

The University of Bradford Institutional Repository

This work is made available online in accordance with publisher policies. Please refer to the repository record for this item and our Policy Document available from the repository home page for further information.

Author(s): Pearson, G.S.

Title: Education, Outreach & Codes of Conduct: OPCW & IUPAC Activity

Project: Bradford Project on Strengthening the Biological and Toxin Weapons
Convention (BTWC)

Publication year: 2005

BTWC Briefing Papers: 2nd Series: No. 19

Series Editor(s): Pearson, G.S. and Dando, M.R.

Publisher: University of Bradford (<http://www.brad.ac.uk>)

Publisher's repository: <http://bradscholars.ac.uk:8080/dspace>

Copyright statement: © 2005 University of Bradford. This work is licensed under a
Creative Commons Licence (<http://creativecommons.org/licenses/by-nc-nd/2.0/uk>).



Strengthening the Biological Weapons Convention

Briefing Paper No 19 (Second Series)

Education, Outreach & Codes of Conduct: OPCW & IUPAC Activity

November 2005

Series Editors

Graham S Pearson and Malcolm R Dando

Department of Peace Studies, University of Bradford

Strengthening the Biological Weapons Convention

Briefing Paper No 19 (Second Series)

Education, Outreach & Codes of Conduct: OPCW & IUPAC Activity

Graham S. Pearson

Series Editors

Graham S Pearson and Malcolm R Dando

Department of Peace Studies

University of Bradford

Bradford, UK

November 2005

EDUCATION, OUTREACH AND CODES OF CONDUCT: OPCW & IUPAC ACTIVITY

by Graham S. Pearson*

1. The States Parties to the Biological and Toxin Weapons Convention (BTWC) are meeting on 5 to 9 December 2005 to “*discuss and promote common understanding and effective action on:*

The content, promulgation, and adoption of codes of conduct for scientists.”¹

2. At the Meeting of Experts on 13 to 24 June 2005 to prepare for this Meeting of States Parties presentations were made by a number of intergovernmental organisations which included the Organisation for the Prohibition of Chemical Weapons (OPCW). The OPCW presentation briefly described a joint OPCW-IUPAC (International Union of Pure and Applied Chemistry) international workshop on the Chemical Weapons Convention (CWC), on the professional conduct of chemists and chemical engineers, and on chemistry education in July 2005 at St. Anne’s College, Oxford, England.

3. The OPCW presentation² at MX/2005 described the goal of the workshop as follows:

The goal of the workshop is to discuss how awareness of the Chemical Weapons Convention and its requirements and obligations can be advanced in the chemical and chemical engineers communities (and more generally in the international scientific community), how professional conduct that is in line with these requirements can be promoted, and how the knowledge of the Chemical Weapons Convention and its requirements can be more fully reflected in chemistry education. The hope is that the workshop will be able to develop concrete proposals for follow-up measures, both at the level of governments of CWC States Parties and through the existing mechanisms of science unions such as IUPAC and its constituent national chemical societies and science academies.

4. This Briefing Paper provides some of the background to and the developments at the joint IUPAC/OPCW international workshop held at St. Anne’s College, Oxford on 9 to 12 July 2005 with 27 participants from 18 countries as it was recognised that the steps being taken by the IUPAC and OPCW on education, outreach and codes of conduct could be a useful model for effective action by the States Parties to the BTWC.

Introduction and Background

* I acknowledge with many thanks the contributions made in discussion of the draft of this Briefing Paper by Professor Leiv K. Sydnes, President of IUPAC, Professor Bryan Henry, Vice President of IUPAC, and Dr Ralf Trapp of the OPCW.

¹ United Nations, Fifth Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxins Weapons and on their Destruction, Geneva, 19 November – 7 December 2001 and 11 – 22 November 2002. *Final Document*, BWC/CONF.V/17, 2002. Available at: [http://www.opbw.org/rev_cons/5rc/docs/final_dec/BWC-CONF.V-17-\(final_doc\).pdf](http://www.opbw.org/rev_cons/5rc/docs/final_dec/BWC-CONF.V-17-(final_doc).pdf)

² Organisation for the Prohibition of Chemical Weapons, *OPCW activities and perspectives on the content, promulgations, and adoption of codes of conduct for scientists*, 13 June 2005. Available at <http://www.opbw.org>

5. The International Union of Pure and Applied Chemistry (IUPAC) in 2002 undertook an evaluation of scientific and technological advances in the chemical sciences that might have an impact on the implementation of the Chemical Weapons Convention (CWC). This was one of the efforts by IUPAC to provide a sound scientific foundation for decision-makers to address important global issues. This evaluation was timely as it was published³ in *Pure and Applied Chemistry* in December 2002 prior to the First Review Conference of the CWC held on 28 April 2003. The Director-General of the Organisation for the Prohibition of Chemical Weapons (OPCW) had informed the Member States of the OPCW of both the IUPAC initiative and of his acceptance of this at the Sixth Session of the Conference of States Parties on 14 May 2001. In his opening statement, the Director-General had said:

An important aspect of the preparations for the review conference is an assessment of the scientific foundations of the Convention. Does the present verification regime under Article VI, and the Schedules contained in the Annex on Chemicals, adequately reflect the scientific and technological progress that has been made over the past decade, and the current trends in science and technology? Much has changed, as is evidenced by the completion of the human genome project and the emergence of genomics, as well as by advances in chemical production technologies, a better understanding of the functioning of certain biomolecules and receptors, etc. The International Union of Pure and Applied Chemistry has proposed to the Secretariat that it undertake a review of key areas of science, with a view to identifying developments and trends that are relevant to the CWC. We welcome this offer, and look forward to the results of this international scientific review. Its results will, of course, be passed on to Member States for advice and action well before the review conference.

6. As the only independent, non-governmental, international organization devoted to the chemical sciences and their applications, IUPAC was regarded as very well placed to conduct this review. Formed in 1919, IUPAC is an association of bodies – National Adhering Organizations – that represent the chemists of different member countries. IUPAC has currently, in November 2005, 49 National Adhering Organizations, and 19 other countries are also linked to IUPAC in the status of Associate National Adhering Organizations. *Appendix 1* provides further background information about IUPAC.

7. The report of the evaluation undertaken in 2002 included a section entitled “ Education and Outreach”. This summary findings and observations in this section were that;

- 1. Greater efforts on education and outreach to the worldwide scientific and technical community are needed in order to increase awareness of the CWC and its benefits. An informed scientific community within each country can be helpful in providing advice to States Parties and in disseminating unbiased information to the public.*
- 2. Education of and outreach to Signatory States and non-signatory States could be helpful in increasing awareness of the importance of universal adherence to the Convention thereby enhancing safety and security for all States.*

³ George W. Parshall, Graham S. Pearson, Thomas D. Inch and Edwin D. Becker, “Impact of Scientific Developments on the Chemical Weapons Convention (IUPAC Technical Report)”, *Pure Appl. Chem.*, Vol. 74, No. 12, pp.2323-2352 (2002).

8. The rationale for these findings included the observations that an informed scientific and technical community within each country could be very helpful in providing advice and disseminating information to the public. Consequently IUPAC, together with its National Adhering Organizations, could play an important role in this education and outreach program by working in cooperation with the National Authorities within the individual States Parties to enhance awareness by chemists of the obligations and undertakings of the Convention. A parallel approach could usefully be taken worldwide by chemical industry associations in cooperation with National Authorities. In due course, chemical weapon prohibition and non-proliferation considerations might even be incorporated into university and school curricula as part of chemistry education in a similar way to that in which environmental issues, ethics of genetics and similar issues have been incorporated into chemistry and biology education in the recent past. It was also noted that education and outreach are also important in the context of the promotion of the universality of the Convention. The CWC in 2002 had 145 States Parties, 29 Signatory States -- who have signed the Convention but have yet to ratify the Convention and thus implement it -- and 20 non-signatory States. Some of the Signatory States and non-signatory States might not have ratified or acceded to the Convention because of a lack of awareness of the benefits that the Convention would bring.

9. The IUPAC evaluation was considered by the Scientific Advisory Board (SAB) of the OPCW in its report forwarded by the Director-General⁴ to the States Parties for consideration at the First Review Conference. In his covering note, the Director-General observed that;

2.20 In relation to international cooperation and related matters, the SAB has concluded that the OPCW needs to clearly establish what it requires in the field of education, outreach, and international cooperation. At the same time, the SAB has observed that current OPCW international cooperation programmes appear to be making useful contributions to the development of States Parties' national capacities in the peaceful uses of chemistry. OPCW international cooperation programmes and its educational and outreach activities would benefit from increased cooperation with other international, regional, and national organisations.

10. The SAB report addressed these aspects in more detail:

9.1 Greater publicity is needed by OPCW about its aims and objectives, and about the key issues it faces. This must include information on the requirements in relation to the declaration, destruction, and verification of CW and related facilities; the methodologies the OPCW uses (particularly for analysis); the nature of and the reasons for industrial declarations; the nature of and reasons for industrial inspections and the value gained from such inspections; the role of National Authorities; and the requirements to provide assistance and to foster international cooperation.

9.2 Greater efforts in terms of education and outreach to the worldwide scientific and technical community are needed in order to increase awareness of the Convention and its benefits. An informed scientific community within each country can be helpful in providing advice to States Parties and in disseminating unbiased information to the public. Education of, and outreach to, signatory States and non-signatory States could be helpful in increasing

⁴ OPCW, "Note by the Director-General: Report of the Scientific Advisory Board on Developments in Science and Technology", Conference of States Parties, First Review Conference 28 April – 9 May 2003, RC-1/DG.2, 23 April 2003

the awareness of the importance of universal adherence to the Convention, thereby enhancing the safety and security of all states.

9.3 The SAB noted that the Secretariat had developed certain projects that supported these goals, in particular the Associate Programme and the Ethics Project.

9.4 The SAB was convinced that efforts in the area of education and outreach are important to further the objectives of the Convention; these efforts include raising awareness, assuring that the principles of the Convention become firmly anchored in professional ethics and teaching, and promoting international cooperation in the field of chemistry. International cooperation and outreach were also important with respect to attracting additional countries to adhere to the Convention. The SAB expressed a strong desire to further discuss and clarify its own role in relation to education, outreach, and international cooperation. At the same time, the SAB noted and welcomed the contributions that certain non-governmental organisations, as well as national chemical societies and science academies, have been making in relation to creating awareness about the Convention. Public awareness and education about the Convention can contribute significantly to encouraging compliance with its norms and provisions.

9.5 There are a number of opportunities in the area of outreach, education, and international cooperation. In particular, the SAB reviewed the OPCW's programmes in the area of international cooperation in the light of the developments in science and technology, and concluded as follows:

(a) there is good reason for close cooperation between the OPCW and other relevant international organisations, such as UNITAR, WHO, or UNEP, in further developing the international cooperation programmes of the OPCW;

(b) the programmes and projects currently being implemented by the OPCW in the area of international cooperation appear to be contributing to the development of the national capacities of the States Parties in the area of the peaceful uses of chemistry. Two members of the SAB are involved in one of these programmes (i.e. the programme for support of research projects implemented by the ICA Division); and

(c) in further enhancing these programmes, particular attention should be given to projects aimed at improving the capabilities of the States Parties to monitor chemical compounds.

9.6 The SAB considered it useful for the OPCW to continue and intensify its dialogue with other organisations, such as the IUPAC and its chemistry education division; with other international science unions in relevant fields such as biochemistry and molecular biology (IUBMB) or biological sciences (IUBS); with professional and chemical industry associations; with international institutes and programmes; with organisations of engineers and scientists committed to CW disarmament; and with national as well as regional science academies.

9.7 The SAB concluded that it will need to continue discussing practical and useful measures in relation to education, outreach, and international cooperation as part of its future work programme.

11. The report of the First Review Conference⁵, whilst not explicitly addressing education and outreach, included the following conclusion:

*7.79 The First Review Conference **noted** that a valuable aspect of national implementation measures involves ensuring that the chemical industry, the scientific and technological communities, the armed forces of the States Parties, and the public at large are aware of and knowledgeable about the prohibitions and requirements of the Convention.*

In addition, the First Review Conference in paragraph 7.83

*(d) **encouraged** States Parties to take measures to raise awareness about the prohibitions and requirements of the Convention, inter alia in their armed forces, in industry, and in their scientific and technological communities;*

12. Subsequent to the First Review Conference, a proposal for a meeting to be held on chemistry education, outreach and the professional conduct of chemists was agreed between the Director-General of the OPCW, Ambassador Rogelio Pflirter, and the President of IUPAC, Professor Leiv Sydnes, in early 2004. This was a development from the earlier collaboration between IUPAC and the OPCW which has been outlined above prior to the First Review Conference in 2003 when the Review Conference urged that awareness should be raised about the prohibitions and obligations of the CWC. It also built upon the work that the OPCW's Technical Secretariat had already, prior to the First Review Conference, put into ethical considerations (in its Ethics Project) as it was recognized the CWC affects the work of all those using chemicals in academia, industry or government and that the ethical conduct of those using chemicals was important for the effective implementation of the CWC.

13. The objectives proposed for the joint meeting were to:

- Increase awareness of the Chemical Weapons Convention (CWC) and its requirements in the chemical and chemical engineers communities (and more generally in the international scientific community),
- Enhance the knowledge about its key provisions and requirements,
- Integrate issues related to the Convention and its implementation into chemistry teaching, and
- Promote professional conduct of chemists and chemical engineers that is fully in line with the Convention.

The meeting was discussed by representatives of the OPCW Scientific Advisory Board and IUPAC at a meeting in the Hague on 17 January 2005; those present included Leiv Sydnes, Peter Atkins, Natalia Tarasova, Jiri Matousek, Alberto Fratadocchi, Richard Robson, and Ralf Trapp. This meeting agreed the outline and decided to take it forward through a meeting to be held in Oxford in July 2005.

14. The Scientific Advisory Board met for its 7th Session from 9-11 March 2005 when it received a report on the joint project from Alberto Fratadocchi, as chairman-designate of the

⁵ OPCW, "Report of the First Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (First Review Conference)", Conference of States Parties, First Review Conference 28 April – 9 May 2003, RC-1/5, 9 May 2003

temporary working group on education and outreach, which included information on the planned Oxford meeting. The SAB encouraged the continuation of this work⁶, on the understanding that over the long term it would lead, inter alia, to awareness-raising, efforts to provide educational materials and guidance to school and university science teachers, and the incorporation of the Convention's requirements into codes of conduct and ethics for scientists and engineers. Subsequently, on 25 May 2005, the Director General of the OPCW issued a note⁷ to the Executive Council on the 7th SAB report, in which these developments were brought to the attention of the EC by stating:

12. As regards education and outreach, the Director-General notes the state of preparations for an international workshop being organised jointly by the OPCW and the International Union of Pure and Applied Chemistry, which will focus on how the requirements of the Convention can be better reflected in codes of professional conduct and ethics as well as in chemistry education. The workshop is scheduled for 10 to 12 July 2005 in Oxford, the United Kingdom of Great Britain and Northern Ireland, and the Secretariat will render the support required to ensure that it is success.

15. The international Workshop took place as planned in Oxford from 9 to 12 July 2005 with the aim of developing concrete proposals for follow-up measures, both at the level of governments of CWC States Parties and through the existing mechanisms of science unions such as IUPAC and its constituent national chemical societies and science academies.

The Workshop

16. The OPCW and IUPAC organized a Workshop entitled *The Chemical Weapons Convention, chemistry education and the professional conduct of chemists* at St. Anne's College, Oxford, UK on 9 to 12 July 2005. Financial support was provided by the OPCW and IUPAC.

17. There were 27 participants from 18 countries.⁸ Plenary sessions set the scene for the Workshop and included presentations by leading international scientists and engineers engaged in chemical education and in codes of conduct. The Workshop successfully brought together the collective knowledge of academia, industry, government and the OPCW in order to address how education, outreach and codes of conduct could facilitate the implementation of the Chemical Weapons Convention within States Parties and how awareness of the CWC could be placed in a broader educational context of ethical concerns in chemistry. The plenary presentations provided background for six discussion sessions in which the participants in two small groups addressed how undergraduate and postgraduate education might address the ethical and practical aspects of preventing the misuse of chemistry and how academia, industry and government might be encouraged to reflect CWC issues in their codes of conduct or practice.

18. The activities at the workshop are presented in two sections, as follows;

⁶ OPCW, "Report of the Seventh Session of the Scientific Advisory Board", Scientific Advisory Board, Seventh Session, 9-11 March 2005, SAB-7/1, 11 March 2005.

⁷ OPCW, "Note by the Director-General: Report of the Seventh Session of the Scientific Advisory Board", Executive Council, Forty-First Session, 28 June – 1 July 2005, EC-41/DG.8, 25 May 2005.

⁸ Participants came from the following countries: Argentina, Australia, Belgium, Canada, Croatia, Cuba, Czech Republic, Germany, India, Iran, Italy, Norway, Russia, Sweden, Switzerland, Ukraine, UK, and USA

- **A. Presentations and discussions**
- **B. Workshop Outcomes**

A. Presentations and Discussions

19. The presentations at the Workshop were divided into six sessions, as follows:

- **Background and Context for the Workshop**

In this session the speakers – the organizers of the Workshop: Peter Atkins, the Chairman of the IUPAC Committee on Chemistry Education, and Ralf Trapp of the OPCW Secretariat – set out the objectives of the Workshop from the perspective of IUPAC and the OPCW respectively. The joint project objectives were set out together with the intention that the workshop should be able to develop concrete proposals for follow-up measures, both at the level of governments of CWC States Parties and through the existing mechanisms of science unions, such as IUPAC and its constituent national chemical societies and science academies.

These were followed by a presentation by Jiri Matousek, Chairman of the OPCW Scientific Advisory Board, setting out a conceptual framework for the discussion of how issues relating to the CWC might be incorporated into chemistry education.

- **Codes of Conduct I**

In this session, three speakers addressed different aspects relating to codes of conduct. Bob Mathews of the Australian Defence Science and Technology Organization examined the role of codes of conduct in the context of the CWC and why it is important to raise awareness among chemists of the CWC. A layered approach to codes was outlined with a universal code containing guiding principles, a code of ethics developed by scientific or professional societies and a code of practice developed by the institution or workplace. These various codes would be seen as complementary and may be most effective if developed as a package. It was pointed out that there is a mid-spectrum region with bioregulators and toxins between classical chemical weapons and traditional biological agents; the prohibitions of both the BTWC and the CWC applied to such mid-spectrum agents. Graham Pearson of the Department of Peace Studies, University of Bradford, UK then spoke on behalf of the UNESCO Division of Ethics and Science to outline current activities by UNESCO in regard to a Code of Conduct for scientists. The World Conference for Science in Budapest in 1999 organised by UNESCO and ICSU (International Council for Science) had paid special attention to ethical principles and responsibilities in the practice of science and had agreed that UNESCO's COMEST (World Commission on the Ethics of Scientific Knowledge and Technology) had a special responsibility to follow up on this issue. Currently a decision in draft for feasibility studies on a universal declaration of science ethics to be carried out in 2005 to 2007 was being prepared for consideration at the 33rd General Conference of UNESCO. Alastair Hay of the Unit of Molecular Epidemiology of the University of Leeds, UK then spoke to outline the Royal Society's recent activities in regard to the roles of codes of conduct in preventing the misuse of scientific research. There was clear value in having such codes although wide consultation was needed when developing codes. It was pointed out that many valuable guidelines for professional conduct already exist such as

the existing health and safety regulations in the UK which require risk assessments to be carried out in regard to both those carrying out an activity and also those who might be affected by the activity. The presentation concluded by considering the seven questions which Ambassador John Freeman of the UK, chair of the 2005 Geneva meetings, had put to the States Parties of the Biological and Toxin Weapons Convention (BTWC) who are addressing the content, promulgation and adoption of codes of conduct for scientists.

- **Codes of Conduct II**

In this session, two further presentations addressed codes of conduct. Graham Pearson of the Department of Peace Studies, University of Bradford, UK examined what could be gained from the experience of the States Parties to the BTWC who were, in 2005, addressing the content, promulgation and adoption of codes of conduct for scientists. The BTWC is the international treaty providing the closest parallel to the CWC with both Conventions containing general purpose criteria⁹ which prohibit an entire class of weapons. The Meeting of Experts held in Geneva on 13 to 24 June 2005 had seen the participation of over 500 individuals with over 280 from capitals coming from 82 States Parties and 3 Signatory States, eight Intergovernmental Organizations (including the OPCW), 23 guests of the Meeting and 16 NGOs. The seven questions posed by the Chair (Ambassador John Freeman of the UK) were reviewed and it was noted that these were equally applicable to codes for the CWC. Brian Rappert of the University of Exeter set out a strategy for engaging life scientists regarding dual-use research. He outlined the considerations that he gave early in 2003 to engage the educational community about dual use research and the life sciences. This led to a series of 26 seminars being carried out with university life science departments during the 2004-5 academic year. 6 were in London, 13 in the rest of England, 3 in Scotland, 2 in Wales, 1 in Northern Ireland and 1 in Germany with over 600 participants in all. These were interactive seminars using about 9 slides followed by discussion of questions selected by the seminar organizers. The approach taken in the life sciences was suggested as a useful model for the chemical sciences. The key was to go to the people engaged in the science of interest and to create a situation in which they discussed issues with each other. Such an approach went beyond awareness raising to enabling debate about the key issues.

- **Education I**

In this session, three presentations addressed education. Alistair Hay of the Unit of Molecular Epidemiology of the University of Leeds, UK considered the CWC and Chemistry Teaching in which he described how codes of conduct for scientists had been

⁹ In the BTWC the general purpose criterion is embodied in Article I that states: *Each State Party to this Convention undertakes never in any circumstances to develop, produce, stockpile or otherwise acquire or retain:*

*(1) Microbial or other biological agents, or toxins whatever their origin or method of production, **of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes;***

The text in bold is the general purpose criterion. At successive BTWC Review Conferences, the States Parties have agreed extended understanding to this prohibition. At the Fourth Review Conference in 1996, it was agreed that *the Convention unequivocally covers all microbial or other biological agents or toxins, **naturally or artificially created or altered, as well as their components,** whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes.* The extended understanding makes it clear that the prohibitions of the BTWC apply to chemicals in the midspectrum region between classical chemical agents and traditional biological agents.

successfully discussed with A-level students at a local school. In addition, he had recently spoken to 200 teachers of chemistry and pointed out the opportunities that are already in the current UK A-level and GCSE level curricula to explore “spiritual, moral and cultural dimensions in addition to gaining scientific knowledge and understanding of chemical topics” and to consider moral and ethical issues “through discussion of the uses of scientific knowledge including the recognition that such uses can have both beneficial and harmful effects.” Jiri Matousek of the Faculty of Science of Masaryk University Brno, Czech Republic described a model example of a course he has taught at the Masaryk University entitled “Military Chemistry, Toxicology and Protection against Highly Toxic Chemicals” which addressed issues related to the CWC. The syllabus for this 28 hour course was outlined. There are four main parts: an introduction which sets the scene regarding chemical weapons; the chemistry and toxicology of the basic types of chemical warfare agents; the fundamentals for protection of military and civilian personnel against chemical weapons and highly toxic chemicals; and issues related to chemical disarmament including the historical development of treaties prohibiting chemical weapons, the CWC and technologies for chemical weapon destruction. Alfredo Fratodocchi of the Academy of Science of the Institute of Bologna, Italy then described a meeting held on 28 April 2005 to consider how the Academy of Science could support the CWC and the OPCW. This initiative addressed chemistry education in high schools and universities with particular attention being given to ethics and professional responsibility of chemists, chemical engineers and industrial chemists. One recommendation was that the authors and editors of chemical education books should include a chapter on ethics and responsibility. The need had also been recognized for a degree course that would help chemists to be trained as possible future OPCW inspectors and to provide information relating to the implementation of the CWC. The Academy of Science would establish a committee to study the curricula of high school students and university students.

- **Education II**

In this session, a further presentation addressed chemical weapons in the education of chemists. Ferruccio Trifiró of the University of Bologna addressed Chemical Weapons in Scientific Literature and in Education. He examined the treatment of chemical weapons in scientific journals by analysing the number of references to terms such as “lewisite” and “sarin” and comparing the number of such references in the past year to the number over the past 50 years. He then considered what should be done in Italy to increase awareness of chemists about the CWC, referring to three papers recently published in the Italian journal of the chemical society ‘La Chimica e L’Industria’. Finally, consideration was given to what was useful to publish or teach to make chemists more aware of the CWC.

- **International Law & The Role of the Chemical Industry**

In this session, one presentation addressed international law. Kobi-Renee Leins of the Mines-Arms Unit in the Legal Division in the International Committee of the Red Cross (ICRC) in Geneva, Switzerland spoke on International Law & Norms governing work in the Life Sciences. In this she recalled the laws relevant to poisoning and the deliberate spread of disease recalling the ancient taboos and the customary rules of international law that prohibit the use of poison or poisoned weapons or of chemical weapons. The international treaties – the Geneva Protocol of 1925, the Biological and Toxin Weapons

Convention of 1972 and the Chemical Weapons Convention of 1993 – and the requirements for national laws under Article IV of the BTWC and Article VII of the CWC apply to all persons within the States Parties to these Conventions. Consequently, all scientists, physicians and those who employ them have a responsibility under specific treaties and under customary international law to prevent the hostile use of life sciences. A parallel responsibility applies to prevent the hostile use of chemistry.

The second presentation addressed the role of the chemical industry. Dr Richard Robson of CEFIC, Belgium addressed two issues. First, he described the Responsible Care programme which is encouraging continuous improvement across the global chemical industry and then went on to examine the role of the chemical industry in the implementation of the CWC. The Responsible Care programme was a public commitment by the chemical industry to improve the safety, health and environmental performance of the products and processes of the chemical industry. The programme was launched in Canada in 1985 and was now an International Council of Chemical Associations (ICCA) initiative operating in 85 countries worldwide which was estimated to cover over 90% of the world's chemical production. The Responsible Care Global Charter called for those involved to abide by the global principles, to continuously improve and report performance, to advance sustainable development, to enhance product stewardship, to promote Responsible Care through the value chain, to support national and global Responsible Care governance processes and to address stakeholder concerns and expectations.

Secondly, he examined the role of the chemical industry in the implementation of the CWC. After outlining current voluntary contributions made by the industry to the implementation of the CWC he went on to consider codes of conduct. It was noted that these exist in several States Parties to the CWC and aim to strengthen the cooperation between industry and the national authorities, to provide a basis for more effective control and to reduce the administrative burden wherever possible. This was illustrated by the UK code of conduct on chemicals subject to trade controls and voluntary requirements which had been drawn up jointly by the CIA (Chemical Industries Association), BCTDA (British Chemical Distributors and Traders Association) and CPA (Crop Protection Association). This addresses chemical weapon and drug precursors, chemicals subject to export licensing, chemicals subject to PIC, and POPs. The objective of the code is to increase awareness throughout the industry, establish and improve standards of control, protect against diversion of chemicals in the illicit production of drugs and weapons of mass destruction, cooperate fully with government and law enforcement authorities, promote environmentally sound management of chemicals in international trade and safeguard the chemical industry's good reputation.

B. Workshop Outcomes

20. In the *opening session* of the workshop, representatives of IUPAC and the OPCW set the context. This was to increase awareness of the Chemical Weapons Convention (CWC) and of its requirements and its obligations and to address how these can be advanced in the communities of chemists and chemical engineers and, more generally, in the international scientific community. It was also to examine how professional conduct that is in line with these requirements and obligations could be promoted and how the knowledge of the Chemical Weapons Convention and its requirements could be more fully reflected in chemistry education.

21. The OPCW noted that it had been engaged in an ethics project with the States Parties to the CWC to promote the development of an awareness among chemistry/engineering professionals consistent with the object and purpose of the CWC, to promote a culture of compliance with the requirements of the Convention as well as to integrate ethical and scientific aspects of chemical weapons disarmament into chemistry and chemical engineering education. The OPCW recalled that the First Review Conference in 2003 had **noted** that a valuable aspect of national implementation measures involves ensuring that the chemical industry, the scientific and technological communities, the armed forces of the States Parties, and the public at large are aware of and knowledgeable about the prohibitions and requirements of the Convention. The objective was that the workshop would develop concrete proposals for follow-up measures, both at the level of governments of CWC States Parties and through the existing mechanisms of science unions such as IUPAC and its constituent national chemical societies and science academies.

22. Each participant was assigned to one of two discussion groups, on education and outreach issues and codes of conduct/practice. Reports from the discussion groups were presented in the final session of the Workshop.

23. This section provides a summary of the wide-ranging deliberations by the discussion groups. The discussions were guided by the underlying requirements specified in the Chemical Weapons Convention.

I Chemistry Education and Outreach

24. The education and outreach discussion group convened by Natalia Tarasova of Russia and with Peter Mahaffy of Canada as rapporteur began by considering several science communication principles identified in the draft report on IUPAC's niche in Public Understanding of Chemistry initiatives from IUPAC Project ##2004-047-1-050, chaired by Peter Mahaffy. This led to the following formulation of how the requirements and obligations of the CWC could be communicated in an educational context:

- To Whom (and Why) – or, in other words, who are the target audiences?
- What should be communicated?
- How should this be communicated?
- Strategies for implementation
 - Short term
 - Longer term
- How to assess the effectiveness of these communications

Target Audiences

25. The following were identified as being the primary target audiences:

- a. Educators, especially secondary school and post-secondary school teachers, as it is through educators that citizens and the public at large can be reached.
- b. Scientists, chemical engineers and technologists as they are those primarily engaged in science and technology using chemicals – and these chemicals fall under the CWC.

- c. The approach preferred would be to work through undergraduate and postgraduate programmes to reach these target audiences.
- d. It was recognised that neither IUPAC nor the OPCW have the resources needed to work directly with teachers and students. However, both IUPAC and the OPCW can influence and work with other organizations.
- e. IUPAC chemists were recognized as being the primary target for educational initiatives to reach chemists. Furthermore, many IUPAC chemists work in educational contexts.
- f. A further target audience is the authorities responsible for accreditation of educational programmes such as ACS, EuCheMS.
- g. In some countries and contexts, an appropriate target will be Ministries of Education.

Communication

26. Attention was then given to what should be communicated. The current situation is that many people know that there is some kind of treaty relating to chemical weapons but they are unable to summarize the key features or know what is specifically prohibited. One measure of success for any educational initiative would be improving awareness in the target audiences that the CWC is relevant to them. In considering what needs to be communicated, it was recognized that this depends on understanding what the target audience needs to know and is willing to know.

27. It was suggested that education starts with the positive uses of chemicals, leading into the potential for multiple uses of some chemicals and thus the concept of dual-use chemicals and the prohibitions and obligations under the CWC. This needs to be put into the context of professional responsibility of each individual for the beneficial use of chemicals and chemical technologies. It was recognized that it is important that codes of behaviour are not static. Certainly, in educational contexts, the process of developing responsibility is as important as the final code that is produced – and subsequent cohorts of students need to go through a similar process to take ownership. Consequently, attention needs to be given to how best to involve students in the formulation of their own codes of behaviour with respect to the use of chemicals.

28. In considering how such communication should be achieved, it was recognized that the National Authorities within each State Party to the CWC are the primary conduits at present. However, National Authorities have very limited resources and are generally not well connected within the State Party with other government bodies that have responsibility in the area of education, or with educational institutions. Communication should therefore involve working with national Ministries of Education and of the Environment as and where appropriate.

29. Above all the need was to motivate scientists and teachers at all levels so as to get them involved in various ways. It was important to work with organizations that represent the target audiences (such as scientists and educators) enabling them to communicate with students and other members of the public.

Strategies for Implementation

30. A number of short and longer term action items were identified together with how and when they should be implemented and who should take responsibility for the action item.

Short term action items

1. Support international science education conferences for teachers where chemicals and the prohibitions and obligations arising from the CWC can be raised in the broader context of the responsible use of chemistry.
2. Use of IUPAC web site for disseminating information regarding CWC-related courses and initiatives already in place.
3. Increased awareness for chemists about the obligations of CWC - in the context of building enthusiasm for the profession of chemistry.
4. IUPAC/OPCW joint project
5. Dissemination of Workshop Outcomes

Longer term action items

6. Identification of appropriate accreditation agencies for undergraduate programs for chemists and teachers.
7. IUPAC/OPCW sponsored debates where the topic would relate to CWC – perhaps at the IUPAC General Assembly (undergraduate level), and the Chemistry Olympiad (secondary schools).

II Codes of Conduct

31. The codes of conduct discussion group convened by Graham Pearson of the UK and with Jo Husbands of the USA as rapporteur considered the following aspects relating to how codes could be developed for those engaged in science and technology using chemicals:

- Scope of code of conduct
- Who is the code needed for?
- Why is a code necessary?
- What codes are needed?
- What should codes include?
- Drafting elements for a Society Level Code of Conduct
- Subsequent activities
- The next steps
- Review of the Seven Ambassador Freeman Questions

Scope of a code of conduct

32. It was recognized that any code needed to address the potential misuse of chemicals to cause harm to humans, animals and the environment. The potential misuse needed to be widely crafted so as to include pesticides, illicit drugs, chemical and biological weapons, hazardous wastes etc.

Who is the code needed for?

33. A code is required for all those engaged in science and technology using chemicals. The code needs to be widely crafted so as to be applicable to chemists, physicists, mathematicians, life scientists, etc. A code should not be restricted to scientists and engineers but should also be applicable to those making policy decisions, administrators, funding organizations and bodies, sales personnel etc, and should apply throughout academia, industry and government.

Why is a code necessary?

34. From a point of view relating to the implementation of the Chemical Weapons Convention, a code is necessary:

- To complement national implementation legislation and regulations
- To achieve in-depth compliance throughout academia, industry and government of all those engaged in science and technology using chemicals
- To implement the general purpose criterion of the Chemical Weapons Convention under which chemical weapons are defined as *Toxic chemicals and their precursors, except where intended for purposes not prohibited under this Convention, as long as the types and quantities are consistent with such purposes.* The text in bold is known as the general purpose criterion which embraces **all** toxic chemicals and their precursors unless in types and quantities for purposes not prohibited under the Convention.
- To protect public health and the environment.

It was recognized that the reasons why a code is important would be different in different States Parties.

What codes are needed?

35. There has been much attention paid to codes of conduct during the past decade, notably following the UNESCO/International Council for Science (ICSU) World Conference on Science in Budapest, Hungary in 1999 and subsequently by UNESCO and its World Commission on Ethics in Science and Technology (COMEST) as well as by ICSU. The States Parties to the Biological and Toxin Weapons Convention (BTWC) held a Meeting of Experts from 13 to 24 June 2005 in Geneva to address *The content, promulgation and adoption of a code of conduct for scientists.* A Meeting of States Parties on this subject would meet again in Geneva from 5 to 9 December 2005. It was evident from all this consideration that benefit was seen from a tiered or layered approach:

- Universal principles/declarations – this might be seen as an aspirational code

- Society codes – this might be seen as guidance on conduct
- Institutional or workplace codes – this might be seen as setting out practices to be followed in the workplace

36. These three types of code were seen as complementary. The lead for developing such codes was different according to the layer or tier concerned. Thus, the universal principles/declaration were being actively studied by UNESCO/COMEST who were planning to carry out feasibility studies in the next couple of years leading to an ethical declaration of principles in science and technology. Another initiative was that being taken by Sir David King, the Chief Scientific Adviser to the UK Government, who following a Carnegie meeting in 2004 of the Ministers of Science of the G-8 Nations, had developed seven key principles related to Rigour, Respect and Responsibility. These were currently being trialled across scientists in the British Government and had also been sent to the G-8 Nations and to the EU.

37. At the society code level, this was seen as the area in which IUPAC and national societies could play a key role. In the context of the CWC and chemicals, National Authorities in the States Parties should also be able to play a role. The next layer, the institutional or workplace codes, would need to reflect the particular characteristics and requirements of the institution or workplace.

What should codes include?

38. It was recognized that the focus should be on the extension of existing codes, where such codes existed, rather than on the creation of new codes. One particular example, particularly at the institutional/workplace codes, related to whether existing requirements for risk assessments for health and safety purposes might be extended to considering whether proposed activities were lawful and thus consistent with national implementing legislation for the CWC.

39. It was also noted that for any code to be effective it needs to involve those concerned in a continuing process. This applied at two levels – first in the development and updating of codes – and secondly, in the implementation, particularly at the institutional/workplace level, of the codes. For a successful code, all elements of the community to be subject to a code need to be involved as it is this which helps to create a sense of shared ownership. This engagement needs to also continue when a code is being implemented.

40. It was observed that at the Meeting of Experts held by the States Parties to the BTWC in June 2005, there had been a successful engagement of many elements of the community through the open sessions held with the participation of both Intergovernmental Organizations (IGOs) and “guests of the Meeting of Experts” which had included 23 non-governmental organizations (NGOs). There would be clear benefits in taking forward consideration of codes of conduct in the context of the Chemical Weapons Convention in a similar open session involving both the States Parties to the CWC and relevant IGOs and NGOs. The consideration given to codes of conduct in the context of the CWC had underlined the importance of education and outreach as part of any approach to effective codes of conduct. A research study carried out by Brian Rappert of the University of Exeter and Malcolm Dando of the University of Bradford involving 26 seminars involving over 600 participants in university life science departments in London (6), the rest of England (13), Scotland (3), Wales (2), Northern Ireland (1) and Germany (1) had shown that there was little knowledge of the BTWC or of dual use issues in the life sciences. It

was probable that the situation was similar in regard to knowledge of the CWC in university natural science departments.

41. Case studies/examples help to demonstrate why codes matter to every element of the community engaged in science and technology using chemicals. However, specific examples need to be identified that are seen as relevant to each part of the community. There are benefits in using positive examples first and then illustrating how misuse may occur. The following were identified as examples:

Positive examples

- New tools and techniques – microreactors
- Synthesis of new chemicals and development of new processes
- Research in the interface between traditional chemical and biological agents
- Intangible technology – the answers to the question “How did you do that?”

Negative examples

- Illicit drugs
- Aum Shinrikyo sarin attacks in the Tokyo subway
- Bhopal methyl isocyanate accident
- Chemical warfare images of Halabjah

Drafting Elements for a Society Level Code of Conduct

42. Consideration was given to identifying the sort of language that might be included in a code of conduct at the intermediate society level. It was suggested that such a code would start by recalling why codes are important – namely, to complement national implementing legislation for the CWC, to achieve in depth compliance throughout academia, industry and government, to implement the general purpose criterion which make the CWC relevant to all toxic chemicals and their precursors, and to protect public health and the environment. The sequence in which these reasons might be listed in a code could well differ depending on which points were particularly relevant in a specific country.

43. In considering possible language for codes, the discussion group had copies of the Rigour, Respect and Responsibility code which was being taken forward by Sir David King, the UK Chief Scientific Adviser to the Government, the American Chemical Society Code, the Royal Australian Institute Code, and the Royal Society of Chemistry code. None of these included specific mention of the CWC. Bearing these codes in mind, the discussion group considered the sort of language that might usefully appear in a society level code.

44. Four paragraphs were identified as providing the sort of transition from the general to the specific that would be helpful if incorporated into a code:

- Extraordinary benefits to the quality of life, public health and agriculture throughout the world are made available by the knowledge, methods and techniques in science and technology using chemicals

- The possible misuse of this knowledge, methods and techniques in science and technology using chemicals places moral and ethical responsibilities on those engaged in science and technology using chemicals to ensure that their activity is aimed only at bringing benefit to humankind and the environment
- The stewardship responsibilities of those engaged in science and technology using chemicals for sustainable development and the needs of future generations underlines the importance of complying with and supporting relevant international treaties and conventions

Consequently the responsibilities on all those engaged in science and technology using chemicals to ensure that their work is, and is perceived to be, in compliance with the international treaties and national laws and regulations prohibiting chemical or biological weapons or illicit drugs and relating to banned and severely restricted chemicals, PIC, POPs, the Basel Convention ...

45. In addition, additional drafting elements were identified which might be incorporated into the society level code or into the institutional/workplace codes:

- Acknowledge that minimizing risks from misuse of science and technology using chemicals is of concern to them and part of their responsibilities
- Recognize that their personal benign intent is an insufficient justification for setting aside such concerns
- Be aware of the possible misuses of their work
- Consider the direct and indirect benefits and harms of their work to colleagues, their professional communities and society at large
- Ensure that they are knowledgeable about and comply with relevant international and national laws and regulations
- Where inadequacies are identified in regard to existing laws and regulations, such concerns should be raised with relevant policy officials and professional organizations
- Take actions within their own sphere of influence that will contribute to reducing the risk of misuse of knowledge, methods and techniques in science and technology using chemicals

These were further developed after the workshop by two of the participants (Robert Mathews and Graham Pearson) into a set of draft elements (see *Appendix 2*) that might be considered for inclusion in appropriate codes.

46. It was also recognized that responsibility for minimizing the risk that science and technology using chemicals may be misused is both a matter for individuals and for the professional and technical communities. Collectively, it was important to:

- Recognize that their expertise means that they have a responsibility to contribute to efforts to reduce the risk that science and technology using chemicals may be misused
- Set up procedures so that those concerned about possible misuse or perceived misuse can address such concerns and resolve them
- Educate their members and the public about the potential for the misuse of science and technology using chemicals and how the risk of such misuse may be minimized, including through increasing awareness of this Code

The Next Steps

47. Consideration was given to what action was needed to take forward codes of conduct for those engaged in science and technology using chemicals. This could be done at several levels and include OPCW, IUPAC and the National Authorities of the States Parties to the CWC, as it was recognized that a successful outcome would require a concerted effort by all three.

Review of the Seven Ambassador Freeman Questions

48. The discussion group noted that in December 2004, Ambassador John Freeman of the UK who was chairing the BTWC meetings considering *the content, promulgation and adoption of codes of conduct for scientists* had circulated to the BTWC States Parties seven questions that could be examined at the meetings being held in Geneva in 2005. As it was noted that these questions were equally applicable to a code of conduct in relation to the CWC if references to the BTWC were replaced by the CWC, the seven questions were considered by the discussion group (see *Appendix 3*) who concluded that the OPCW/IUPAC workshop had addressed most if not all of the questions raised by Ambassador Freeman in December 2004 in the context of the BTWC meetings to address codes of conduct for scientists.

Conclusions

49. The following findings and observations can be drawn on the basis of discussions at the Workshop.

I Chemistry Education and Outreach

1. Outreach to those engaged in science and technology using chemicals and efforts to ensure that the education of all chemists includes an awareness of the requirements and obligations of the CWC will contribute to achieving in-depth compliance within States Parties to the Convention. An informed scientific and technological community within each country can help provide advice to the States Parties and in disseminating unbiased and accurate information to the public.
2. Steps need to be taken in chemistry education both at secondary and post-secondary levels to enhance the awareness of both the benefits that science and technology using chemicals can bring and of the potential for misuse in regard to illicit drugs, chemical and biological weapons, PIC, POPs, etc ...
3. There needs to be recognition that those engaged in science and technology using chemicals have a role in ensuring sustainable development and the fact that compliance

and implementation of international treaties such as the CWC and the BTWC contribute to this.

4. From the point of view of the implementation of the CWC and achieving in-depth compliance, a concerted effort is needed involving both the OPCW and the National Authorities of the States Parties and IUPAC.

5. There needs to be a clear endorsement of the initiative by the OPCW which can be referred to by various national societies in approaching their respective National Authorities and other national ministries.

6. The IUPAC/OPCW joint project would take forward the proposed chemistry education and outreach initiative.

II Codes of Conduct

7. Codes of conduct are needed for all those engaged in science and technology using chemicals to protect public health and the environment and to ensure that activities in science and technology using chemicals are, and are perceived to be, in compliance, with international treaties, national laws and regulations such as those relating to illicit drugs, chemical and biological weapons, banned and severely restricted chemicals, PIC, POPs etc...

8. Such codes of conduct are complementary to national implementing legislation for the CWC and will help to achieve in-depth compliance throughout academia, industry and government of those engaged in science and technology using chemicals. They will extend awareness of the general purpose criteria of both the CWC and the BTWC and thus will help to ensure its effective implementation.

9. There are benefits to be gained from a layered approach to such codes:

- Universal principles/declarations such as those being developed by UNESCO/COMEST
- Society codes such as those of or being developed by professional and industrial associations
- Institutional/workplace codes such as those in or being developed by individual institutions/workplaces

The three layers are complementary and mutually reinforcing. The approach to be adopted throughout should be to extend existing codes rather than seeking to create new codes.

10. Successful codes require the involvement of all elements of the community engaged in science and technology using chemicals as such involvement creates the sense of shared ownership and it is evident that the process of creating and developing codes adds significantly to their effectiveness. There are also benefits in the codes, particularly at the institutional/workplace level creating processes in which the ethical aspects of each new

piece of work is considered in a similar way to that in which risk assessments for health and safety are currently required in many countries.

11. Consideration should be given to the development of a model code of principles as well as draft elements for codes which might be promulgated urging recipients to review any existing codes with a view to revising them to embrace any missing aspects.

12. As with the chemistry education/outreach initiative, there needs to be a clear endorsement by the OPCW of the benefits that can arise from in-depth compliance as a result of codes of conduct for all those engaged in science and technology using chemicals.

50. The President of IUPAC, Prof. Leiv Sydnes, referred to the Oxford workshop in his presidential address to the IUPAC Congress in Beijing in August 2005 noting:

... at the end of last year we were invited by the [OPCW] to engage IUPAC experts in a joint project, aiming at increasing the awareness of the Chemical Weapons Convention in the scientific community, enhancing the knowledge about its key provisions and requirements, facilitating the integration of issues related to the Convention into chemistry teaching, and promoting professional conduct of chemists and chemical engineers that is fully in line with the Convention. A most successful workshop was held in the beginning of last month in Oxford, with significant involvement of IUPAC chemists
...

51. While the workshop identified the development of codes of conduct as a high priority and this will be considered further by IUPAC when the material from the Oxford workshop is available, it is important to note that currently IUPAC has not adopted such a code nor made a commitment to develop such a code. For a multifaceted organization like IUPAC to do so will be a major undertaking, and will require an extensive transparent process that would involve all of its constituents.

52. The States Parties to the BTWC are encouraged to consider adopting a similar cooperative effort between the States Parties and an appropriate international union of the life scientists – possibly the International Council of Scientific Unions (ICSU) might be well placed to undertake a parallel role to that being taken by IUPAC and the associated national chemical societies. It is evident that a similar effort on education, awareness raising and codes of conduct in the life sciences area will bring similar benefits by helping to achieve in-depth compliance with the BTWC throughout academia, industry and government of those engaged in science and technology using life sciences.

Appendix 1

IUPAC – the International Union of Pure and Applied Chemistry

The International Union of Pure and Applied Chemistry (IUPAC)¹⁰ serves to advance the worldwide aspects of the chemical sciences and to contribute to the application of chemistry in the service of mankind. As a scientific, international, non-governmental and objective body, IUPAC is able to and does address many global issues involving the chemical sciences. IUPAC was formed in 1919 by chemists from industry and academia. Over nearly eight decades, the Union has succeeded in fostering worldwide communications in the chemical sciences and in uniting academic, industrial and public sector chemistry in a common language. IUPAC has long been recognized as the world authority on chemical nomenclature, terminology, standardized methods for measurement, atomic weights and many other critically evaluated data. The Union sponsors major international meetings that range from specialized scientific symposia to meetings with societal impact. IUPAC is an association of bodies, National Adhering Organizations, which represent the chemists of different member countries. There are currently 49 National Adhering Organizations¹¹, and 19 other countries are also linked to IUPAC in the status of Associate National Adhering Organizations¹².

IUPAC is the largest of the Scientific Unions associated with ICSU – the International Council for Science. Other Unions include a number of general and specialized fields, but IUPAC is the only Union dealing with Chemistry as an overall science and in myriad applications.

¹⁰ *About IUPAC*. Available at <http://www.iupac.org/general/about.html>

¹¹ The countries of the 49 National Adhering Organizations are: Argentina, Australia, Austria, Bangladesh, Belarus, Belgium, Brazil, Bulgaria, Canada, Chile, China, Croatia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, India, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Korea, Kuwait, Netherlands, New Zealand, Norway, Pakistan, Poland, Portugal, Puerto Rico, Russia, Serbia and Montenegro, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, and USA.

¹² The 19 countries linked to IUPAC as Associate National Adhering Associations are: Albania, Cuba, Cyprus, Estonia, Hong Kong, Kenya, Malaysia, Mauritius, Mexico, Peru, Philippines, Romania, Singapore, Sri Lanka, Tanzania, Thailand, Tunisia, Uruguay and Vietnam.

Appendix 2

Draft Elements for Codes of Conduct.¹³

*[Note: This is solely an illustrative draft. It has **no** standing and has **not** been considered or approved by IUPAC]*

All National Chemical Societies are urged to review their existing codes of conduct, or develop new codes of conduct, to ensure compliance of their members with all relevant international and national laws and regulations, and to promote the uses of chemicals solely for the benefits of mankind. Consideration should be given to the inclusion in such codes of additional elements such as;

The members of the National Chemical Societies should ensure that all those who engage in science and technology using chemicals:

- Work to ensure that their activities and knowledge do no harm
- Work for ethical and beneficent advancement, development, and use of scientific knowledge.
- Are knowledgeable about and comply with relevant international and national laws and regulations
- Shall not engage in activities that are, or are perceived to be, unlawful
- Shall not knowingly or recklessly contribute to the development, production, stockpiling or use of toxic chemicals and their precursors or of biological agents or toxins, except where intended for purposes not prohibited by the Chemical Weapons Convention or the Biological and Toxin Weapons Convention (such as for industrial, agricultural, research, medical, pharmaceutical, protective or other peaceful purposes) as long as the types and quantities are consistent with such peaceful purposes.
- Acknowledge that minimizing risks from misuse of science and technology using chemicals is of concern to them and part of their responsibilities
- Recognize that their personal benign intent is an insufficient justification for setting aside such concerns
- Be aware of the possible misuses of their work
- Consider the direct and indirect benefits and harms of their work to colleagues, their professional communities and society at large

¹³ These draft Elements for National Chemical Societies were developed by Bob Mathews and Graham Pearson drawing upon language drafted by the discussion group and upon language in other codes..

- Consider carrying out health and safety reviews of their work and including therein consideration of whether such work is ethical and lawful.

Appendix 3

Review of the Seven Questions asked by Ambassador John Freeman

1. The discussion group noted that in December 2004, Ambassador John Freeman of the UK who was chairing the BTWC meetings considering *the content, promulgation and adoption of codes of conduct for scientists* had circulated to the BTWC States Parties seven questions that could be examined at the meetings being held in Geneva in 2005. As it was noted that these questions were equally applicable to a code of conduct in relation to the CWC if references to the BTWC were replaced by the CWC, the seven questions were considered by the discussion group
2. The seven questions were considered in turn by the discussion group from the point of view as to whether they had been addressed during the OPCW/IUPAC workshop in Oxford.

- How can we raise awareness of the CWC provisions in the global scientific community and reinforce the responsibilities of scientists?

This had been addressed as the central theme of the OPCW/IUPAC Oxford workshop.

- Should under-graduate and post-graduate education programmes address the ethical and practical aspects of preventing the misuse of science? How can we encourage due consideration of the possible consequences of the misuse of research?

This had also been addressed as a central theme of the OPCW/IUPAC Oxford workshop.

- How can we encourage universities, industry, research bodies and government to reflect CWC issues in their own in-house codes of practice and operational frameworks? Might we consider the introduction of guidance or instructions into existing structures that deal with the safety and ethics of individual experiments and research?

This had also been addressed as a central theme of the OPCW/IUPAC Oxford workshop.

- How can we promote the proper use of science-based activities and knowledge and encourage appropriate oversight of such work?

There had been less attention given at the Oxford workshop to the question of oversight. The discussion group noted the potential concern about chemicals in the mid-spectrum region between traditional chemical agents and biological agents such as calmatives and bioregulators. It was important to ensure that any work in this region was carefully considered to ensure that it was neither in breach nor perceived to be in breach of the CWC or the BTWC.

Consideration was also given to the question of national chemical defence programmes. It was noted that the OPCW had in 2004 adopted a format for the annual submission by States Parties of information on national protective programmes. It was recognized that transparency of such programmes both between States Parties and more widely to the public is important to demonstrate that States Parties are both compliant and perceived to be compliant with the obligations of the CWC and the BTWC.

Finally, it was noted that special attention might be given in codes for those engaged in science and technology using chemicals within government to ensure that perceptions of their activities are in compliance with international treaties and national laws and regulations.

- Is it necessary to provide guidance on how to deal with research that throws up unexpected or unpredictable results of relevance to the CWC prohibitions?

This was another area to which less attention had been given at the Oxford workshop. The discussion group considered that this was especially relevant in the mid-spectrum region between traditional chemical and biological agents and in regard to synthetic chemicals that mimic biological functions. It was considered that the question of unexpected/unpredicted results should be addressed in codes especially at the institutional/workplace level.

- How might we promote consideration among research and project funders of CWC issues when considering proposals, eg, whether the research could be misused in the future and what steps might help prevent this?

This had also been addressed as a central theme of the OPCW/IUPAC Oxford workshop.

- To whom or to what body might an individual turn if he/she suspects that someone else's conduct is in breach of CWC prohibitions? What safeguards might there be for such individuals? And how might any malign accusations be filtered out?

This had also been addressed in the OPCW/IUPAC Oxford workshop.

3. It was thus evident that the OPCW/IUPAC workshop had addressed most if not all of the questions raised by Ambassador Freeman in December 2004 in the context of the BTWC meetings to address codes of conduct for scientists.