OPCW

Scientific Advisory Board

Twenty - Second Session
8 – 12 June 2015

SAB-22/WP.1
1 October 2014
ENGLISH only

SUMMARY OF THE FOURTH MEETING OF THE SCIENTIFIC ADVISORY BOARD'S TEMPORARY WORKING GROUP ON VERIFICATION

1. The Report of the Fourth Meeting of the Scientific Advisory Board (SAB) Temporary Working Group on Verification is hereby circulated to States Parties. The meeting was held in The Hague from 29 September to 1 October 2014.

2. The Chairman of the SAB and the Director-General have agreed that this report can be circulated to States Parties in advance of the Twenty-Second Session of the SAB.

3. In accordance with the Rules of Procedure of the SAB, this report will be reviewed in detail by the SAB at its Twenty-Second Session.

Annex:

Report of the Fourth Meeting of the SAB Temporary Working Group on Verification

CS-2014-8826(E) distributed 08/10/2014

Annex

REPORT OF THE FOURTH MEETING OF THE SAB TEMPORARY WORKING GROUP ON VERIFICATION

1. AGENDA ITEM ONE – Introduction and adoption of the agenda

1.1 The Scientific Advisory Board's Temporary Working Group (TWG) on Verification held its fourth meeting from 29 September to 1 October at OPCW Headquarters in The Hague.

1.2 The meeting was chaired by Roberto Martinez-Alvarez on behalf of the SAB.

1.3 The meeting began with a brief opening statement by the Chair. The list of TWG members who attended this meeting can be found in the Appendix.

1.4 The following agenda was adopted:

(a) Introduction by the TWG Chair and adoption of the agenda;

(b) Challenges to the CWC verification regime on Article IV, V, IX, X and Paragraph 27 of Part XI of the Verification Annex;

(c) Challenges to the verification regime: chemical industry perspectives;

(d) Experiences of other international organisations;

(e) Which methodologies might be helpful for the Technical Secretariat to keep abreast of developments in science and technology of relevance to the CWC verification regime?

(f) Break-out sessions to discuss recommendations for the final report;

(g) Any other business;

(h) Conclusions, recommendations, plan of action for intersessional period, elaboration of the TWG report and date of the next meeting.

2. AGENDA ITEM TWO – Challenges to the CWC verification regime on Article IV, V, IX, X and Paragraph 27 of Part XI of the Verification Annex

<u>United Nations Mission to Investigate Allegations of the Use of Chemical Weapons in the Syrian Arab Republic</u>

2.1 Professor Åke Sellström (guest speaker) provided his perspective on the United Nations Mission to Investigate Allegations of the Use of Chemical Weapons in the Syrian Arab Republic (hereinafter "the UN investigation"), which he led. He described key elements of the preparation-and-planning phase (including visits to capitals and collection of testimonies), the conduct of the investigation (including the processes and outcomes from the use of interviews, epidemiology, sampling, and documentation), and reporting. The briefing included an overview of the

Secretary-General's mechanism (which was established in 1988) and how it was invoked for the above-mentioned investigation. He highlighted several potential lessons relevant to the OPCW, including:

(a) Forming a highly competent and cohesive team prior to deployment, building on the synergies between the United Nations (UN), OPCW and World Health Organization (WHO);

(b) OPCW is particularly strong on logistical and technical aspects;

(c) OPCW's procedures were used with good effect in the investigation: some of these procedures could benefit from further adaptation;

(d) Training should be augmented, e.g. in order to improvise under pressure and make assessments in the field in rapidly changing circumstances;

(e) Bio-medical sampling and analysis should be augmented and institutionalised and environmental bio-sampling should be considered;

(f) Epidemiology is a powerful tool also for investigations of use of chemical weapons; and

(g) Adding expertise in metallurgy and material science would be useful (e.g. for attribution analysis).

2.2 In the discussion, the following points were raised:

(a) In the UN investigation, the results obtained from biomedical samples were critical because they provided factual evidence of exposure to chemical warfare agents and corroborated evidence for the use of chemical weapons.

(b) In relation to biomedical sample analysis for detection of agents, it was noted that DNA testing is a useful forensic tool for linking samples to individuals.

(c) Critical to success of the UN investigation was the team building and selection of the team members: the team members must be able to work together under pressure and in often chaotic situations.

(d) OPCW proficiency testing protocols have been developed around challenge inspection scenarios, and the UN investigation helped to clarify the distinct differences between an Investigation of Alleged Use (IAU) and a Challenge Inspection (CI). A panel appointed by the OPCW Director-General is considering these differences in a review of proficiency testing.

<u>Sampling and analysis</u>

2.3 Hugh Gregg (from the Technical Secretariat) discussed the experiences and practices of the laboratories that had been involved in the UN investigation. He pointed out that all laboratories had similar experiences and difficulties due to the time pressure. In the on-going lessons learned reviews by the laboratories themselves, the following considerations were raised:

(a) The modification of proficiency testing procedures and standard operating procedures to match a realistic scenario (especially in relation to volume of samples that are likely to be requested);

(b) Best practices for handling biomedical samples outside a regulated laboratory environment;

(c) How to get adequate information on the nature of the samples sent to the lab, what could the laboratories provide to the inspectors to ensure they are thorough in their sample and observation collection on-site;

(d) Updating methods to allow all data to be considered, prioritisation of samples collected from the field for analysis;

(e) Confidentiality issues;

(f) Handling media (and consistent message to convey across all laboratories);

(g) Reporting in such a way that the team and analysts not in field can both quickly obtain the necessary information from the report;

(h) Guidelines on what to report (much data was collected that has value, yet some results would not lend themselves to immediate conclusions); and

(i) How to most efficiently communicate information between laboratory and field.

He stated that a critical aspect of the laboratory system is the sharing of scientific information and new developments: these networks are a critical aspect of maintaining readiness.

OPCW-UN Joint Mission

2.4 Dominique Anelli (of the Technical Secretariat) briefed the TWG on key aspects of the OPCW-UN Joint Mission for the elimination of the chemical weapons programme of the Syrian Arab Republic (hereinafter "the Joint Mission"). He described the key modalities of the Joint Mission (including legal aspects and agreements) and the verification and destruction activities undertaken (both inside and outside the country). Key issues included security of staff deployed to the field; coordination and communication between agencies and between technical and policy staff; the range of expertise and skills needed (both at headquarters and in the field) to meet the unusual requirements of the mission; and equipment. Mr Anelli highlighted potential lessons to help ensure readiness for contingency operations in the future, including: ensuring a sound and robust framework, knowledge management and retention of rare expertise (most staff involved in the Joint Mission will be leaving OPCW by the end of 2015), the need to innovate and to communicate effectively across numerous disciplines and areas of work; keeping duplication of effort to an absolute minimum; deploying fuller analytical capabilities to the field (for example, Raman spectroscopy had been used in the field for the first time), handling compressed time lines

(especially within the organisation), and ensuring appropriate and robust equipment is available.

2.5 Jonathan Mills (Inspection Team Leader from the Technical Secretariat) provided further insight from the perspective of the Head of Field Operations. He described how the decision to launch inspections was conducted on a case-by-base basis, centred on individual risk assessments balanced against mission criticality. The use of remote/video monitoring equipment was developed in response to such assessments and the deterioration of prevailing security conditions. The absence of a robust reporting and feedback loop sometimes led to a disparity between the operational ground truth and the view from headquarters.

2.6 In the discussion, the following points were raised:

(a) The Joint Mission has forced the OPCW to adapt its procedures in relation to the verification activities in the context of the unique removal and destruction of Syrian chemical weapons;

(b) The importance for a thorough and systematic lessons-learned exercise with recommendations was pointed out. The TWG is looking forward to receive at its next meeting a briefing by the Technical Secretariat on the lessons learned.

Gap analysis

2.7 Per Runn highlighted key factors of a gap analysis conducted during the intersessional period. Preliminary analysis, based on interviews with over twenty staff members of the Technical Secretariat, indicated that: verification of chemical weapons destruction is based on established practises not policy; difficulty to retain chemical weapon expertise; the need to capitalise on the lessons learned on equipment from the mission in the Syrian Arab Republic; the importance of preparing for future challenges - such as sea-dumped chemical weapons munitions, continued destruction of old chemical weapons and new riot-control agents and incapacitating chemical agents - that are likely to arise; IT support for Article IV and V verification; the need to adopt inspection reports that allow for uploading of information to the Verification Information System (VIS); the lack of analysis to allow the Technical Secretariat to prepare for emerging chemical weapons scenarios; uncertainty about the responsibilities for and policies related to CI and IAU activities; the insufficient CI and IAU training due to unavailability of staff; the future role of qualified experts in an IAU team; and the difficulty to maintain readiness to launch a CI or an IAU with the reduction of the size of the Technical Secretariat and the loss of key competence.

2.8 In the discussion, the following points were raised:

(a) To remain credible, it will be critical for the OPCW that it can retain its expertise in the area of chemical weapons including old chemical weapons and abandoned chemical weapons. This might include retaining staff with key knowledge and concentrating the Technical Secretariat's chemical weapons expertise into one unit.

(b) The use of qualified experts and non-inspection personnel at OPCW HQ are valuable in the context of CI and IAU. It is critical that mechanisms are in place to ensure that the appropriate expertise is readily available.

(c) The idea that other international organisations could play a role in the context of qualified experts was raised.

(d) Operating in a resource constrained environment requires appropriate balance of staff focused on routine verification versus CI or IAU.

3. AGENDA ITEM THREE – Challenges to the verification regime: chemical industry perspectives

The results of a survey of industry representatives on the challenges of the verification regime were presented to the TWG. Industry representatives believe that the verification regime remains relevant to the object and purpose of the Convention, and welcomes the opportunity for discussion of several issues relevant to efficient and effective implementation of the Verification Annex. The industry survey addressed declaration issues, site selection issues for inspection of other chemical production facilities (OCPFs), sampling and analysis, production by synthesis. The survey results include several recommendations for improvements that might be considered, including further consultations to ensure consistency in declarations, the development of criteria for OCPFs relevant to the Convention, and review of import/export information, among others.

In the discussion, the question was raised on how management systems and internal audits could support verification.

4. AGENDA ITEM FOUR – Experiences of other international organisations

4.1 An overview of "Big Data" was provided by Kavita Berger (guest speaker) from the Center for Science, Technology, and Security Policy at the American Association for the Advancement of Science (AAAS), a nongovernmental and professional science association in the USA. The presentation summarised findings from a recent report of the Center (one of a number of objective evaluations of emerging or enabling technologies that AAAS has produced). Dr Berger explained that although no formal definition of big data exists, it often is defined as data generated, collected, and combined from a variety of distinct sources (i.e., the variety of data); is added to, deleted from and/or changed in data sets at different speeds and times (i.e., the velocity of data); that it can be incomplete, imperfect, and error-prone and that data collected in these repositories are not standardised (i.e., the veracity of data); and that the amount of data is very large requiring multiple petabytes of storage (i.e., the volume of data).

4.2 The presentation highlighted a series of case studies on the use of big data that included closed source information, open source information, and social media. Common challenges encountered with big data analysis were described, together with the approaches that are being explored to overcome these challenges. In addition to the technical challenges, social challenges (ethical, privacy, etc) are important to consider in any application of the use big data, and especially in a verification context.

Further assessments of big data can be found in a report from AAAS entitled National and Transnational Implications of Big Data in the Life Science that would be released in October 2014. The presentation concluded with examples of possible applications of big data in a verification context, such as: evaluating an incident that has occurred through social media, satellite imagery, and other data sources; monitoring discussions about certain agents, precursors, equipment, and other relevant information; identifying communication networks and linkages between entities; evaluating supply chains of agents, precursors, equipment, technologies, and expertise; mapping locations of known or suspected sites with adversary activity (specifically, non-state actors) and/or conflict areas; and tracking communication of adversaries with public calls for harmful use of agent.

4.3 In the discussion, the following points were raised:

(a) There may be opportunities to apply the methodologies of the use and analysis of big data for chemical informatics that can benefit CWC implementation.

(b) Management and use of such great amounts of data is a challenge and requires expertise to ensure quality and validity of the data.

4.4 Philipp Amann (guest speaker) presented on the experiences of the European Union's law enforcement agency (EUROPOL) and the Organisation for Security and Co-Operation in Europe (OSCE). The presentation focused on the use of open source intelligence (OSINT) and data mining and how to turn data into meaningful information or intelligence. The presentation, which also touched upon Big Data, highlighted some of the challenges such as source verification and validation, the limited evidentiary value of open source information, and the difficulty of proving causality when conducting Big Data analysis. The presenter then offered some examples of how open source information is or could be used by the OSCE e.g. in the area of opinion mining, and provided a very recent example that will involve the use of drones by the OSCE to monitor the truce in Ukraine. Following this, the presentation gave an overview of how data analysis is used by Europol's European Cybercrime Centre in the area of combating cybercrime. The speaker highlighted some of the more recent trends in the area of cybercrime such as the trade of drugs, stolen goods, weapons, etc. on online marketplaces on the Darknet. As these parts of the Internet are not easily accessible and provide a high level of anonymity, the presenter drew attention to the potential use of these underground fora for activities that could be of relevance to the OPCW and the CWC, considering also the increasing adoption of virtual currencies.

4.5 In the discussion, the following point was raised:

Cybercrime is an increasing problem: combating it effectively and efficiently requires expertise, skills and a variety of (new) tools and methodologies, including data collection and analysis. Such tools may have applications for support of verification activities as they become more sophisticated and allow information to be more thoroughly validated.

5. AGENDA ITEM FIVE – Which methodologies might be helpful for the Secretariat to keep abreast of developments in science and technology of relevance to the CWC verification regime?

5.1 Keith Powell (of the Technical Secretariat) described the use of social media as a tool for communication and a means of receiving information relevant to emergency response and verification activities. Mr Powell pointed to parallels between using social media for humanitarian crisis response and public/societal verification. He explained that tools such as social media analysis, crisis mapping and crowd sourcing all offer ways to opportunities to utilise public information for actionable outcomes.

5.2 In the discussion, the following points were raised:

(a) Monitoring of social media has the potential to provide additional information which complements the information collected from formal sources, provided that the data is validated.

(b) The speed and penetration of social media challenge the existing mechanisms for evaluating and disseminating information.

6. AGENDA ITEMS SIX AND SEVEN – Break-out sessions to discuss recommendations for the final report

On the basis of its four meetings, the TWG started discussing recommendations for its final report, focusing in particular on:

(a) What are the technologies/methodologies used for verification purposes in other international treaties that could benefit the CWC verification regime?

(b) Which methodologies (whether existing or new) could assist States Parties in ensuring that all declarable plant sites are identified for declaration?

(c) Which new or emerging technologies may add value to existing capabilities for verification purposes (such as data analysis/data mining, statistical analysis)?

(d) What are the key technical components of a consistent approach to declaring complex mixtures of discrete organic chemicals?

(e) What are the verification aspects of the meaning of “produced by synthesis”?

(f) How can sampling and analysis most effectively be utilised for verification purposes?

7. AGENDA ITEM SEVEN – Any other business

No other business was raised.

8. AGENDA ITEM EIGHT – Conclusions, recommendations, plan of action for intersessional period, elaboration of the TWG report and date of the next meeting

8.1 The fifth meeting of the TWG was scheduled for 28-29 January 2015 and the sixth and final meeting for 5-6 May 2015. The TWG will present its final report to the 22nd Session of the SAB (which will be held on 8-12 June 2015).

8.2 The Chairperson closed the meeting at12:00 on 1 October 2014.

Appendix

LIST OF PARTICIPANTS IN THE FOURTH MEETING OF THE SAB TEMPORARY WORKING GROUP ON VERIFICATION THE HAGUE, THE NETHERLANDS 29 SEPTEMBER TO 1 OCTOBER 2014[1]

PARTICIPANT	INSTITUTION
Professor Roberto Martinez-Alvarez*[2]	Universidad Complutense de Madrid
Dr Robin Black	Consultant
Mr Hermann (Alex) Lampalzer	Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO)
Mr Stefan Mogl	SPIEZ Laboratory, Spiez
Dr Daan Noort	Netherlands Organisation for Applied Scientific Research (TNO)
Mr Eric Pujol	International Atomic Energy Agency (IAEA)
Mr Mehran Rouzbahani	Consultant
Mr Cheng Tang*	Office for the Disposal of Japanese Abandoned Chemical Weapons, Ministry of National Defence, China
Dr Per Runn	Consultant
Professor Alejandra Graciela Suárez*	Universidad Nacional de Rosario. Consejo Nacional de Investigaciones Científicas y Técnicas
Professor Paula Vanninen*	Finnish Institute for Verification of the Chemical Weapons Convention, Department of Chemistry, University of Helsinki
Mr Francois Mauritz van Straten*	South African Nuclear Energy Corporation SOC Ltd, Pretoria
Mr Valentin Rubaylo*	State Scientific Research Institute of Organic Chemistry and Technology, Moscow
Dr Rob Visser	Consultant
Mr Michael Walls	American Chemistry Council
Mr Philipp Amann (guest speaker)	European Union's law enforcement agency (EUROPOL)
Dr Kavita Berger (guest speaker)	Center for Science, Technology, and Security Policy, American Association for the Advancement of Science, Washington DC
Mr Philipp Amann (guest speaker)	European Union's Law Enforcement Agency (EUOPOL)
Professor Åke Sellström(guest speaker)	Consultant

* Member of the Scientific Advisory Board

- - - o - - -

[1] Dr Augustin Baulig (Secrétariat général de la défense et de la sécurité nationale, Paris), Mr Bimal Mehta (Transpek Industry Ltd., Vadodora), Dr Nicia Maria Fusaro Mourão (ABIQUIM), and Dr Mui Tiang Sng (DSO Laboratories, Singapore) could not attend the fourth meeting of the TWG.

[2] Chairperson of the TWG on Verification.