OPCW

Scientific Advisory Board

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REPORT OF THE SIXTH SESSION OF THE SCIENTIFIC ADVISORY BOARD

1. Introduction

1.1 The Scientific Advisory Board (SAB) met for its Sixth Session from 16 to 18 February 2004 in The Hague. A list of participants appears as Annex 2 to this report.

1.2 The Director-General opened the meeting with a statement in which he welcomed six new SAB members, thanked the former SAB members who had left since its previous session for their valuable contributions to the work of the OPCW, and set out his views on the future work of the SAB.

1.3 Following the proposal by the Director-General, the SAB elected Jiří Matoušek of the Czech Republic as its new Chairman, and Thomas Inch of the United Kingdom of Great Britain and Northern Ireland as its Vice-Chairman.

1.4 During this meeting, the SAB addressed the following matters:

(a) the results of the First Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (hereinafter "the First Review Conference");

(b) biomedical samples;

(c) sampling and analysis;

(d) optimisation of the verification system;

(e) keeping the OPCW abreast of scientific and technological progress;

(f) awareness-building, outreach, and education;

(g) the OPCW's international cooperation programmes; and

(h) assistance and protection against chemical weapons.

2. The results of the First Review Conference

The Technical Secretariat (hereinafter "the Secretariat") briefed the SAB on the results of the First Review Conference. Thomas Inch also informed the SAB about the results of the meeting of government experts to review the findings of the SAB that were submitted to the First Review Conference, at which the experts discussed the Note by the Director-General submitting the SAB's observations and findings to the First Review Conference (RC-1/DG.2, dated 23 April 2003). (See also the report of the Chairman of the Executive Council on this meeting, EC-36/2, dated 16 February 2004).

3. Biomedical samples

3.1 The SAB had previously agreed that there should be a temporary working group to advise the OPCW on the issue of biomedical samples.

3.2 The SAB considered a presentation by the Secretariat on the OPCW's current capabilities to collect and analyse samples of biomedical origin. The presentation included a review of a report by a group of experts who had considered the matter in December 1999, and the results of a questionnaire sent to all Member States regarding their capabilities in this field. The SAB noted that, of the 12 Member States that had responded to the questionnaire, 6 reported that they had capabilities relevant to the OPCW's mission, although none were specifically accredited for the analysis of biomedical samples.

3.3 The SAB agreed that:

(a) the establishment of methods and procedures for analysing, collecting, and transporting samples of biomedical origin remains an important OPCW activity relevant to the implementation of the Chemical Weapons Convention (hereinafter "the Convention");

(b) although scientific progress has recently been made in this field, there is still a shortage of robust, validated procedures that could provide unequivocal results in support of the OPCW's activities; and

(c) while the primary use of analytical methods and procedures for biomedical samples would be to support investigations of the alleged use of chemical weapons, further work is also needed to define the range of scenarios and applications within which such sampling and analysis might be performed under the Convention.

3.4 The SAB decided to establish a temporary working group that, in the first place, would prepare an assessment of the analytical aspects of biomedical sampling and analysis, with a view to developing specific recommendations for the SAB's consideration. The SAB suggested that Dr Inch chair this group, and requested that the Secretariat arrange an initial two-day workshop for the temporary working group, during which it could address key issues, and develop an action plan that recognised the resource implications of setting up a system for biomedical sampling and analysis. The terms of reference for this group appear as Annex 1 to this Note.

4. Sampling and analysis

4.1 The SAB visited the OPCW Laboratory and Equipment Store and held extensive briefings and discussions on the OPCW's current capabilities with respect to sampling and analysis. It also noted the progress that had been made in this regard.

4.2 The SAB made the following observations about sampling and on-site analysis:

(a) The time it takes to prepare samples needs to be cut down even more, and the logistics required for sample preparation need to be further improved. A number of techniques were pointed out that could speed up sample preparation considerably and that could thus enable larger sample throughput (in particular by avoiding water/solvent evaporation) and reduce the logistical burden the size and weight of the sample preparation kit place on the inspection team. Such techniques would be needed if sampling and analysis were to be performed in industry inspections with short inspection times (24 hours). Some of these techniques have been developed by the OPCW in the context of setting up a system for preparing control samples and matrix blanks. What is now needed is to validate these procedures so they can be approved for use in inspections. This will require the support of suitable laboratories in Member States.

(b) The OPCW Central Analytical Database (OCAD) now contains a representative number of scheduled chemicals. There is a need for further gap analysis to identify compounds that still need to be added, but in general terms the coverage of scheduled chemicals in the OCAD appears to be very good for verification purposes. There are, however, no unscheduled chemicals in the OCAD, and the inclusion of riot-control agents and of chemicals directly related to scheduled chemicals (e.g. well-known degradation products, impurities, and additives) should be considered.

(c) The OPCW is in the process of replacing its gas chromatograph-mass spectrometer (GC-MS) with new bench-top equipment, which has passed the transport-ruggedness and performance testing it was put through. The SAB had concerns about possible performance problems at temperatures above 30 degrees Celsius, and suggested that the equipment should be tested to determine whether the concerns are justified and, if they are, that practical ways to cool the equipment should be looked into.

(d) In the combination of GC-MS, the OCAD, and the AMDIS software, OPCW inspectors now have an effective and non-intrusive package for the on-site detection of scheduled chemicals, including any Schedule 1 chemicals (except for ricin and saxitoxin; see subparagraph (e) below). The OPCW should maintain and use this capability. The SAB expressed again the view that analyses should preferably be performed on-site, and that further detailed off-site analyses should be reserved for scenarios such as investigations of alleged use, challenge inspections, and cases where there is an expectation that concentrations at trace level need to be analysed and that the matrix might present difficulties.

(e) The OPCW on-site sampling and analysis package does not allow for the analysis of toxins (for example ricin and saxitoxin). The SAB reiterated that, if the OPCW wants to have the capability of identifying these toxins during on-site inspections, it will need to look at alternative techniques such as immuno assays.

(f) Correct sample-taking (selecting the right sample and collecting the right number of samples) is an important matter, and mistakes made in the field when samples are acquired cannot be corrected afterwards with high-performance analyses (even though the analysis is essentially qualitative or semi-quantitative, and not quantitative).

4.3 The SAB concluded with regard to off-site analysis that the OPCW's current proficiency testing did not stretch the performance of laboratories seeking to become or remain OPCW designated laboratories to the point where they can demonstrate fully their ability to perform complex analyses at trace level with the required degree of reliability and quality assurance. The SAB expressed the view that the OPCW should conduct future tests with these standards in mind. There were also concerns about the possibility of masking the presence of an analyte in a sample.

4.4 The SAB recommended that the Director-General reactivate the temporary working group on sampling and analysis so that it might further study these matters relating to sampling and analysis, advise the Secretariat on possible improvements, and submit its observations on these matters to the Director-General and through him to the States Parties. Those members of the SAB that are willing to work in this group indicated that after the meeting they would correspond in order to prepare the terms of reference for it. Miguel Sierra will act as the focal point for this task, and it was also proposed that he serve as Chairman of the group. The SAB suggested furthermore that the Director-General consider inviting some members of the SAB temporary working group on sampling and analysis to attend an upcoming trial challenge inspection, the scenario for which includes sampling and analysis.

5. Optimisation of the verification system

5.1 The SAB was briefed on the efforts of the Secretariat and the Member States to further optimise the verification system, in part by increasing its efficiency. The SAB received further information about the overall statistics on the conduct of inspections and the utilisation of resources. It was quite clear that reducing the size of inspection teams is a key factor in the further optimisation of verification activities, in particular at chemical weapons destruction facilities (CWDFs).

5.2 The SAB was briefed on current attempts to achieve such reductions, including by allowing inspection teams to rely more on instrumental surveillance, particularly so that they do not have to work night shifts, but more generally so that verification activity by inspectors is replaced by the use of instruments. The SAB was pleased to see that some progress had been made in this regard. However, there was a strong sense that much more could still be done by making fuller use of CCTV or video-surveillance systems and by relaying the data that are routinely collected by a given CWDF from control systems in place there to more-centralised OPCW

inspection-team control centres. One SAB member, Gerhard Matz, offered the Secretariat the opportunity to visit his institute to discuss these matters in detail.

5.3 The SAB also learned that, despite the decisions taken by the Conference of the States Parties on procedures for revising the technical specifications for approved equipment (C-8/DEC.3, dated 22 October 2003) and on adding new items of approved equipment to the list of such equipment (C-7/DEC.20, dated 11 October 2002), such adjustments hade yet to be made in practice. The SAB had previously stressed that the Director-General must have the freedom to have the Secretariat buy and use equipment appropriate to its needs. The SAB therefore encourages the Secretariat to make appropriate and frequent use of these existing procedures. It is important that Secretariat staff have the right equipment; that they strive to further refine the specifications for the technology they use and reduce the weight of the equipment they carry, including that used for analytical purposes; and that the equipment be actually commercially available.

5.4 The SAB would be pleased if their respective National Authorities could give its members an opportunity to attend an OPCW inspection as observers.

6. Keeping the OPCW abreast of developments in science and technology

6.1 The SAB had an initial discussion with inspectors about their training activities. There is a system in place that provides for the mandatory training of inspectors so that they can perform certain functions and that certifies that as a general matter they are qualified to carry out inspections. The system offers, *inter alia*:

(a) specialised safety and medical training;

(b) training in emergency procedures;

(c) training geared toward achieving or maintaining the required certification in the use of certain types of equipment and in the performance of certain inspection duties;

(d) confidentiality training;

(e) refresher training;

(f) training offered in-house by Secretariat staff as and when they are available; and

(g) training made possible by offers from Member States.

6.2 The SAB did note, however, a rather serious deficiency in the overall training regimen: There seems to be little if any systematic training to keep inspectors abreast of relevant developments in science and technology, including new methods of synthesising scheduled chemicals, new production equipment, and new industrial processes relevant to the Convention. Such training is particularly important to inspectors who are chemical-production technologists or chemical-production logisticians with a chemical industry background.

6.3 The SAB is willing to help the Secretariat to clarify the gaps and deficiencies in the current training programme and to gain access to institutions and experts that could provide the required training. The SAB recognised that, when it comes to training to keep inspectors abreast of developments in science and technology relevant to the Convention, the Secretariat's in-house expertise is insufficient. The members of the SAB are, therefore, looking forward to receiving from the Secretariat more-detailed information on the areas where there are gaps in the training programme so they can provide the required advice. The SAB will return to this matter at its next meeting.

7. Awareness-building, outreach, and education

7.1 The SAB received a briefing on the Ethics Project. It also noted initiatives outside the OPCW, such as codes of conduct in professional associations and a recent statement by the International Council of Chemical Association on the consistency between the Convention and the industry's Responsible Care® programme. There is, however, an additional need to raise awareness about the Convention and to incorporate Convention-related issues into education: The SAB discussed how it could help increase awareness of the Convention and promote the incorporation of issues related to it into science teaching in schools, universities, and any subsequent professional education.

7.2 Based on the positive experience with the project of the International Union of Pure and Applied Chemistry (IUPAC) in preparation for the First Review Conference, and given the continuing support of the IUPAC leadership and their readiness to help, the SAB felt it would be useful for the OPCW to approach IUPAC again and requested its help with improving awareness of the Convention and the incorporation of Convention-related issues into the educational programmes of chemistry students.

7.3 At the same time, the SAB recognised that this issue is a broad one, and that there may also be additional opportunities to promote awareness if they were combined with a wider awareness-raising approach that took in all types of weapons of mass destruction. Such an expansion would provide additional opportunities to raise awareness of and knowledge about the Convention but, because it might involve other partners in addition to the IUPAC, such as the International Atomic Energy Agency and the World Health Organisation, it would also require proper coordination.

7.4 In any event, the SAB considered it important that a temporary working group be formed to deal with these matters.

8. International cooperation

8.1 The SAB received a briefing from one of its members about a recent research project aimed at developing a new process for the oxidative catalytic destruction of toxic materials and wastes. This project has reached the pilot-plant stage and was seen as an example of the kind of research project that the OPCW might consider funding in the context of its international-cooperation programmes. Two SAB members are already involved in the work of the committee that's reviewing the OPCW's research-support programme. Their work might serve as a model for SAB members wishing to

get involved in other international-cooperation programmes of the OPCW, to make proposals for their improvement, and to help review their effectiveness.

8.2 The SAB considered this to be an important matter, and at a future meeting it will consider further how it can help improve the OPCW's international cooperation programmes.

9. Assistance and protection

9.1 The SAB was briefed on the Secretariat's assistance and protection projects and related matters. Assistance and protection are important activities that the SAB will also study in the future; it will make observations and draft proposals on how the OPCW can enhance its preparedness in these areas.

9.2 Providing protection against chemical weapons is, of course, the responsibility of the States Parties themselves, and many of them have taken measures to improve their preparedness, in part to address the possibility that terrorists will use toxic chemicals. The OPCW can facilitate exchanges, offer advice, provide a framework for consultation and cooperation, and help assess needs. The SAB noted that an OPCW assessment capability has been established in the form of an assistance coordination and assessment team, but that there remain uncertainties about the actual delivery of assistance should it be requested after such an incident.

9.3 The SAB also noted the efforts that had been made to provide training to States Parties to enhance their civil defence and first-responder capabilities. It observed that a more-systematic attempt should be made to solicit feedback on these training courses, to communicate that feedback to the organising institutions, and for the OPCW to conduct an assessment of such reviews with a view to evaluating programme efficiency and identifying areas where improvements could be made.

9.4 The SAB also noted that a consultant to the Secretariat was preparing a training manual. Several members of the SAB offered to conduct a peer review of this manual. In addition, it was stressed that, in addition to developing training material for first responders or trainers, it was important to develop educational hand-outs to inform the public about basic protective measures and about procedures to be followed in the case of a toxic release. States Parties have an important role to play in developing such educational materials; the OPCW would be able to offer its assistance, facilitate cooperation, and provide a forum for exchanges of experiences and material. The OPCW could also help identify minimum standards for public information about basic protective measures that States Parties might consider adopting. It was at the same time recognised that public education in this field is a difficult process that involves considerable public resources.

9.5 The SAB also noted that there was a lack of good data on protection measures and their effectiveness after chemical attacks in urban areas. Such data could be gathered from feedback offered during OPCW seminars and training courses on protection, but clearly the resources of the OPCW are inadequate for it to undertake such a systematic compilation project.

10. Conclusions

10.1 The SAB considered which issues it should focus on next, and recommended that:

(a) the Director-General establish a temporary working group on biomedical samples as soon as practical, so that work in this important area could be initiated in 2004;

(b) the Director-General reactivate the temporary working group on sampling and analysis so that, with Secretariat assistance, it could conduct further discussions on finding practical solutions to sampling and on-site analysis, with particular emphasis on developing sample-preparation procedures to improve logistics and shorten the time required on-site, on how to fill gaps in on-site analysis (including of toxins), and other matters reflected in this report. The SAB, furthermore, suggested that the Director-General consider inviting some members of the temporary working group of the SAB on sampling and analysis to attend an upcoming trial challenge inspection the scenario of which includes sampling and analysis; and

(c) the Director-General establish a temporary working group on education and outreach, which would discuss further the contribution that the SAB might make to enhancing awareness of the Convention. The SAB recommended that, as a first step, the OPCW formally approach the IUPAC with a request for help in developing and implementing a project to enhance awareness of the Convention and to incorporate aspects of the Convention and its implementation into science curricula.

10.2 The SAB also concluded the following:

(a) Its members are willing to help review any proposals developed by the Secretariat and Member States to further optimise verification, in particular with respect to the verification of the destruction of chemical weapons. Given that many of the solutions will be country- and facility-specific, a temporary working group may not be needed at the moment, but individual SAB members with relevant expertise remain available for consultation by the OPCW.

(b) Its members should contact their respective National Authorities to see whether they can be given an opportunity to observe an OPCW inspection, so that they can become better acquainted with how the OPCW conducts on-site inspections.

(c) Its members are willing to help review any proposals developed by the Secretariat and Member States regarding international cooperation, assistance, and protection (including by commenting on the draft training manual and on other relevant projects).

10.3 At its next meeting the SAB will take up again the other matters discussed in this report, in order to identify those that can be accommodated in its work schedule.

10.4 The SAB stressed the need for the Secretariat to ensure that in future the draft agenda and the background materials are made available at least three weeks in advance of the meeting. The meeting itself should be supported by clear and precise presentations by Secretariat staff. The Secretariat undertook to meet this request.

10.5 The SAB welcomed the recent opportunities for interaction and discussion with delegations, and with regional groups on their request, and expressed the view that this interaction should continue and become a regular feature of its work.

Annexes:

Annex 1: Temporary Working Group on Biomedical Sampling and Analysis: Terms of Reference
Annex 2: List of Participants in the Sixth Session of the Scientific Advisory Board

Annex 1

TEMPORARY WORKING GROUP ON BIOMEDICAL SAMPLING AND ANALYSIS

TERMS OF REFERENCE[1]

1. This temporary working group on biomedical sampling and analysis will consist of experts in those biomedical sampling and analysis techniques relevant to the activities of OPCW. The experts should represent laboratories that are working actively in this area and have current knowledge of relevant technologies and scientific developments. Interested members of the SAB may also wish to join the group.

2. The group is requested to report to the SAB on the following:

   (a) the specification of key biomarkers for the chemical warfare agents in the schedules;

   (b) recommendations regarding the most-appropriate methods for analysing blood, urine, or other matrices for agents, agent markers, metabolites, and/or adducts, and other techniques that can provide evidence of chemical weapons exposure;

   (c) the identification of shortcomings in existing methodologies, and a proposed plan of action to establish a standard set of tests, which proposal should include:

      (i) required sensitivities and detection limits;

      (ii) analytical standards and reference compounds needed;

      (iii) standard operating procedures for validating methodologies; and

      (iv) criteria for the interpretation of analytical results in the context of confirming the alleged use of chemical weapons; and

   (d) administrative and organisational aspects of analysing biomedical samples that may be relevant, including:

      (i) suggestions regarding procedures to develop a suitable network of laboratories;

      (ii) recommendations regarding procedures for inter-laboratory comparison exercises and/or proficiency training; and

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1 These terms of reference were prepared by Ashok Datta, Robert Gibson, Thomas Inch, and Miguel Sierra.

(iii) updates on the number of laboratories active in this field and that have an interest in extending their capabilities.

3. Depending on the results achieved during its initial deliberations, the temporary working group's follow-up activities could include:

(a) elaborating on scenarios in which biomedical analysis may become important, and, for each scenario, providing guidance on the urgency of analysis in relation to the stability of markers and on lag-times for bringing samples to the laboratory;

(b) standardising sample collection and handling, development of standard operating procedures (including as regards transport);

(c) assessing training needs and resources required for the extension of the OPCW's capabilities in biomedical sampling and analysis; and

(d) preparing the OPCW Laboratory to handle biomedical samples.

Annex 2

LIST OF PARTICIPANTS IN THE SIXTH SESSION OF THE SCIENTIFIC ADVISORY BOARD

	Participant	Member State
1.	Ashok K Datta	India
2.	Alfred Frey	Switzerland
3.	J Robert Gibson	United States of America
4.	Thomas D Inch	United Kingdom of Great Britain and Northern Ireland
5.	Bjørn-Arne Johnson	Norway
6.	Young-chul Lee	Republic of Korea
7.	Detlef Männig	Germany
8.	Jiří Matoušek	Czech Republic
9.	Gerhard Matz	Germany
10.	Brahim Y Meklati	Algeria
11.	Koichi Mizuno	Japan
12.	Ernő Pungor	Hungary
13.	Burkhard Seeger	Chile
14.	Abbas Shafiee	Islamic Republic of Iran
15.	Miguell Sierra	Spain
16.	Theodros Solomon	Ethiopia
17.	Rolando A Spanevello	Argentina

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