chemist***

this is the approach **to be controlled**

New scientific advances and CWC

Existing non-proliferation and disarmament treaties must be **periodically updated** to cope with the new potential threats linked to nanosystems

The **updatable lists** of **banned or** controlled **chemicals** are the **strong point** of CWC

Its **periodical revision** allow the members to take into account rising problems and defects of the current state-of-the-art

*The **new concepts** of*
- size-dependent toxicity
- nanotoxicology and **nanopathology**
- intentionally toxic nanosystems
deserve special attention in next years

In conclusion

Nanosciences can play a relevant role in developing new protection and decontamination capabilities

BUT they can **affect** remarkably the **potential of chemical industrial production** and induce **"rogue nations"** to **circumvent** fixed international regulations

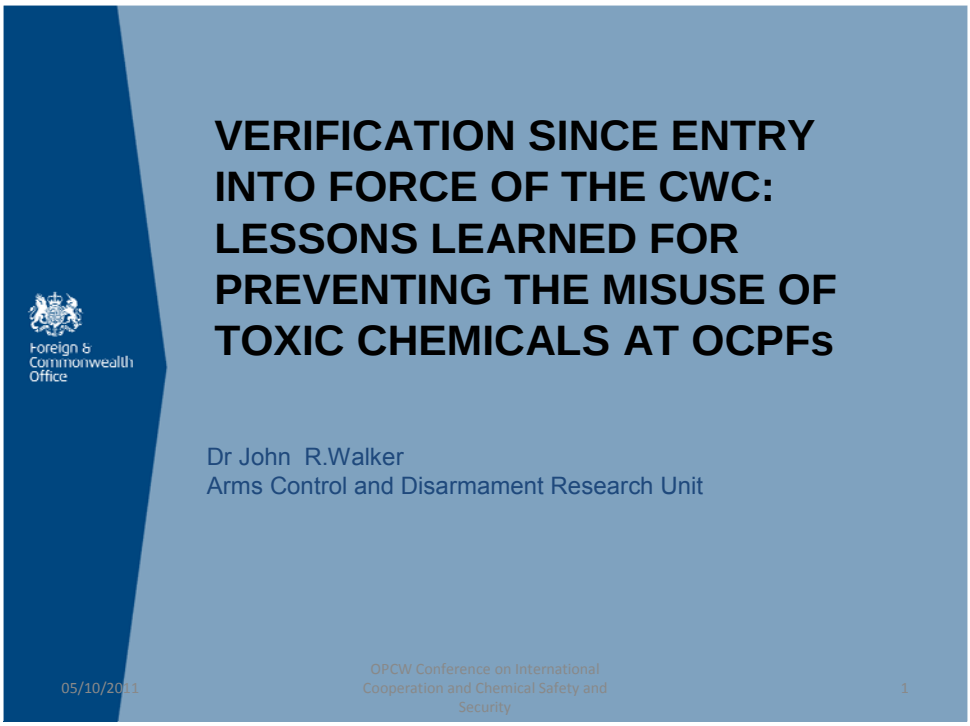
they can be a **resource** or a **threat**

Key role of **scientific research** and, above all, of **Chemistry**

*It is crucial to **encourage studies on the risks** of nanosystems and to **foster research projects on** effective **countermeasures***

the higher the level of countermeasures
the lower the risk of illicit use of toxic nanosized chemicals

Dr. John R. Walker, Arms Control and Disarmament Research Unit (ACDRU), Foreign and Commonwealth Office, United Kingdom



INTRODUCTION

- Brief overview of objectives and expectations from CWC negotiations.
- Problem of capable industry and practical application of verification measures: Other Chemical Production Facilities.
- Lessons for preventing misuse of toxic chemicals.

CWC NEGOTIATIONS

- How to define scope for practical aspects of industry verification regime? Objective was verification of the non-production of chemical weapons.
- Lessons from National Trial Inspections at 'Schedule 2' and 'Schedule 3' plant sites – other relevant capabilities.
- How to target these? Ad hoc checks, ad hoc inspections, declarations of chemical processes performed – such as fluorination, esterifciation.
- Compromise was OCPF regime – DOCs/PSFs. Details in Part IX of the Verification Annex reflect fact that measures agreed were compromise with some issues not thought through.
- Challenge Inspection also seen as important safeguard to address any loopholes in verification regime.

PREVENTING MISUSE OF TOXIC CHEMICALS: LESSONS (1)

- Not nearly as many sites declared as anticipated during negotiations – less than 5,000 OCPFs declared to Technical Secretariat.
- Confidentiality issues generally in industry declarations and inspections very much less of an issue that was once perceived.
- Sampling in Schedule 2 sites shows that concerns misplaced.
- Issue of targeting most relevant and most capable sites remains problem for OCPF regime and thus wider aim of minimising risk of misuse of toxic chemicals generally.
- OCPF inspections as currently constituted cannot be seen objectively as 'burden' on either industry or National Authorities: declaration is only a page long with simple questions and inspection is only one day – average about 7 to 10 hours.

PREVENTING MISUSE OF TOXIC CHEMICALS: LESSONS (2)

- Options for sustaining OCPF verification regime in coming years:
  - sort out more effective selection mechanism to focus on most capable sites i.e. multi-purpose flexible, batch production capabilities.
  - enhance declaration requirements to include lists of chemicals produced and nature of production – dedicated or batch.
  - investigate feasibility of on-site sampling and analysis – requires faster sample preparation and analysis time.
  - modest increase in total numbers .of OCPF inspections.
  - make more use of interviews and documents reviews during inspections.
  - maintain technology watch to see how changes in production technologies may impact on declarations and inspection process.
  - TS to maintain capabilities to mount effective inspections at industry sites.

SESSION 5: INTERACTIVE SESSIONS

Panel discussion A: International cooperation

Panel discussion B: Chemical safety

Panel discussion C: Chemical security

PANEL DISCUSSION A: INTERNATIONAL COOPERATION

Prof. Nelson Torto, Professor of Analytical Chemistry and the Head of the Chemistry Rhodes University, South Africa

Collaboration or Networking

Characteristics

- Common ground
- Contribute
- Benefit to society
- Poverty alleviation
- Common efforts
- Long term interest
- Research fidelity
- Synergy
- Inter/multi-disciplines

Requirements

- Clear objectives
- Intellectual resources: People
- Harmonisation of activities
- Technological resources:
  - Infrastructure, communication, logistics
- Support system: Finance
  Maintenance

Historical Perspective

Regional French Universities

- Initiative from 1961
- Ministers of Education meetings (MINEDAF)
  - Exchange of students
  - Exchange of teachers
  - Technical information
- University of Dakar
- University of Abijan
- University of Brazzaville
- University of Tannarive

Southern Africa

- BOLESWA/UBLS
- Joint University
  - Botswana
  - Lesotho
  - Swaziland
- University of Botswana
- National University of Lesotho
- University of Swaziland

African Situation

- Scientists are trained abroad
  - Focus on non-African research questions
- Limited funds to purchase or service instrumentation
- Low capacity to adopt or develop new methodology on returning home
- No role models, mentors, capacity
- Scientists eventually feel isolated

The TRIPLE HELIX

A social sciences concept - modelling transformation processes in generating innovation

University-Industry-Governmental relations

How is this relevant to the state and development of Centres of Excellence

Examples of Drivers

- OPCW
- IFS
- IPICS
- TWOWS
- TWAS
- ANSTI, AAU, AAS, UNESCO
- IUPAC
- DAAD
- ACS, NSF, NIH, IOCD
- Chemical Societies & Federations

Examples of Networks in Africa

- NABSA
- NAPRECA
- **SEANAC**
- ANCAP
- ALNAP
- AMSEN
- West Africa Biotechnologies
- ESALAMA
- SARBIO
- AFASSA
- NITUB
- NUSESA
- ALAMOSN

SEANAC: *the network*

- Formed in February 2002 in Botswana
- Workshop funded by Sida
- Facilitated by Analytical Division of the Chemistry Department at UB
- Network was formed by 13 Universities from 11 countries
- Botswana, Ethiopia, Uganda, Kenya, Swaziland, Lesotho, Malawi, Tanzania, Zambia, Zimbabwe and Mozambique

www.seanac.org

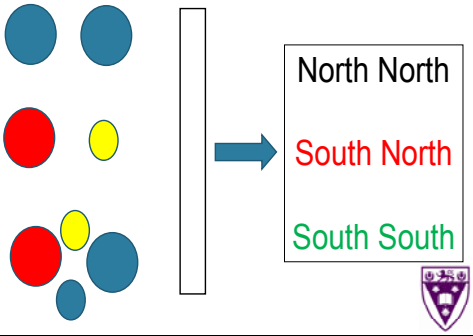
Tasks for SEANAC

- Short term
  - Workshops
    - Curricula
    - Retraining
    - Project teams
  - Networking
    - Exchange Visi
- Long Term
  - Postgraduate training
  - Academic exchange
  - Summer schools
  - Networking
  - Training of trainers
  - Regular symposia
  - Promote women participation in SEANAC activities
  - Special colloquia for youth
  - Validation activities
  - Assist with instrumentation

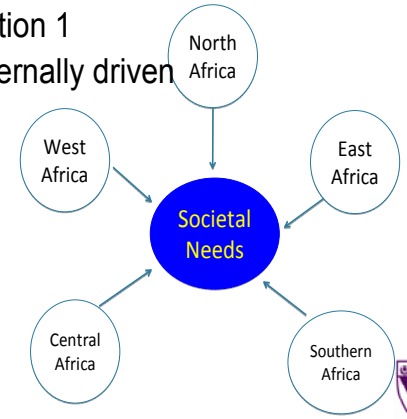
Harmonising curricula:-pre-workshop

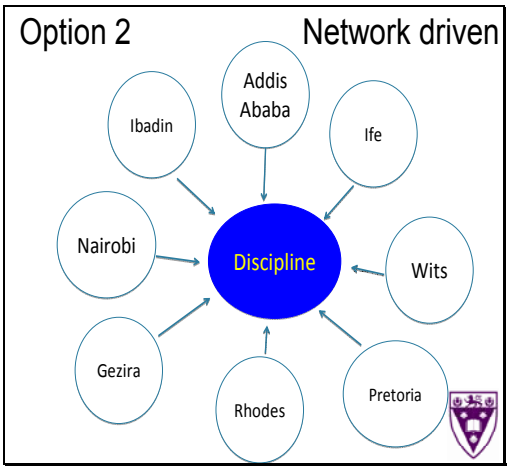
Triple Helix Workshop 2009

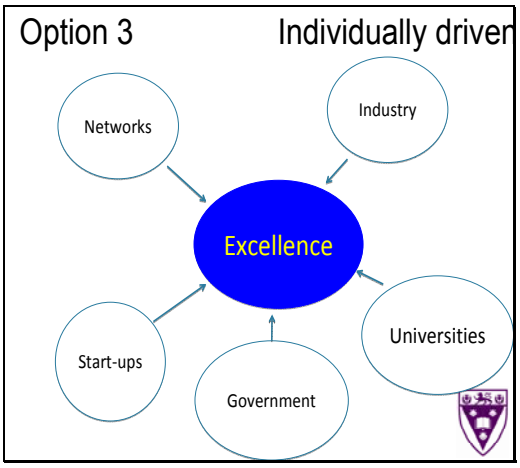
How do we collaborate to build COEs?



Option 1 Externally driven




Option 2
Network driven
Addis Ababa
Ibadin
Ife
Nairobi
Discipline
Wits
Gezira
Rhodes
Pretoria


Option 3
Individually driven
Networks
Industry
Excellence
Universities
Start-ups
Government

Prof. Volodymyr Zaitsev, Chair of the Analytical Chemistry Department, Taras Shevchenko University, Kiev, Ukraine

International Cooperation

* OPCW has global responsibility and
* It is the SINGULAR LEGAL instrument for:
  * Comprehensive ban of CW
  * **And misuse of chemicals**

The OPCW needs to prepare for a transition elimination of CW to and agency that will ensure that chemical warfare and toxic chemicals will newer reappear *(from the final report of OPCW advisory panel)*

New Challenge require new capacity

Existed capacity

Comprehensive ban of CW

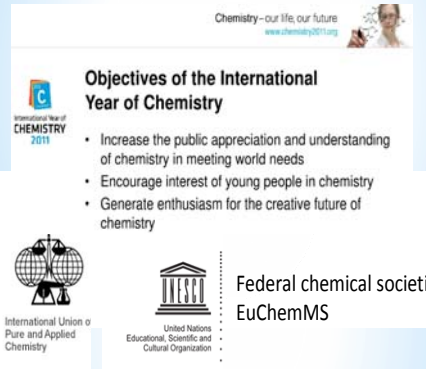
Government ⟷ OPCW

Future capacity

Governmen t ⟷ OPCW ⟷ Industries ⟷ Public

Cooperation between OPCW, public and industry is crucial
(Mr. U. Rosenthal, Minister of Foreign Affairs, The Netherland)

OPCW niche for International Cooperation



Federal chemical societies
EuChemMS

What OPCW future in term of International collaboration?

* Conference support
* Research projects support
* Personnel education

What is public threat and NGO expectations?

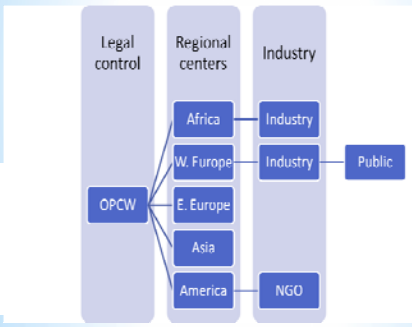
- Fear of chemistry vs. prospects (Mr. U. Rosenthal, Minister of Foreign Affairs)
- 3000 Chemical problems per. Year;
- 8.3% of death have chemical causes (Dr. K. Gutschmidt, WHO)
- Increase the public appreciation of chemistry (Prof. D. Black, IUPAC)

My expectation

OPCW new challenge

Prevent misuse of chemicals ≥ Ensure peaceful chemistry

OPCW structure to fulfill new task



Why regional cooperation is needed?

- **Each region has its own specificity**
  - OPCW understands and help to meet the region need
  - Build national capacity *(Dr. D. Faraday)*
- **Regional cooperation gives quicker response**
- **Common objectives and responsibilities (water sources)**
- **Better transparence**

Prevent misuse of chemicals (Legal instrument, not NGO)

Where the point for beginning?

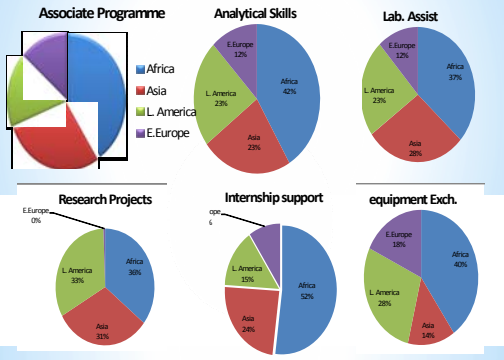
Where risk of the chemicals misuse is more essential?

- Les-developed countries?
- Industrially-developed countries?
- Countries with transitional economics?

From OPCW Director-General lecture:

Immerging economics commonly have increased of chemical production
Intermediate and small enterprises in those countries cause safety difficulties

OPCW Programs



Ukraine Potential

- **Education**

1 university for 0,25 10^6 population (with 10-20 10^3 in each) while in W. Europe **1** to 10^6 population

- **Research (Chemistry)**
  - Academy of Sciences (R&D) 15 x 200 (in chemistry)
  - Universities (10 x 200)
  - Applied research centers (5-10)x100
- **Chemical Industry**
  - Heavy (Fertilizers) – 2nd country income
  - Medium (Pesticides)
  - Small (Fine chemical) – new private companies
  - Farm. Industry (80% in internal market)

Establishing OPCW regional center in Ukraine can catalyse better international collaboration in Eastern European region and promote its development

* Ukraine is belong to State parties that declare full elimination of chemical weapons
* Has largest CW owner as a neighbour
* It is not belongs to any military blocks
* In respect to request of effective horizontal collaboration with NGO and public such centre can be established in University
* T. Shevchenko University has experience in collaboration with OPCS and will be happy to coordinate development of regional plans, promote implementation of article XI in region

Dr. Philippe Louvet, Chemical Expert, Deputy Head of Chemical Synthesis Department, Laboratory of Analytical Chemistry, Centre d' Etudes du Bouchet (CEB), France

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

MINISTÈRE DE LA DÉFENSE
ET DES ANCIENS COMBATTANTS

The French Single Small Scale Facility

A Focus on Chemical Safety Management

Dr. Philippe LOUVET – DGA CBRN Defence

September 2011

DGA
DIRECTION GÉNÉRALE DE L'ARMEMENT

Agenda

- The French SSSF
  - Overview
  - A Focus on chemical safety management
    - Definition and strategy
    - Production unit
- Conclusion

The French SSSF

The French SSSF

- Main mission of the French SSSF
  - To produce, package, store and deliver CW or CW related agents needed for purposes not prohibited under the CWC
    - to the benefit of military forces, or
    - for national security

The French SSSF

- The French SSSF includes
  - a production unit
  - a storage area
  - a 1400 m^3 confinement chamber
- Co-located with the French OPCW designated analytical laboratory at DGA CBRN Defence
  - Analyses of the schedule chemicals are realised by experts in this field

A Focus on chemical safety mamagement

Definition and strategy

- Chemical safety activities
  - Activities applied to the identification, understanding and control of hazards involved in the production, handling or use of chemicals to prevent injuries and incidents
- DGA CBRN Defence strategy
  - Suppress or substitute hazardous substances
    - Schedule chemicals
  - Engineering controls
  - Organizational measures
  - Personal Protective Equipment (PPE)

Production Unit

Production Unit

- High safety production unit
  - Designed for working with lethal chemicals
  - Isolated area with limited and monitored access
  - Three zones
    - Hot zone: two airlock chambers that give access to a production lab, a packaging lab and a storage room
    - Warm zone: two classical chemical labs, a monitoring room and a first aid room
    - Cold zone: office space and support area

Production Unit

- Very high confinement
  - Sophisticated ventilation system that protects the staff inside the production unit from any hazardous chemical vapors
  - Hot zone
    - Static confinement with a system of airlock chambers
    - Dynamic confinement
      - Labs in the hot zone are under negative pressure with respect to the adjacent ones in the warm zone
      - Cascade of depression in the hot zone: first airlock chamber, second airlock chamber, decontamination shower room, storage lab, packaging lab, production lab, and micropilot
    - Beeper and visual alarms

Production Unit

- Very highly sophisticated filtration systems
  - Protect the surrounding communities and the environment from any hazardous chemical vapors
  - Paper and carbon filters
  - One back-up air extractor for each lab
  - Chemical monitoring of the air extracted from the production unit

Production unit

- Fume hoods
  - Regularly Controled
  - Alarms
    - Beeper
    - Ribbon strip and liquid column manometer

Production unit

- Power supply
  - Two different sources of electricity
    - Only one source is used at a time
  - One extra generator for each of these sources

Production unit

- First airlock chamber
  - To put on personal protective equipment (PPE)
  - Liquid column manometer
  - Supplied air respiratory protective equipment
- Second airlock chamber
  - To take off one's PPE
  - AP2C-V and hydrogen detector
  - Supplied air respiratory protective equipment

Production unit

- Production lab
  - Special polymer floor coating
    - No liquid or vapor absorption
    - Pneumatic valve enables to drain off liquids if needed
  - Micropilot
    - Corrosion resistant equipments
    - Reinforced glass system and specific seals

Production unit

Production unit

- Production lab
  - Detection equipments
    - Fixed AP2C-V
    - Mobile AP2C and AP4C
    - Hydrogen detector
    - Hydrogen cyanide detector
    - Fire detector
  - Automatic extinguisher in the micropilot

Production unit

- Medical countermeasures
  - Autoinjector Ineurope for nerve agents
  - Cyanide antidote kit
  - British anti lewisite (BAL)
  - Reactive Skin Decontaminant Lotion (RSDL)
  - Emergency chemical decontamination glove using specific absorbant (Fuller's earth)
  - Army medical officer
    - Available on site
    - In charge of conducting medical training and of writing procedures

Production unit

- Waste liquid
  - PEHD tank
    - Double wall
    - Liquid leak detection system
    - Connected to the filtration system
    - Monitoring of pH and liquid level

Production unit

- Monitoring room
  - Computer control of safety systems
    - Ventilation/extraction
    - Detection equipments
    - Video
    - Locking/opening micropilot doors
    - Control of specific chemical reaction
    - PEHD waste tank

Packaging, transport, storage, waste disposal plan

Packaging

- Schedule 1 chemical are packaged in hermetically sealed glass vial
  - Classified codification for the labelling

Transport

- Hermetically sealed glass vial packaged in high confinement container or cylinder filled with an absorbant
  - Transport by foot or by car
    - Loaded in a part of the vehicle seperate from the driver
    - Decontamination and detection equipments, antidote kits
    - Surveillance and talkies walkies

Schedule chemicals storage building

- High safety area
  - Isolated area
  - Chemical monitoring of air extraction
    - ADLIF detector
    - Fixed and mobile AP2C, mobile AP4C
  - Fire detector with two automatic extinguisher systems
  - Power supply
    - Two different sources of electricity
    - One back-up fuel generator

Computer-based inventory system

- For schedule chemicals (classified database)
  - Every chemical sample is accompanied by a document : the entire itinerary of the sample, from the very moment it is synthesized at DGA CBRN Defence to its eventual disposal, is clearly registered
- For non schedule chemicals
  - List of all the chemicals at DGA CBRN Defence with relevant information on each of them
  - Real-time inventory tracking
  - Minimize bulk storage and waste and help to locate any hazards in the labs

Waste

- Waste disposal plan
  - Written procedures for handling waste from the time it is produced to its ultimate treatment or disposal
  - Every waste container is
    - Well characterized with an appropriate labelling mentioning its chemical classification for safe storage and proper disposal
    - Stored in a centralized storage area

Personal Protective Equipment

Personal Protective Equipment

- Respirator for Ground Soldier (ANP-VP)
  - NRBC or NRBC-ABEK-P3 canisters
    - Should be correctly fitted to a person's face: the fit factor of the mask for each person is regularly controled
- Light decontamination suit (TLD)
  - Weight 0.5 kg
  - Protect against chemical agent vapors, aerosols and droplets

Personal Protective Equipment

- Supplied air respiratory protective equipment
- EVATOX evacuation hoods

Schedule 1 Production Cycle

"Campaign"

Campaign

- Appropriate organizational measures
  - Campaign
    - 1 to 3 weeks
    - Schedule chemicals synthesized or handled
  - On site authorisation
    - C1 : to work in a schedule chemical atmosphere
    - C2 : to handle schedule chemicals
    - C3 : to open a sealed storage vial of schedule chemical
    - C4 : to synthesize a schedule chemical

Campaign

- Before
  - Campaign Work Instructions: product identification, detailed procedure, hazards identification, safety measures and safe handling, accidental release measures, appropriate disposal
  - Check list
    - Extractors and ventilators, sound and visual alarms, detector equipments, filters, safety showers, decontaminant solution, antidotes, mineral absorbent, PPE, power supply….
    - Authorization
    - Availability of the army medical officer

Conclusion

Conclusion

- DGA CBRN Defence
  - Chemical safety is our top concern
  - Multiple-approach strategy
  - Certifications in international standards
    - ISO 14001, OHSAS 18001 and ISO 9001

« Within DGA CBRN Defence, no activity which is detrimental to the health and safety of staff or to the integrity of our environment will be conducted, whatever its significance or of its status of emergency »

Merci de votre attention

QUESTIONS?

PANEL DISCUSSION B: CHEMICAL SAFETY

Prof. Jonathan Okonkwo, Tshwane University of Technology, South Africa: "Green Chemistry: Equipping and Strengthening Chemical Sciences for Sustainable Development"

GREEN CHEMISTRY: EQUIPPING AND STRENGTHENING CHEMICAL SCIENCES FOR SUSTAINABLE DEVELOPMENT

OKONKWO OJ

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- **OPCW**
- **IYC CONFERENCE ORGANIZING COMMITTEE**
- **DR B. KGAREBE**

OUTLINE OF PRESENTATION

- **CHEMISTRY & SOCIETY**
- **CHEMICAL INDUSTRY & THE ENVIRONMENT**
- **HISTORY OF GREEN CHEMISTRY**
- **PRINCIPLES AND CONCEPTS OF GREEN CHEMISTRY**
- **GLOBAL RECOGNITION OF GREEN CHEMISTRY**
- **GREEN CHEMISTRY AND SUSTAINABLE DEVELOPMENT**
- **TWELVE PRINCIPLES OF GREEN CHEMISTRY**
- **PROGRESS IN GREEN CHEMISTRY (REAL WORLD CASES)**
- **CONCLUDING REMARKS**

CHEMISTRY & SOCIETY

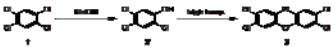
- **Pharmaceutical** –manufacture of drugs (pain killers, antibiotics, heart and hypertensive drugs);
- **Agriculture** –production of fertilizers, pesticides;
- **Food** –manufacture of preservatives, packaging and food wraps, refrigerants;
- **Medical** –disinfectants, vaccines, dental fillings, anaesthetics, contraceptives;
- **Transportation** –production of petrol and diesel, catalytic converters to reduce exhaust emissions;
- **Clothing** –synthetic fibres, dyes, waterproofing materials;
- **Safety** –polycarbonate materials for crash helmets;
- **Sports** –composite materials for rackets, all weather surfaces;
- **Office** –inks, photocopying toners;
- **Homes** –paints, vanishes and polish, detergents, pest killers

CHEMICAL INDUSTRY AND ENVIRONMENTAL

1956: Minamata disease was first discovered in Minamata city in Japan. It was caused by the release of methylmercury in the industrial wastewater from a chemical factory

1961: *Itai-itai disease* was caused by cadmium poisoning due to mining in Toyama Prefecture in Japan

1976: The **Seveso disaster** was an industrial accident that occurred in a small chemical manufacturing plant near Milan in Italy. It resulted in the highest known exposure to 2,3,7,8-tetrachlorodibenzo-p-dioxin in residential population.



1984: The **Bhopal** disaster was an industrial catastrophy that took place at a pesticide plant owned and operated by Union Carbide (UCIL) in Bhopal India resulting in the exposure of over 500,000 people. It was caused by methyl cyanate (MIC) gas.

1986: The **Chernobyl disaster** was a nuclear accident at the Chernobyl nuclear plant in Ukraine. It resulted in a severe release of radioactive materials. Most fatalities from the accident were caused by radiation poisoning.

1989: Exxon Valdez , an oil tanker hit a reef and spilled an estimated minimum 10.8 million US gallons (40.9 million litres) of crude oil. This has been recorded as one of the largest spills in United States history and one of the largest ecological disasters.

HISTORY OF GREEN CHEMISTRY

- In **1990** the Pollution Prevention Act was passed in the United States. This act helped create a *modus operandi* for dealing with pollution in an original and innovative way. This paved the way to the green chemistry concept.
- Paul Anastas and John Warner coined the two letter word "green chemistry" and developed the twelve principles of green chemistry.
- In **2005** Ryoji Noyori identified three key developments in green chemistry: use of supercritical carbon dioxide as green solvent, aqueous hydrogen peroxide for clean oxidations and the use of hydrogen in asymmetric synthesis.

PRINCIPLES AND CONCEPTS OF GREEN CHEMISTRY

Green Chemistry, or sustainable/environmentally benign chemistry is the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.

As a chemical philosophy, green chemistry applies to organic chemistry, inorganic chemistry, biochemistry, analytical chemistry and physical chemistry.

- **Minimize:**
  - **waste**
  - **energy use**
  - **resource use (maximize efficiency)**
- **utilize renewable resources**

GLOBAL RECOGNITION OF GREEN CHEMISTRY

- **Australia:** The Royal Australian Chemical Institute (RACI) presents Australia's Green Chemistry Challenge Awards;
- **Canada:** The Canadian Green Chemistry Medal is an annual award given to any individual or group for promotion and development of green chemistry;
- **Italy:** Green Chemistry activities in Italy centre on inter-university consortium known as INCA. In 1999, INCA has given three awards annually to industry for applications of green chemistry;
- **Japan:** In Japan, The Green & Sustainable Chemistry Network (GSCN), formed in 1999, is an organization consisting of representatives from chemical manufacturers and researcher;
- **UK:** In the United Kingdom, the Crystal Faraday Partnership, a non-profit group founded in 2001, awards businesses annually for incorporation of green chemistry;
- **USA:** United States Environmental Protection Agency'(EPA);
- **Nobel Prize**: The Nobel Prize Committee recognized the importance of green chemistry in 2005 by awarding Yves Chauvin, Robert H. Grubbs, and Richard R. Schrock the Nobel Prize for Chemistry for "the development of the metathesis method in organic synthesis."

GREEN CHEMISTRY AND SUSTAINABLE DEVELOPMENT

- To better understand and solve the issue of environmental pollution, many approaches and models have been developed for environmental impact assessments.
- Some of these approaches and models have been successful in predicting impacts for selected chemicals in selected environmental settings.
- These models have joined air and water quality aspects to point and nonpoint sources and have been very useful for the development of emission control and compliance strategies.
- However, some of the approaches and models were aimed primarily at evaluating the quantity of pollutants that could be discharged into the environment with acceptable impact, but failed to focus on pollution prevention.
- The concept of end-of-pipe approaches to waste management decreased, and strategies such as environmentally conscious manufacturing, eco-efficient production, or pollution prevention gained recognition.
- The UN defines sustainable development as 'meeting the needs of present without compromising the ability of future generation.'
- Green chemistry focuses on how to achieve sustainability through science and technology

THE TWELVE PRINCIPLES OF GREEN CHEMISTRY

Prevention
It is better to prevent waste than to treat or clean up waste after it is formed;

Atom economy
Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product;

Less hazardous chemical syntheses
Wherever practicable, synthetic methodologies should be designed to use and generate substances that possess little or no toxicity to human health and the environment;

Designing safer chemicals
Chemical products should be designed to preserve efficacy of function while reducing toxicity;

Safer Solvents and Auxiliaries
The use of auxiliary substances (e.g., solvents, separation agents, etc.) should be made unnecessary wherever possible and innocuous when used;

Design for energy efficiency
The use of auxiliary substances (e.g. solvents, separation agents, etc.) should be made unnecessary wherever possible and, innocuous when used;

THE TWELVE PRINCIPLES OF GREEN CHEMISTRY(CONT'D)

Use of renewable feedstock
Energy requirements should be recognized for their environmental and economic impacts and should be minimized. Synthetic methods should be conducted at ambient temperature and pressure;

Reduce derivatives
A raw material or feedstock should be renewable rather than depleting wherever technically and economically practicable;

Catalysis
Reduce derivatives - Unnecessary derivatization (blocking group, protection/ deprotection, temporary modification) should be avoided whenever possible. Catalytic reagents (as selective as possible) are superior to stoichiometric reagents;

Design for degradation
Chemical products should be designed so that at the end of their function they do not persist in the environment and break down into innocuous degradation products;

Real time analysis for pollution prevention
Analytical methodologies need to be further developed to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances and

Inherently safer chemistry for accident prevention
Substances and the form of a substance used in a chemical process should be chosen to minimize potential for chemical accidents, including releases, explosions, and fires.

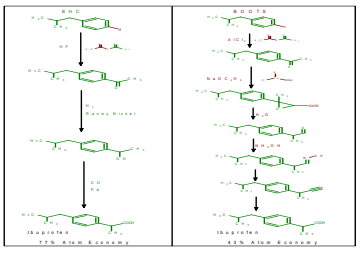
PROGRESS IN GREEN CHEMISTRY (REAL WORLD CASES)

Over the past decade, green chemistry has convincingly demonstrated how fundamental scientific methodologies can be devised and applied to protect human health and the environment in an economically beneficial manner . Significant progress has been made in key research areas, such as *atom economy, alternative synthetic route for feedstocks and starting materials, biocatalysis, green solvent, biosorption, designing safer chemicals, energy* and waste management.

ATOM ECONOMY (Synthesis of Ibuprofen)

Atom economy is one of the fundamental principles of green chemistry. Atom economy looks at the number of atoms in the reactants that end up in the final product and by-product or waste.

% Atom economy = 100 x Relative molecular mass of product / Relative molecular mass of reactants



ALTERNATIVE SYNTHETIC ROUTE FOR FEEDSTOCKS AND STARTING MATERIALS

Production of dimethylcarbonate (DMC) production

DMC is a versatile and environmentally innocuous material for the chemical industry. Owing to its high oxygen content and blending properties, it is used as a component of fuel.

Traditional method for the production of DMC

This method involves the use of phosgene ($COCl_2$) and methanol (CH_3OH) as shown below:

$COCl_2 + 2CH_3OH \rightarrow CH_3OCOOCH_3$ (DMC) + $2HCl$

Alternative route for the production of DMC

This involves the use of copper chloride (CuCl), methanol (CH_3OH), oxygen (O_2) and carbon monoxide.

$2CuCl + 2CH_3OH + 1/2O_2 \rightarrow 2Cu(OCH_3)Cl + H_2O$

$2Cu(OCH_3)Cl + CO \rightarrow 2CuCl + CH_3OCOOCH_3$

BIOCATALYSIS

Bioleaching is the extraction of specific metals from their ores through the use of microrganisms such as bacteria. This is much cleaner than the traditional heap leaching using cyanide in the case of gold extraction.

Extraction of gold

This can involve numerous ferrous and sulphur oxidizing bacteria, such as *Acidithiobacillus ferrooxidans* and *Acidithiobacillus thiooxidans* (also referred to as *Thiobacillus*). For example, bacteria catalyse the breakdown of the mineral arsenopyrite (FeAsS) by oxidising the sulphur and metal (in this case arsenic ions) to higher oxidation states whilst reducing dioxygen by H_2 and Fe^{3+}. This allows the soluble products to dissolve.

$FeAsS(s) \rightarrow Fe^{2+}(aq) + As^{3+}(aq) + S^{0+}(aq)$

This process occurs at the cell membrane of the bacteria. The electrons pass into the cells and are used in biochemical processes to produce energy for the bacteria to reduce oxygen molecules to water. In stage 2, bacteria oxidise Fe^{2+} to Fe^{3+} (whilst reducing O_2).

$Fe^{2+} \rightarrow Fe^{3+}$

They then oxidise the metal to a higher positive oxidation state. With the electrons gained, they reduce Fe^{3+} to Fe^{2+} to continue the cycle. The gold is now separated from the ore and in solution.

GREEN SOLVENT

One of the green solvents is supercritical carbon dioxide ($scCO_2$) which has been

receiving heightening interest and application in green chemistry research because of its unusual properties. Supercritical carbon dioxide refers to carbon dioxide that is in a fluid state while also being at or above both its critical temperature and pressure (Tc = 31.3 ^oC, P_c = 1071 psi (72.9 atm) yielding rather uncommon properties. Supercritical carbon dioxide has been used as a processing solvent in polymer applications such as polymer modification, formation of polymer composites, polymer blending, microcellular foaming, particle production, and polymerization.

Reaction of amines with CO_2 $\longrightarrow$

$RNH_2 + CO_2 \rightarrow RNHCOOH \rightarrow RNH_3^+ RNHCOO^-$

$RNH_2 + 2H_2C(O)CH_2 \rightarrow RN(CH_2CH_2OH)_2$

$H_2C\text{-}O\text{-}CH_2 + CO_2 \rightarrow$ -[COO-CR-C-O-]

(polycarbanates)

BIOSORPTION

Biosorption is one such important phenomenon, which is based on one of the twelve principles of Green Chemistry, i.e., "Use of renewable resources." It has gathered a great deal of attention in recent years due to a rise in environmental awareness and the consequent severity of legislation regarding the removal of toxic metal ions from wastewaters.

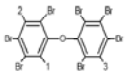
In recent years, a number of agricultural materials such as the following have been used to remove toxic metals from wastewater:

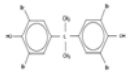
- palm kernel husk,
- modified cellulosic material,
- corn cobs,
- residual lignin,
- wool,
- apple residues,
- olive mill products,
- polymerized orange skin,
- banana husk,
- pine back,
- sawdust,
- coals,
- **MAIZE TASSEL**

DESIGNING SAFER CHEMICALS

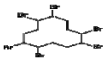
FLAME RETARDANTS

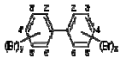
- Flame retardants containing bromine, compared to fluorine, chlorine and iodine have shown to be the most effective and requires a lower loading of materials.
- Brominated flame retardants (BFRs) are structurally diverse group of compounds and BFRs are:
- Polybrominated diphenyl ethers (PBDEs); Tetrabromobisphenol A (TBBPA);





- Hexabromocylodecane (HBCD) and Polybrominated biphenyls (PBBs).





The main *inorganic* flame retardants are:

- aluminium trihydroxide,
- magnesium hydroxide,
- ammonium polyphosphate
- antimony trioxide and *nitrogen-based* flame retardants

ENERGY

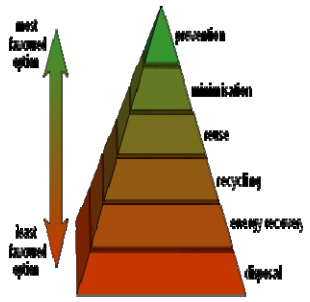
Fossil fuel

- This is dogged with many environmental pollution problems. There is, therefore, a growing need for alternative energy sources to replace fossil fuels. Renewable energy resources that are currently receiving attention include, solar energy, wind energy, hydro energy, fuel cells to mention but four.

Safer petrol

- altering the refinery process to put more aromatics into the petrol pool. This option brings along with exposure of the public to benzene as well as increase in crude oil requirement per litre of fuel;
- addition of ethanol produced from biomaterials to the petrol pool. This has been ongoing in Brazil for some years;
- addition of methyl *t*-butyl ether (MTBE) to the petrol pool. MTBE has high octane.
- use of electric vehicles powered by fuel cells.

WASTE MANAGEMENT



CONCLUDING REMARKS

- The challenges in resource and environmental sustainability require more efficient and benign scientific technologies for chemical processes and manufacture of products.
- Green chemistry addresses such challenges by opening a wide and multifaceted research scope thus allowing the invention of novel reactions that can maximize the desired products and minimize the waste and byproducts, as well as the design of new synthetic schemes that are inherently, environmentally, and ecologically benign.
- Therefore, combining the principles of the sustainability concept as broadly promoted by the green chemistry principles with established cost and performance standards will be the continual endeavour for economies for the chemical industry.
- It is, therefore, essential to direct research and development efforts towards a goal that will constitute a powerful tool for fostering sustainable innovation.
- Green chemistry alone cannot solve the pressing environmental concerns and impacts to our modern era, but applying the twelve principles of green chemistry into practice will eventually help to pave the way to a world where the grass is greener.

CHEERS & THINK GREEN!

Dr. Mark Cesa, IUPAC Committee on Chemistry and Industry: "IUPAC Safety Training Programme"

The IUPAC Safety Training Program

Mark C. Cesa
IUPAC Committee on
Chemistry and Industry

STP Overview 13 Sept 2011.ppt

IUPAC Committee on Chemistry and Industry

Role and Strategic Priorities

- **Projects that share best practice globally**
- **Knowledge transfer to developing countries**
- **Capacity building**
- Public appreciation of chemical science and technology
- Reputation and trust

Provides the IUPAC 'home' for industrial companies

The Safety Training Program

Enables experts from developing countries to learn about safety and environmental protective measures by visiting and working in plants of IUPAC Company Associates in the industrialized world.

Administration

IUPAC Committee on Chemistry and Industry (COCI)
- Recruiting, vetting and approving trainees
- Matching trainees and Host Companies
- Financial support for travel

Host Companies
- Trainees' local expenses
- Development of course of study; training

Selection of Trainees

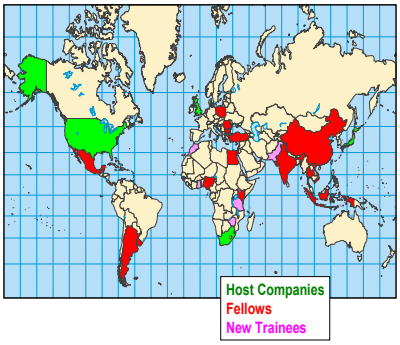
Professional scientists and engineers who are currently:

Involved at a supervisory or managerial level in chemical companies, governmental or scientific institutions, or universities;

Engaged in aspects of safety and environmental protection or in the teaching of these fields;

Influential in their workplaces and within their home country.

Trainees and Host Companies



Responsibilities of Trainees

Utilize learnings within their place of employment

Disseminate knowledge gained in the program throughout home country

Establish new programs to improve safety practices within home country.

File report with IUPAC
- Evaluation of training - host company, content of program, usefulness
- Activities to be undertaken to apply training after return home

Safety Training Program Workshops

Mechanism for follow-up and monitoring of progress

Held at IUPAC Congresses
- Ottawa – 2003
- Beijing – 2005
- Turin – 2007
- Glasgow – 2009
- San Juan - 2011

Trainees present and discuss activities they have pursued since their training

Plenary speakers address topics of concern in the country or region where the Congress is held

Further Information

Application Forms
Brochures
Reports from Trainees
Articles and Publicity
Workshop Summaries

http://www.iupac.org/standing/coci/safety-program.html

Mr. Bertrand Giry, Director, Safety Department, Groupe, Rhodia: "Chemical Industry by-products; impacts and experience sharing"

GIRY Bertrand

Chemical industry by-product

Impact and experience sharing

Private company main aim is profit

- Chemical plant needs an heavy investment
  - Businees plan with a good cash generation
  - Compliant with all regulations
    - Responsible care voluntary
- Setting down casualties, injuries and environmental attempt
- Difficult to take into account without regulations very low probability events

Implementing a new Chemical plant

- All chemical plants need large quantity of **water** for cooling
  - Avoid hydric stressed countryside
- Profitability study needed with return on investment with :
  - main product business plan,
  - by-product cost of remediation, possibility of selling it
  - Pollution cleaning cost.
- Caution : Environmental Regulation change has a large impact
  - investment cost higher (x1.5 at least)
  - Profitability not reach

By products remediation

- "second choice" main products:
  - Selling them on market as low quality grade
  - Retreating them and selling only as "first choice".
- Others by-product ;
  - Environmentally neutral: storage possibility; space needed.
  - Selling possibility : efficient cash for free!!!
  - Neutralizing pollutant : cash and investment consuming.
  - Gas exhaust : carbon credits to be examined

Purification devices

- Always some first step mechanical engineering
- Purely chemical ones
  - Expensive to run on
  - and Easy to manage
  - Neutral product generated
- Biological ones (can clear carbon based molecules, some nitrogen and phosphorus ones)
  - Difficult to etablish : biological floc must be precisely adapted to the pollutant to eliminated and conditions
  - Must be feed up when plant is not producing
  - Can't react easily to production quantity or quality change
  - Floc sample to be kept appart if floc regeneration needed

PANEL DISCUSSION C: CHEMICAL SECURITY

Ms. Nohemi Zerbi, Chemical Sector Specific Agency, US Department of Homeland Security: "US Chemical Sector Specific Agency- Voluntary Chemical Sector Security Programs"

The Office of Infrastructure Protection

National Protection and Programs Directorate
Department of Homeland Security

Organisation for the Prohibition of Chemical Weapons

September 13, 2011

Overall Landscape

Homeland Security

2

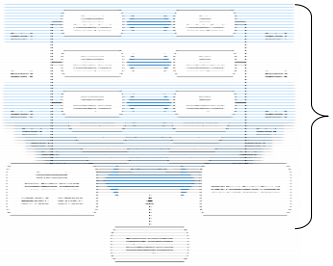
National Infrastructure Protection Plan

- A comprehensive and unifying framework for the Government and private sector to improve protection and resilience of critical infrastructure.
- All-hazards approach.
- Provides a unifying framework for 18 unique sectors, ranging from asset-focused to system- and network-focused.
- Coordinates efforts of Federal partners; owners and operators; and State, local, tribal and territorial governments.
- Outlines roles and responsibilities.
- Describes the information-sharing environment and communications.

Homeland Security

3

Sector Partnership Model



Council functions include comprehensive planning, methodology development, risk assessment, protective programs and resilience strategies, incident management, training, exercises, and identification of research and Ddvelopment requirements

Homeland Security

4

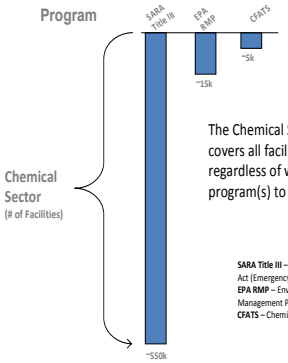
Sector-Specific Agency

- The Sector Specific Agency (SSA) is the primary Federal entity responsible for coordinating the unified effort to protect against and mitigate the effects of risks to critical infrastructure within that sector.
- Work closely with government at all levels and with private sector partners to:
  - Develop protective security programs and resilience strategies;
  - Strengthen partnerships and improve information sharing;
  - Promote education, outreach, and training; and
  - Maintain awareness and communicate with critical infrastructure partners and senior leadership during an incident.
- The Department of Homeland Security (DHS) is the SSA for the Chemical Sector

Homeland Security

5

Chemical Sector Size



The Chemical Sector-Specific Plan covers all facilities within the sector regardless of which, if any, regulatory program(s) to which they belong.

SARA Title III – Superfund Amendments and Reauthorization Act (Emergency Planning and Community Right to Know Act)
EPA RMP – Environmental Protection Agency 's Risk Management Plan
CFATS – Chemical Facility Anti-Terrorism Standards

6

Chemical Sector Coordinating Councils

Government	Private Sector
Department of Commerce	Agricultural Retailers Association
Department of Defense	American Chemistry Council
Department of Energy	American Coatings Association
Department of Health and Human Services	Chemical Producers & Distributors Association
Department of Homeland Security	Compressed Gas Association
Department of Justice	CropLife America
Department of Labor	Institute of Makers of Explosives
Department of Transportation	International Institute of Ammonia Refrigeration
Environmental Protection Agency	International Liquid Terminals Association
Department of State	National Association of Chemical Distributors
Office of the Director of National Intelligence	National Petrochemical & Refiners Association
Chemical Safety Board	Society of Chemical Manufacturers and Affiliates
State, Local, Tribal and Territorial Government Coordinating Council Liaisons	The Chlorine Institute
	The Fertilizer Institute

7

Chemical Sector Programs

- **Information Sharing**
  - **Annual Chemical Sector Security Summit** – The Chemical SSA and the Sector Coordinating Council co-host an annual summit with workshops, presentations, and discussions on subjects of interest to the private sector. Topics for the event include: CFATS implementation, multi-agency harmonization, inspections process, local security resources, cybersecurity, transportation security, theft and diversion, personnel surety, and research and development activities.
  - **Monthly suspicious activity calls** – The SSA sponsors a monthly unclassified teleconference where DHS briefs current physical and cyber threat information including suspicious activity reporting, overseas activity, and cyber vulnerabilities.

Homeland Security

8

Chemical Sector Programs (cont.)

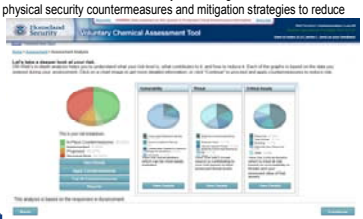
- **Information Sharing**
  - **Biannual classified briefing** – The SSA sponsors a classified briefing for cleared industry representatives twice a year. The intelligence community provides briefings on both physical and cyber threats, as well as other topics of interest for chemical supply chain professionals.
  - **Security Awareness Guide** – to assist owner and operators in their efforts to improve security at their chemical facility and to provide information on the security threat presented by explosive devices and cyber vulnerabilities.
  - **Chemical Sector Training Resources Guide –** The guide contains a list of free or low-cost training, Web-based classes, seminars, and documents that are routinely available through DHS.
  - **Homeland Security Information Network –** HSIN-Chemical Sector is the primary information-sharing platform for the Chemical Sector. The sector does not have an Information Sharing Analysis Center.

Homeland Security

9

Chemical Sector Programs (cont.)

- **Voluntary Chemical Assessment Tool**
  - Developed to provide the means for owners and operators of non-tiered facilities to identify their current risk level.
  - The Web-based tool facilitates a cost-benefit analysis allowing users to select best combination of physical security countermeasures and mitigation strategies to reduce overall risk.



Homeland Security

Unclassified

10

Chemical Sector Programs (cont.)

- **Training**
  - **Web-Based Chemical Security Awareness Training** – An interactive tool available free to chemical facilities nationwide to increase security awareness. The training is designed for all facility employees, not just those who have security responsibilities.
  - **Security seminar and exercise series with state chemical industry councils** – A collaborative effort between various state chemical industry councils aimed at fostering communication between facilities and their local emergency response teams by encouraging representatives to share their insight, knowledge, and experiences during a facilitated tabletop exercise

Homeland Security

11

Chemical Sector Programs (cont.)

- **Exercises**
  - **Cyberstorm III** – Congressionally-mandated exercises that examine the Nation's cybersecurity preparedness and response capabilities.
  - **Infrastructure Protection Sector-Specific TTX Exercise Program (IP-SSTEP)** – Provides National Level Exercise 09 materials to owners and operators to hold their own tabletop exercises.
    - Exercises developed with the purpose of creating an opportunity for public and private critical infrastructure stakeholders and their public safety partners to address gaps, threats, issues, and concerns identified in previous exercises and their after-action processes affecting the Chemical Sector.
    - Allows participants the opportunity to gain an understanding of issues faced prior to, during, and after a terrorist threat/attack and the coordination with other stakeholders, both public and private, regarding their facility.

Homeland Security

12

Chemical Sector Programs (cont.)

- **Cybersecurity**
  - **Industrial Control Systems Joint Working Group (ICSJWG)** – Forum for 18 sectors to discuss and address cybersecurity issues impacting industrial control systems.
    - DHS and the private sector developed the *Roadmap to Secure Control Systems in the Chemical Sector*, published in September 2009. The Roadmap proposes a comprehensive plan, which includes goals and milestones for improving the security, reliability, and functionality of industrial control systems over the next 10 years.
    - Currently forming an implementation working group.
  - **Cybersecurity Evaluation Tool (CSET)** - SSA promotes the DHS developed CSET and in the past facilitated four technical assistance sessions.

Homeland Security

13

Chemical Sector Programs (cont.)

- **Research and Development**
  - **Integrated Project Team (IPT)** - Involved in two Capstone IPTs : Chemical/Biological and Infrastructure Protection. SSA Co-Chairs the Chemical Sub-IPT with the Science and Technology Directorate and Office of Health Affairs. Three thrust areas for Chemical-Sub IPT: chemical analysis; chemical detection; and chemical response and recovery.
  - **SCC R&D Working Group** – Formed in 2009. Priorities are: studying toxicity; tracking toxic chemicals during transport; mitigating chemical releases; developing effective decontamination methods; and reducing the explosive potential of certain chemicals. SCC has ranked current projects and has been briefed on all projects.
- **International Activities**
  - **Strategy -** The SSA has developed an international strategy with the mission to develop and foster partnerships with the international community in order to promote a global culture of protection and resilience in the Chemical Sector.

Homeland Security

Chemical SSA Contact Information

- Web site: www.dhs.gov/chem-voluntary-resources
  - Email: ChemicalSector@dhs.gov

Homeland Security

Homeland Security

For more information visit:
www.dhs.gov/criticalinfrastructure

Nohemi Zerbi, PE, LPP
Chemical Engineer
703-603-5117 nohemi.zerbi@dhs.gov

Mr. W. Wielezynski, President of Polish Chamber of Chemical Industry/PIPC:" Cooperation between stakeholders in promoting chemical safety and security"

Cooperation between the OPCW and stakeholders in promoting chemical safety and security

Polish Chamber of Chemical Industry (PIPC) is the organization representing chemical companies towards domestic and foreign government and non-government organizations. PIPC is the only Polish organization being a member of CEFIC and is authorized to represent chemical industry on international forum.

Polish Chamber of Chemical Industry has a long standing relationship with the OPCW. We have contributed substantively to its various relevant events. Polish Chamber very much value the recommendations and encouragement of Governments promote – via the OPCW platform - safety and security of chemical facilities and in transportation and engage all the relevant stakeholders. Enhancing chemical safety and security culture will provide greater assurance that the national chemical security systems will accomplish their functions of preventing, detecting and responding to, theft, sabotage, unauthorized access, illegal transfer of chemical material and the associated facilities and transport.

With the rapid development of chemical industry production all over the world, the question of security in the area of legitimate production, transportation and use of chemicals is assuming a growing importance. Chemical industry could be targeted by terrorist, and therefore it requires advice, assistance and common strategically approaches to tackle this dangers.

The growing threat of terrorist attacks with use of chemicals requires introduction in all countries more stringent measures in the sphere of chemical safety and security. This will require serious financial resources and expertise which chemical industry does not have. As the leading international organization devoted to preventing the hostile use of toxic chemicals, and with close ties to the chemical industry, the OPCW is well-placed to serve as a meeting ground for governments and industry to discuss chemical security. The OPCW could facilitate and promote joint approaches combining governments and industries to develop and introduce effective safety and security measures at global level.

OPCW should offer a platform for discussion about contributions of relevant governments, chemical industries, international organisations, NGO's, academia and independent experts against a misuse of toxic chemicals and to promote chemical safety and security in the participating countries.

The cooperation between the OPCW and all the relevant stakeholders against misuse of toxic chemicals and enhancement of chemical safety and security will soldify mutual relations and build them on a solid partnership basis. It would create a material basis of the cooperation and strategic relations in time of OPCW transformation.
Lessons should be learnt from CEFIC programs in the area of safety and security, national and industry approaches, programs in the International Atomic Energy Agency

(IAEA) and WHO in terms of promoting safety and disseminating best practices in the field of safety and security in nuclear and biological materials and promoting health regulations.

The main dimension of the OPCW work should be provision of assistance to help Member States establish a strong chemical security culture. An effective chemical security culture can result in a significant increase in the effectiveness of the security of chemical material and associated facilities and transport. Responsible Care programme has now incorporated a Security Code which addresses facility, cyber and transportation security requiring companies to conduct comprehensive security vulnerability assessments of the facilities, implement security enhancement and to create security management systems. ICCA, CEFIC, Member States, national chemical industry associations, scientific community, and the relevant international organisations involved in this issue. The OPCW should work together with the chemical industry associations and relevant government agencies in raising awareness and improving chemical safety and security best practices, exchanging of information and building networks on relevant issues related to chemical safety and security. OPCW should keep States Parties fully informed of developments in the sphere of chemical safety and security best practices disseminate information and views from the National Authorities and relevant national agencies, chemical industry.

OPCW should develop regional programmes, with the involvement of stakeholders and their expertise as appropriate, to promote chemical safety and security in the participating countries. These programmes should be seen as a process of gathering and sharing relevant knowledge, expertise and practical experience, and training to be offered the States Parties and the chemical industry. These regional programmes should also offer a platform for discussion of the practical issues relating to the contributions that participating countries can make to support prevention, preparedness and response to misuse or release of toxic chemicals and the achievement of the non-proliferation of weapons of mass destruction.

At national level the OPCW should cooperate with relevant national and international partners to build comprehensive national and regional approaches in promoting security of the activities and facilities related to Chemical, Biological, Nuclear and Radiological materials.

Polish chemical industry will initiate - within the regional programmes of cooperation – establishment of the centre of excellence in chemical safety and security. The centre will offer a platform for training, best practices exchanges, on practical issues relating to prevention, preparedness and response to misuse or release of toxic chemicals and chemical safety and security.

The centre of excellence in chemical safety and security will to enhance chemical safety and security culture and to assist national chemical security systems in preventing, detecting and responding to theft, sabotage, unauthorized access, illegal transfer of chemical material and the associated facilities and transport. It will promote cooperation among relevant stakeholders and actors to address the growing risks associated with terrorism, including government agencies, related industries, scientific institutions and international organisations and partners. The centre will promote improvement of the capacities of participating stakeholders in regard to comprehensive

implementation of the relevant international provisions, including UNSC 1540 Resolution.

Mr. Wicher Mintjes, Emergency Services & Security Expertise Center Dow Benelux B.V.: "Security Code for Chemical Facilities"

Wicher Mintjes

Emergency Services & Security Expertise Center

Dow Chemical

2

Chemical Industry Security

3

Chemical Industry Security

International legislation

- **Chemical Weapon Convention, International Ship & Port Facility Security Code**

Export controls

- **Dual Use Goods, Drug precursors, Explosive precursors**

European Initiatives

- **Critical Infrastructure Protection, CBRN**

Transport Security

- **ADR**

National initiatives

- **Covenants**

4

Chemical Industry Security

Cefic needs to be engaged

- **chemical industry key player in many regulations**
- **expertise**

Dialogue Chemical Industry with all relevant partners

5

Chemical Industry Security

Main themes

- **Security programs need to be risk-based**
- **Streamline various regulations and initiatives**
- **Avoid overlapping requirements**
- **Combine inspections where possible**
- **Ensure level playing field**

6

European Responsible Care®
Security Code

7

European RC security code

Designed to help companies achieve continuous improvement in security performance

- **using a risk-based approach to identify, assess and address vulnerabilities,**
- **prevent or mitigate incidents,**
- **enhance training and response capabilities, and**
- **maintain and improve relationships with key stakeholders and authorities**

8

European RC security code

Fully embedded in the existing Responsible Care program

Based on a similar code from the American Chemistry Council developed in 2002

9

European RC security code

Describes fundamental management practices of protection against any kind of criminal, malicious and cyber acts

Affects production, storage, distribution and transportation of products as well as liaison with suppliers and customers

Shared responsibility requiring actions also by other parties such as customers, suppliers, service providers and governmental security agencies

Formally adopted by Cefic in November 2010

10

Seven Management Practices

1. *Leadership Commitment*
2. *Risk Analysis*
3. *Implementation of Security Measures*
4. *Training, Guidance and Information*
5. *Communications, Dialogue and Information Exchange*
6. *Response to Security Threats and Incidents*
7. *Audits, Verification and Continuous Improvement*

11

Security Code Implementation

Implementation through National Chemical Associations

Guidance document for implementation of the Security Code

- **Developed by 3 major chemical companies**
- **To be adopted by Cefic in September 2011**

12

Thank you.

13

SESSION 6: CLOSING PLENARY SESSION

Dr. David B. F. Faraday, Evolve Leadteam Ltd., United Kingdom

International Co-operation Session

Dr. David Faraday

Formal Presentations

- The CWC and International Co-operation
  Dr. Faraday
- Women in Chemistry
  Professor Gurib-Fakim
- Industry Applications from Natural Products Chemistry"
  Professor Aziz
- Enhancing the Effectiveness of International Co-operation Programme
  Professor Cetto
- Effective Implementation of the CWC
  Mr. Onate

Formal Presentations

- International Co-operation for Promoting Centres of Excellence
  Professor Torto
- Regional Co-operation
  Professor Zaitsev
- Green Chemistry – Equipping and Building Chemical Science for Sustainable Development
  Professor Okonkwo
- Chemistry Can Make Mankind Safer
  Professor De-Yi Wang

OPCW CONFERENCE ON INTERNATIONAL COOPERATION AND CHEMICAL SAFETY & SECURITY

SUMMARY OF ISSUES MADE AT INTERNATIONAL COOPERATION SESSIONS

DEFINATION OF INTERNATIONAL COOPERATION

- COOPERATION THAT IS BASED ON MUTUAL BENEFITS TO THE DEVELOPMENT OF THE PARTIES AND PROMOTES INDIVIDUAL CAPACITIES TO BOTH PARTIES
- RESPECT THE SOVEREIGNTY AND AUTONOMY OF BOTH INSTITUTIONS
- PROMOTES TRANSPARENCY AND ACCOUNTABILITY

OBJECTIVES OF ACTIONS

- FORGE NEW FRIENDSHIP AND DEEPENS OLD ONES
- BROADEN EDUCATIONAL FOCUS AND BUILD INTERNATIONAL RELATIONS
- DEEPEN ENGAGEMENT OF ALL PROFESSIONALS IN AGREED ACTIVITIES
- EXPAND THE LEARNING SPACE AT ALL EDUCATIONAL LEVELS
- BROADEN EMPHASIS IN EDUCATIONAL EXPOSURE TO OTHER CULTURES AND LANGUAGES

OBJECTIVE OF ACTION

- INCREASE INTERNATIONAL EXCHANGE OF STUDENTS AND STAFF
- RE-ENGAGE OURSELVES WITH EDUCATORS AND POLICY MAKERS IN UN BODIES
- SOLVE GLOBAL CHALLENGES WHOSE CAUSES AND REMEDIES ARE LEAST KNOWN

OBJECTIVES OF ACTION WITH RESPECT TO OPCW CONFERENCE

- STRENGTHEN EXISTING PROGRAMMES IN TERMS OF REACH AND SCOPE/RANGE
- RECOGNIZE THE INAPPLICABILITY OF "ONE SIZE FIT" FOR ALL.
- FOR OPCW PROGRAMMES TO BE EFFECTIVE IT MUST RECOGNIZE AND ADDRESS THE DIFFERING UNIQUE NEEDS TO PROMOTE ECONOMIC, CULTURAL AND TECHNOLOGICAL DEVELOPMENT WITHIN THE REALM OF PEACEFUL USE OF CHEMISTRY

OBJECTIVES OF ACTION WITH RESPECT TO OPCW CONFERENCE

- PROMOTE ACTIVITIES THAT AWAKEN THE IMAGINATIONS AND INTERESTS OF THE YOUTH AND WOMEN
- BUILD CAPACITIES AND CAPABILITY OF INDIVIDUALS AND INSTITUTIONS
- INTRODUCE NEW PROGRAMMES

WAY FORWARD

- EXPAND EXISTING PROGRAMMES TO INCLUDE STANDARD SETTINGS IN AREAS LIKE ETHICS, INDIGENOUS KNOWLEDGE AND CHEMICAL USE
- INTRODUCE RESOURCE USE MINIMIZATION TO INCREASE SUSTAINABILITY OF GROWTH
- PROMOTE NETWORKS AND COOPERATION AMONGST NEW AND OLD PARTNERS IN NEW AREAS OF MUTUAL INTEREST

Some Key Issues

- There is a demand for a more Regional focus in OPCW Technical Co-operation activities, so that National and Regional needs can be addressed.
- There is a need to build directly on the output from the Article XI workshop and establish concrete and practical measures for the further implementation of Article XI.

Some Key Issues

- The OPCW should learn from the experience of others international organisations engaged in International Co-operation activities, most notably the vast experience in the IAEA.
- Engage with the training of young chemists and engineers, not directly but by 'catalysing' links between the OPCWs stakeholders in academia, industry and govenerment.

Some Key Issues

- Consider the future direction and evolution of the OPCWs role and goals.
- Continue the development of a strategy for International Co-operation in the field of Chemistry.

Thank You

Opportunities

- Building on /expanding established successes in OPCW International Co-operation Programmes
- Engaging young people (especially girls) in chemistry
- Utilising rapid growth in developing economies
- Sharing initiatives between developing countries:
  - utilising natural resources
  - creating new chemical business initiatives
  - Establishing good practice

Opportunities

- Potential measures identified in the Article XI workshop
- Employing some /all of the 11 proposed principles of International Co-operation
- Taking a leadership role in promoting International Co-operation in Chemistry
- Regulation of toxic substances beyond scheduled chemicals

Challenges

- Helping women establish long-term careers in Chemistry
- Rapid growth presents challenging time scales
- Exploiting natural resources in a sustainable way
- Establishing an plan of action based on the Article XI workshop initiatives

Challenges

- Implementing the proposed principles of International Co-operation
- The world complex and getting more so – the field of chemistry is no exception
- Legislation of CWC at a national level

REPORTS FROM PANELS

RAPPORTEUR REPORT - INTERNATIONAL COOPERATION

Dr. David B.F.Faraday, Evolve Leadteam Ltd., United Kingdom

Brief Summary of formal presentations:

Dr. David Faraday (Evolve Leadteam Ltd, United Kingdom) presented an overview of the OPCWs successful portfolio of International Co-operation Programmes and briefly reported on the success of the recent Article XI workshop.
Professor Ameenah Gurib-Fakim (Centre for Phytotherapy Research, Mauritius), gave a thought-provoking account of the challenges faced in engaging women in chemistry across Africa.
Professor Ramlan Aziz (Institute of Bioproduct Development, Malaysia) outlined an innovative approach to the commercial exploitation of natural products chemistry.
Professor Ana Maria Cetto (Institute of Physics, National Autonomous University of Mexico) proposed a set of eleven guiding principles, outlining a new approach to International Co-operation.
Mr. Santiago Oñate (Director, Office of the Legal Adviser, OPCW) gave a legal perspective on the implementation of the Chemicals Weapons Convention.
Professor Nelson Torto (Rhodes University, South Africa) outlined the characteristics and requirements for effective collaborations. He also reviewed examples of networking and collaboration across Africa and proposed some alternative approaches.
Professor Volodymyr Zaitsev (National University of Kyiv, Ukraine) gave a stimulating presentation that considered how the remit of the OPCW might change, with the focus being placed on preventing the misuse of chemicals through promoting peaceful use, and how this might be supported through the development of Regional Centres.
Professor Jonathan Okonkwo (Department of Environmental, Water and Earth Sciences, Tshwane University of Technology) presented a comprehensive overview of the principles of Green Chemistry and shared some real world examples of how it can be successfully applied.
Professor De-Yi Wang (Sichaun University, Peoples Republic of China) addressed the subject of fire retardants, providing us with an overview of the chemistry of fire and how retardants help delay or stop fire.
Professor Shem Wandiga introduced the interactive session by giving an overview of the key themes that came out of these formal presentations and he identified the 'way forward' for the subsequent discussions:

- Expand existing programmes to include standard settings in areas like ethics, indigenous knowledge and chemical use.
- Introduce resource use minimisation to increase sustainability of growth.
- Promote networks and co-operation amongst new and old partners in areas of mutual interest.

OPCW CONFERENCE ON INTERNATIONAL COOPERATION AND CHEMICAL SAFETY & SECURITY

SUMMARY OF ISSUES MADE AT INTERNATIONAL COOPERATION SESSIONS

DEFINATION OF INTERNATIONAL COOPERATION

- COOPERATION THAT IS BASED ON MUTUAL BENEFITS TO THE DEVELOPMENT OF THE PARTIES AND PROMOTES INDIVIDUAL CAPACITIES TO BOTH PARTIES
- RESPECT THE SOVEREIGNTY AND AUTONOMY OF BOTH INSTITUTIONS
- PROMOTES TRANSPARENCY AND ACCOUNTABILITY

OBJECTIVES OF ACTIONS

- FORGE NEW FRIENDSHIP AND DEEPENS OLD ONES
- BROADEN EDUCATIONAL FOCUS AND BUILD INTERNATIONAL RELATIONS
- DEEPEN ENGAGEMENT OF ALL PROFESSIONALS IN AGREED ACTIVITIES
- EXPAND THE LEARNING SPACE AT ALL EDUCATIONAL LEVELS
- BROADEN EMPHASIS IN EDUCATIONAL EXPOSURE TO OTHER CULTURES AND LANGUAGES

OBJECTIVE OF ACTION

- INCREASE INTERNATIONAL EXCHANGE OF STUDENTS AND STAFF
- RE-ENGAGE OURSELVES WITH EDUCATORS AND POLICY MAKERS IN UN BODIES
- SOLVE GLOBAL CHALLENGES WHOSE CAUSES AND REMEDIES ARE LEAST KNOWN

OBJECTIVES OF ACTION WITH RESPECT TO OPCW CONFERENCE

- STRENGTHEN EXISTING PROGRAMMES IN TERMS OF REACH AND SCOPE/RANGE
- RECOGNIZE THE INAPPLICABILITY OF "ONE SIZE FIT" FOR ALL.
- FOR OPCW PROGRAMMES TO BE EFFECTIVE IT MUST RECOGNIZE AND ADDRESS THE DIFFERING UNIQUE NEEDS TO PROMOTE ECONOMIC, CULTURAL AND TECHNOLOGICAL DEVELOPMENT WITHIN THE REALM OF PEACEFUL USE OF CHEMISTRY

OBJECTIVES OF ACTION WITH RESPECT TO OPCW CONFERENCE

- PROMOTE ACTIVITIES THAT AWAKEN THE IMAGINATIONS AND INTERESTS OF THE YOUTH AND WOMEN
- BUILD CAPACITIES AND CAPABILITY OF INDIVIDUALS AND INSTITUTIONS
- INTRODUCE NEW PROGRAMMES

WAY FORWARD

- EXPAND EXISTING PROGRAMMES TO INCLUDE STANDARD SETTINGS IN AREAS LIKE ETHICS, INDIGENOUS KNOWLEDGE AND CHEMICAL USE
- INTRODUCE RESOURCE USE MINIMIZATION TO INCREASE SUSTAINABILITY OF GROWTH
- PROMOTE NETWORKS AND COOPERATION AMONGST NEW AND OLD PARTNERS IN NEW AREAS OF MUTUAL INTEREST

RAPPORTEUR REPORT - CHEMICAL SAFETY

ORGANISATION FOR THE
PROHIBITION OF CHEMICAL WEAPONS

Chemical Safety Management Session Summary and Recommendations

Chemical Safety Management

- The global handling, storing, processing, and transportation of hazardous chemicals (especially at industrial facilities) must be managed in a holistic public/private risk management framework using a systems oriented management approach.
- Focus is on the management of accidental risk from design failures and operating actions leading to unnecessary hazards.
- There is a strong business case for implementing major hazards safety management systems – the value is in preventing the loss of lives, preserving the integrity of operations and protecting the environment.

2

Chemical Security Management Objectives

- A system to ensure the security of the chemicals to protect workers, the public, and the environment from harm
- A management system for preventing or minimizing the consequences of intentional malicious releases of toxic, reactive, flammable, or explosive chemicals
- Security of chemicals to reduce the risks of exposure from misuse of chemicals (theft, diversion, abuse)

Chemical Safety and Security Management

Convergence

Commonality and Synergies

- Common hazards
- Similar failure mechanisms (intent is different, accidental v. deliberate)
- Similar consequences
- Some similar strategies for prevention, detection, mitigation, response

French SSSF (Philippe Louvet, CEB)

- French SSSF – Main mission is the production, packaging, storage, and delivery of SW or CW related agents need for purposes not prohibited by CWC (scheduled and non-scheduled chemicals)
- Explained how this facility is designed and safely conducts operations –
  - Inherent safety: suppress or substitute hazardous substances as first priority
  - Engineering design and safety controls added to reduce risk as second priority
  - Operational procedures, training and policies as third priority
  - Mgmt controls – Ex; Campaign – need to have onsite authorization Level C4 including SME

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Problem Statement

- Chemical safety requires continuous effort to achieve a high level of safety performance
- Current options (from regulations, to regional voluntary organizations and efforts, to various industry programs) alone do not reach as broadly as is necessary to produce the necessary support and change
- There remains a need for global governmental/private leadership on chemical safety
- There needs to be an additional thrust, oversight, and support on this topic
- OPCW has to develop a plan to address these issues

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IUPAC Safety Training Program (Mark Cesa, IUPAC)

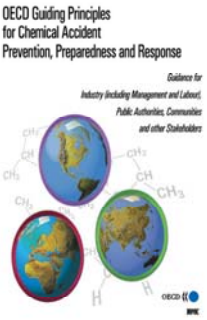
- Safety training program for enabling experts from developing countries to learn about safety and environmental protective measures
- Each scientist or engineer is assigned to an IUPAC Company Assoc in an industrialized country. Typically 1-3 weeks.
- In recent years, Fellows from Turkey, Egypt, Nigeria, Kenya, China, and Uruguay, have received training at host Companies in the U.S.A., Japan, South Africa, and UK.
- Students then utilize learnings within place of employment and disseminate knowledge gained in home country; file report with IUPAC
- Further information at www.iupac.org/standing/coci/safety-program.html

6

Article XI Implementation
OPCW Role in Chemical Safety

- OPCW has the capacity to bring together regulators, scientists and stakeholders.
- OPCW has an excellent track record in dealing effectively and globally with chemical issues and can put the same structure, organization, and resources to bear on this related problem
- OPCW is well-positioned to tackle longer-term challenges
- OPCW can organize through the existing structure a sustained effort to educate, exchange information, and provide guidance on new methods and approaches, and developing practical tools for use in decision-making on chemical safety.

Share Best Practices



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Monitor Performance

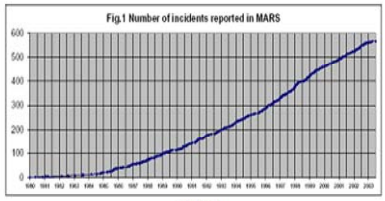
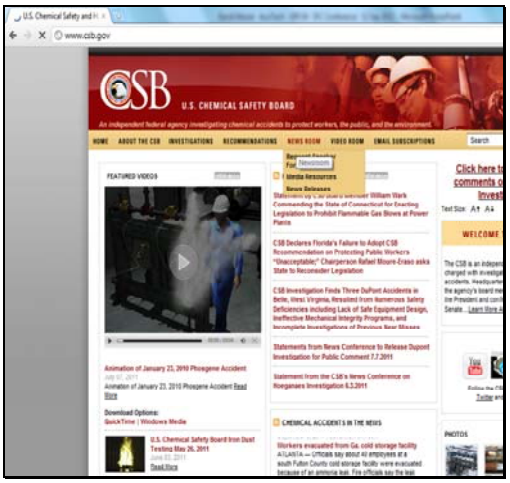


Figure 1
Sources: "Status of the Major Accident Reporting System"
(MARS, Michalis, 10th and 11th meetings of the Committee of the Seveso Competent Authorities)

10

Share Lessons Learned

11



Article XI Implementation
Recommendations

- ***Recommendation*** 1 – to continue seminars on a regular basis for awareness and education and exchange of information and best practices
  - Seminars oriented towards Member States to determine sensitize to the needs and to develop specific plans within their regions or countries and to discuss how to oversee and promote chemical safety management
  - Seminars oriented towards industry within the Member States or regions to promote real impacts on actual chemical safety practices at the user level
  - A training plan will then need to be developed to define the scope, types of training, approach, curriculum, training schedule, logistical information, responsibilities, and estimated resources necessary to meet the training objectives.
  - Involvement of industry, universities

Article XI Implementation Recommendations

- ***Recommendation*** 2 – to develop guidance on how to encourage all stakeholders to adopt best practices in chemical safety management
  - Public/private level
  - Particularly within the user community – the 'business case for chemical safety management' must be explained
  - Metrics and measurement
  - Leadership training and guidance

Article XI Implementation Recommendations

- ***Recommendation*** 3 – to develop guidance on sources of and technical applications of best practices in chemical safety management
  - References available
  - "Model" program(s)
  - *Prevention of Major Industrial Accidents (ILO, Geneva, 1991).*
  - *Safety in the Use of Chemicals at Work (ILO, Geneva, 1993).*
  - United Nations Conference on Environment and Development (UNCED): *Agenda 21 (Chapter 19 on environmentally sound management of chemicals). Rio de Janeiro, Brazil, 1992.*

Article XI Implementation Recommendations

- ***Recommendation*** 4 – to provide access to tools or sources of technical applications for simple, reliable methods and tools for the analysis and management of hazards
  - World Bank Hazards Analysis software (1985)

OPCW practice of chemical safety management: objectives, status, priorities

- Need to set priorities and a plan for chemical safety and security implementation
- Consider establishing a technical steering committee to establish key learnings and to vet ideas
- Recognize that chemical safety and security is a complex issue and requires different approaches
- Potential role for OPCW to identify key areas of assistance through analysis and strategic plan and to then provide a platform to assist in engaging parties for finding solutions

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OPCW practice of chemical safety management: objectives, status, priorities

- OPCW should not be reinventing the wheel but instead building on long history of chemical safety management and ongoing efforts of others
- Scope of audience for OPCW work is potentially unknown and very large, particularly if one includes end users; small and medium sized entities may be a priority and so scope is large; limits on the program scope may be required as a result
- OPCW should encourage and invest in such proven programs as IUPAC training program and Responsible Care

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OPCW practice of chemical safety management: objectives, status, priorities

- OPCW should network and make available references and best practices
- OPCW should consider funding of such programs as IUPAC training

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OPCW practice of chemical safety management: objectives, status, priorities

- Organize a site support team to be dispatched on request to make audits or provide technical assistance to site, region, or member state
- Regional training should be conducted

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OPCW practice of chemical safety management: objectives, status, priorities

- African problems are quite different – priorities were recorded in 2010; regulations are not available at many countries; technologies are very dated; OPCW can help establish 1) regulations such as Stockholm Convention model 2) regional training 3) IUPAC training (Note: SAICM is doing a lot of good work in Africa)
- Africa has established very helpful networks that should be leveraged as an example of a regional approach; OPCW can help with upgrading the labs; African countries need help with disaster management

21

OPCW practice of chemical safety management: objectives, status, priorities

- Leadership is essential; culture
- Scope of chemical safety needs to be defined (acute catastrophic, chronic, smaller scale); Determination should be considered within scope
- Along entire supply chain there needs to be guidance and training
- Ethical aspects of chemical safety to be included

22

OPCW practice of chemical safety management: objectives, status, priorities

- Regulatory enforcement agencies may not have the required knowledge or skills – potential focus area
- Laboratory infrastructure for actual analytical work is lacking; tools are missing back in the company or member state; funding or equipment exchange

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Conclusions

- Chemical Safety Management has become an internationally accepted safety management practice and yet there is much work to be done
- OPCW has an obligation and an opportunity to encourage the safe and secure use of chemicals
- OPCW is in a unique position in the world to promote chemical safety
- A specific plan for how to achieve Article XI with a focus on needs of the Member States seems appropriate

Rapporteur's Report on the Discussions on Chemical Security

13 September 2011

- The scene for the work on chemical security was set by the statement by the Director General Ambassador Üzümcü during the opening session yesterday: "Enhancing chemical safety and security in the areas commercial production, transportation and use of chemicals and biochemical materials is becoming even more important. Promoting a chemical security culture will provide greater assurances that national chemical security systems can perform their functions of preventing, detecting and responding to theft, sabotage, unauthorised access and illegal transfer of chemical material from their associated facilities or during their transportation." The Director-General further underlined that: "As the singular international organisations devoted to preventing the hostile use of toxic chemicals and with close ties with the chemical industry, the OPCW is well-placed to serve as a forum for governments and industry to discuss concerns related to chemical security. Working in partnership with many of you here today, the OPCW can develop a platform for raising awareness, disseminating best practise in the chemical industry. Only by working together as multiple stakeholders, including with the chemical industry and scientific community can we accomplish the goals of the CWC, especially in relation to national implementation, assistance and protection against chemical weapons and the achievement of universality."

- The statements made and views expressed by participants during this conference have supported the Director-General's statement that the OPCW is well placed to serve as a forum for governments and industry to discuss issues related to chemical security and a number of initiatives and support for this was expressed during the conference.

- The European Union representative informed that the support for chemical safety and preparedness against misuse of toxic chemicals is among the priorities of the European Union with significant financial resources for the next programme of EU support for the OPCW to be initiated in coming months. Also the US Delegation in a statement informed about the donation 500 000 USD for the OPCW programmes in chemical safety and security.

- In the media press release prior to the Conference, the United States stressed that: "The conference will seek to enhance support for the objectives of the Chemical Weapons Convention by focusing on the

essential role that it plays in ensuring that chemistry is used exclusively for the good of human kind; this includes the areas of chemical safety, security and international cooperation. Strengthening safety and security at chemical plant sites and in transportation is essential in preventing the misuse and/or unintended release of toxic chemicals."

- We also received in the chemical security segment concrete commitments and proposals from the participating countries. For example, ASEAN countries stated that: "The member states of the ASEAN region emphasize the need for a region-wide mechanism on safety and security of chemicals, including mechanisms for tackling chemical accidents and incidents. The Member States of the ASEAN Region wish to express once again their support of the initiatives of the OPCW in promoting peaceful uses of chemistry and chemical safety and security and look forward to a vibrant exchange of technical knowledge and expertise with other CWC member states in this area during the Conference."

- The delegation of Kazakhstan invited the OPCW and interested countries and organisations for the "International Program on Promoting Chemical Safety and Security", to be initiated in Astana, Kazakhstan, in the spring of 2012. The programme will initiate efforts to establish a permanent international centre in Kazakhstan on the prevention of misuse of toxic chemicals and chemical safety and security.

- During the interactive session on Chemical Security this morning, Poland announced that intends to establish a Centre of Excellence (CoE) to support the States Parties seeking assistance in establishing a culture of chemical security and the implementation of best practices.

- The interventions during this conference have clearly indicated the willingness by stakeholders as governments, chemical industry associations and others to engage in this process. In this endeavour, the support from chemical industry will be critical as in the end it is industry practice that will prevent access to toxic chemicals for hostile purposes.

- The globalisation of chemical industry, including production and trade, makes establishing a culture of chemical security and implementing best practises a priority for an increasing number of countries.

- It was also recognised that many countries will not have the resources to put extensive programs in place and will seek the support from the international community. In doing this it must be recognised that

“no one size fits all” and the support offered must take this into account and the measures developed must be done in a constructive dialogue with the States Parties which are requesting assistance to establish a culture of chemical security and in the implementation of best practices.

- While many large companies have their own chemical security procedures in place, support might be requested particularly from small and medium size companies that lack the expertise and resources to take effective action.

- It was also made very clear that the only effective way to provide support is in close cooperation with the organisations and entities that are already engaged in this process, to avoid “reinventing the wheel” and duplication in this respect and effectively make best use of the available resources. Consequently, only by working together with all stakeholders can the OPCW develop as a platform for raising awareness and disseminating best practices in the chemical industry.

- The ideas presented during this conference have provided an excellent background for the practical work that now will commence in establishing the OPCW as a platform for the enhancement of chemical security.

- The OPCW is looking for further commitments and proposals.

FURTHER THOUGHTS FROM THE CONCLUDING SESSION

International Cooperation

Discussions during the interactive session on International Cooperation covered a variety of subjects including the importance of ethics in chemistry; the exchange of good practices in business and entrepreneurship; the enhanced use of web-based learning tools; the value-added of a regional approach to International Cooperation; lessons learned from the experience and practice of other international organisations, such as the IAEA, in the area of International Cooperation; the need to closely follow developments in chemistry-related science and technology and to take these developments into account in the respective programmatic areas of the OPCW; and the benefit that States Parties can derive from activities and measures related to Article XI of the Convention.

In informal presentations participants furthermore shared successful examples for intra- and inter-regional cooperation in the development of OPCW activities. Issues related to ethics in chemistry were addressed in detail, in particular challenges related to academic research in developing countries and their own chemical industries.

It was suggested that there is a need for the international exchange of good practices in business and entrepreneurship.

It was further suggested that the use of web-based learning tools could be strengthened regarding topics related to the implementation of the Chemical Weapons Convention, including ethics, awareness-raising, and broader subjects related to intellectual property rights and innovation, entrepreneurship, business practices and safety and security. It was highlighted that some training courses covering these subjects already exist and participants recalled that a meeting on Article XI of the Convention, held in November 2010, put forth a recommendation to further strengthen these efforts.

Participants highlighted the value-added of the establishment of Regional Centres and it was noted that existing national and regional bodies could be helpful in this regard.

Participants took note of the IAEA strategy for International Cooperation which presented a clear vision regarding the Organisation's technical assistance activities. It was highlighted in this regard that IAEA State Parties displayed a high level of commitment to these activities. Participants were also informed that the OPCW has started the process of developing a strategy for International Cooperation but noted that progress so far has been limited; participants concluded that the IAEA experience in International Cooperation could serve as a model for the OPCW's activities in this regard.

A number of contributions recalled the outcome of the Article XI workshop of November 2011 and reiterated the need for follow-up measures and practical implementation of the actions proposed. Participants further pointed out that the stakeholders of the Convention in government, academia and industry could make valuable contributions in implementing these measures.

Finally, it was emphasised that the OPCW should further strengthen its partnership with industry and academia, e.g. by promoting the provision of CWC material in university curricula.

Chemical Safety

The interactive session started with an overview on the subject of "Chemical Safety Management". It was highlighted that the global handling, storing, processing and transportation of hazardous chemicals, in particular at industrial facilities, should be managed in a holistic public-private risk management framework. An emphasis was thereby set on the management of accidental risk related to process safety and operating actions, leading to unnecessary hazards.

It was further highlighted that chemical security management objectives, aiming at preventing or minimizing the consequences of intentional malicious releases of toxic, reactive, flammable or explosive materials, can be interrelated with chemical safety management objectives. Common hazards, failure mechanisms, and similar consequences call for similar strategies for the prevention, detection, mitigation and response in the areas of chemical safety and security management.

An example was provided regarding the design and safe conduct of operations in a relevant facility, including the production, packaging, storage and delivery of relevant agents required for purposes not prohibited by the Convention. Key subjects in this regard addressed the inherent safety of operations; additional design and safety controls to further reduce risk; operational procedures, training and policies; and on-site management controls.

It was highlighted that the subject of Chemical Safety was also broadly discussed during the Article XI workshop. It was emphasised that the subject was to be recognised as an important area of the OPCW's work with considerable potential for future deliberations.

One contribution outlined the "IUPAC Safety Training Programme" aimed at enhancing the expertise of scientists, engineers and students from developing States in the areas of safety and environmental protective measures.

Chemical Security

The statements made and views expressed by participants indicated that the OPCW was well placed to serve as a forum for governments and industry to discuss issues related to chemical security. A number of initiatives to this effect were put forth during the Conference.

The delegation of Kazakhstan invited the OPCW and interested countries and organisations to the 'International Program on Promoting Chemical Safety and Security', to be initiated in Astana, Kazakhstan, in the spring of 2012. The programme seeks to initiate efforts to establish a permanent international centre in Kazakhstan on the prevention of misuse of toxic chemicals and chemical safety and security.

During the interactive session on Chemical Security, Poland announced that it intends to establish a Centre of Excellence (CoE) to support the States Parties seeking assistance in establishing a culture of chemical security and the implementation of best practices.

OPCW Conference on International Cooperation and Chemical Safety & Security

Conference Objectives

The OPCW Conference on International Cooperation and Chemical Safety & Security represents the Organisation's contribution to the 2011 International Year of Chemistry (IYC) as proclaimed by the United Nations General Assembly (UNGA). In events all over the world, the IYC celebrates the achievements of chemistry as a science that has brought immense benefits and contributed to progress and prosperity.

In commemorating chemistry's vast potential to advance human progress, the international community must continue to strengthen the norms against the misuse of chemistry for military purposes. This is a lesson from a tragic history of chemical warfare that impelled the international community to conclude the Chemical Weapons Convention (CWC).

The CWC is a cornerstone of international efforts to eliminate the dangers posed by weapons of mass destruction, to curb their proliferation and to achieve their elimination. The Convention is a multifaceted tool, combining the goals of complete disarmament and non-proliferation with a broad range of activities that facilitate and promote chemistry's manifold peaceful applications.

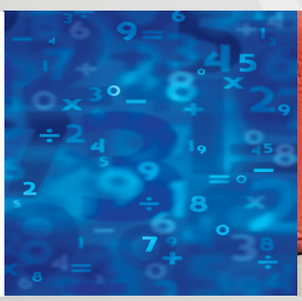
By focussing on the essential and unique role that the Convention plays in ensuring that chemistry is exclusively used in the service of humankind, the OPCW Conference enhanced support for the objectives of the Convention and highlighted future challenges – including in the key areas of international cooperation, chemical safety and security.

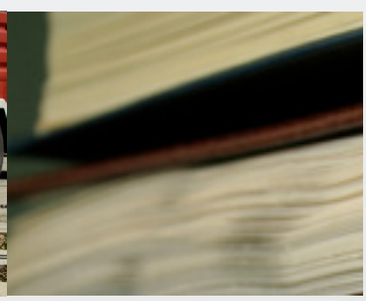
Key Conference Topics:

- International Cooperation
- Chemical Safety
- Chemical Security

The Conference featured panel discussions and interactive sessions.

This conference marked the first time that OPCW webcast the proceedings live. Video is available at http://www.opcw.org/chemicals-conference.



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