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# SAB's Assessment on Verification Issues

*OEWG Future Priorities*  
*31 January 2017*

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# Happy Chinese New Year!

- Best wishes to you all !  
& Have a healthy and prosperous Year of the Rooster !
- All the success to the Open Ended Working Group on Future Priorities!



# Acknowledgement

- **A Special Thanks to, Dr. Jonathan Forman, Science Policy Adviser of the TS and the Secretary of the SAB. As a “science diplomat”, Jonathan has provided great thoughts on the subject and provided detailed comments to the presentation. He is an excellent bridge between the SAB and the TS, and science and the policy;**
- **Dr. Chris Timperley, Chairperson of the SAB, has also provided great support, valuable comments and careful editing to the presentation.**

# Contents

## ■ Background

- Overview of the TWG on verification /SAB's assessment and recommendations on verification related issues

## ■ Discussions

- What has changed in the area of verification since the last Review Conference in spring 2013?
- How do you assess the current state of the verification regime?
- Which challenges do you foresee for the verification regime in the next ten years?
- Which issues would you like to see the OEWG-FP address in its recommendations to the Fourth Review Conference in 2018?

# In-depth review of verification related issues

- SAB attaches great importance to verification related issues with scientific and technological dimensions
  - The DG decided in 2012 that an in-depth study by the SAB was necessary and requested the SAB to establish a TWG on Verification;
  - Comprehensive review conducted by the TWG — experiences learned from other international organisations and a gap analysis performed inside the Technical Secretariat;
  - With 6 meetings and 4 interim reports, 18 recommendations suggested;
  - The final TWG's report was endorsed by the SAB at its 22<sup>nd</sup> meeting, Dr. Timperley, the SAB Chair briefed the delegations on 10 June 2015







# ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS

Working Together for a World Free of Chemical Weapons

## Recommendations from the OPCW Scientific Advisory Board's Report on Verification

### Recommendation 1

The Secretariat should consider adopting a comprehensive, more analytical approach to verification utilising all available and verifiable information.



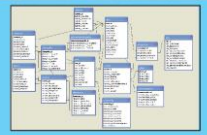
### Recommendation 2

The Secretariat should acquire the capability to use open-source information on a routine basis.



### Recommendation 3

The Secretariat should put in place an information management structure that can provide the support required for the verification process.



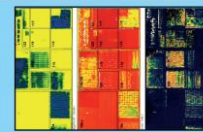
### Recommendation 4

Remote/automated monitoring technologies should be added to the list of approved inspection equipment.



### Recommendation 5

The Secretariat should look into the option of using satellite imagery for the planning of non-routine missions, in particular for IAU and CI.



### Recommendation 6

The Secretariat should visit the National Authorities to obtain assurance on the accuracy and completeness of declarations. The outcome of such visits may impact on the inspection frequency.



### Recommendation 7

The Secretariat must commission an independent review of all activities pertaining to the missions carried out in the Syrian Arab Republic.



### Recommendation 8

The list of declarable OCPFs submitted by States Parties should include all facilities which fall under the definition/requirement of paragraph 1 of Part IX of the Verification Annex, regardless of the purity level of a DOC or DOC mixtures produced.



### Recommendation 9

Not all facilities that fall under Part IX of the Verification Annex should be considered of the same relevance to the object and purpose of the Convention. The TWG recommends a practical approach for enhancing the utilisation of verification resources for OCPF declaration and on-site inspection processes.



### Recommendation 10

The verification thresholds for OCPFs producing highly relevant chemicals, and the possibility of revision of the product group codes, should be addressed by the SAB as well as the industry cluster.



### Recommendation 11

The OPCW should increase the staff of the OPCW Laboratory to cope with various aspects of IAU, biomedical samples, trace environmental analysis, toxins, and on-site analysis. Establishing a network of DLs for biomedical sample analysis should be a high priority.



### Recommendation 12

Lessons on chemical sampling and analysis from the OPCW's support to the 2013 United Nations Mission to Investigate the Use of Chemical Weapons in the Syrian Arab Republic, and all subsequent OPCW activities in relation to the Syrian Arab Republic must be identified and implemented.



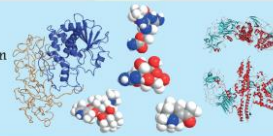
### Recommendation 13

PTs should incorporate a broader range of chemicals, and at a wider range of concentrations, to prepare laboratories for IAU-type scenarios.



### Recommendation 14

The Secretariat should expedite toxin identification exercises.



### Recommendation 15

Continuous additions to the OPCW Central Analytical Database (OCAD) are recommended to allow the OPCW to meet all its mandated inspection aims, including IAU.



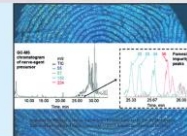
### Recommendation 16

Developments in analytical instrument portability, miniaturisation and disposable biosensors should be periodically reviewed by the Secretariat and the SAB for potential applicability to on-site analysis.



### Recommendation 17

The Secretariat should monitor developments in attribution analysis/chemical forensics.



### Recommendation 18

The Secretariat should augment its capability to monitor and forecast developments in science and technology of relevance to the Convention and its verification regime.



<https://www.opcw.org/special-sections/science-technology/science-technology-monitor/>



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Report available at: [https://www.opcw.org/fileadmin/OPCW/SAB/en/Final\\_Report\\_of\\_SAB\\_TWG\\_on\\_Verification\\_-\\_as\\_presented\\_to\\_SAB.pdf](https://www.opcw.org/fileadmin/OPCW/SAB/en/Final_Report_of_SAB_TWG_on_Verification_-_as_presented_to_SAB.pdf)

# Key considerations, findings and recommendations by the TWG (1)

- Verification methodologies and technologies are important tools to ensure comprehensiveness and effectiveness of the verification regime:
  - ✓ A comprehensive system-based approach to verification
  - ✓ Possible use of open-source information
  - ✓ Enhanced information management capabilities
  - ✓ Application of new technologies
  - ✓ Visits to National Authorities
  - ✓ Lessons from the missions to the Syrian Arab Republic



# Key considerations, findings and recommendations by the TWG (1)

What are the technologies/methodologies used for verification purposes in other international treaties that could benefit the Convention verification regime?

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

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

# Key considerations, findings and recommendations by the TWG (1)

- **Verification methodologies and technologies are important tools to ensure comprehensiveness and effectiveness of the verification regime:**
  - ✓ A comprehensive system-based approach to verification
  - ✓ Possible use of open-source information
  - ✓ Enhanced information management capabilities
  - ✓ Application of new technologies
  - ✓ Visits to National Authorities
  - ✓ Lessons from the missions to the Syrian Arab Republic

## Key considerations, findings and recommendations of the TWG (2)

- Issues related to ensuring consistency of declarations and inspection:
  - **The Issue.** “Currently, there is a **lack of consistency** in how States Parties declare plant sites which produce DOCs. One inconsistency applies to the **declaration of chemical mixtures containing DOCs**, another applies to how States Parties declare plant sites that **produce DOCs via bio-mediated production methods.**”
  - **Produced by Synthesis.** The SAB recommended to the Director-General that this meant any process designed for the formation of a chemical substance (SAB-19/1 and RC-3/DG.1)
  - **Recommendations.**
    - ✓ “mixture of Discrete Organic Chemicals” – Recommendation 8
    - ✓ “produced by synthesis” – Recommendation 9 & Recommendation 10

# Key considerations, findings and recommendations of the TWG (2)

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

Parties declare plant sites which produce DOCs. One

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

methods.”

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**Recommendation 8:** The list of declarable OCPFs submitted by States Parties should include all facilities which fall under the definition/requirement of paragraph 1 of Part IX of the Verification Annex, regardless of the purity level of a DOC or DOC mixtures produced.

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**Recommendation 10:** The verification thresholds for OCPFs producing highly relevant chemicals, and the possibility of revision of the product group codes, should be addressed by the SAB as well as the industry cluster.

# Key considerations, findings and recommendations of the TWG (3)

- Issues around ensuring sampling and analysis is utilised most effectively for verification purposes
  - Gap analysis revealed that to support verification, analytical capabilities of labs should be enhanced
    - ✓ Bio-medical samples
    - ✓ Toxins
    - ✓ Investigative analysis (chemical forensics)
  - Scientific developments that might improve verification capabilities
    - ✓ On-site analysis
    - ✓ Off-site

## Key considerations, findings and recommendations of the TWG (3)

- Issues around ensuring sampling and analysis is utilised most effectively for verification purposes
  - Gap analysis revealed that to support verification, analytical capabilities of labs should be enhanced

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

- Scientific developments that might improve verification capabilities
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How can sampling and analysis be utilised most effectively for verification purposes?

- Scientific developments that might improve verification capabilities
  - ✓ On-site analysis
  - ✓ Off-site

# Most recommendations are under consideration by the TS and the PMOs, some have already been implemented

■ **Note by the Director-General  
Dated EC-80/DG.7, 28 August 2015**



OPCW

Executive Council

Eightieth Session  
6 – 9 October 2015

EC-80/DG.7  
28 August 2015  
Original: ENGLISH

## Annex

### ACTION TO IMPLEMENT THE RECOMMENDATIONS MADE BY THE SCIENCE AND TECHNOLOGY BOARD IN ITS REPORT ON VERIFICATION<sup>11</sup>

### NOTE BY THE DIRECTOR-GENERAL

#### THE IMPACT OF DEVELOPMENTS IN SCIENCE AND TECHNOLOGY IN THE CONTEXT OF THE CHEMICAL WEAPONS CONVENTION

Recommendation from the SAB	Implementation	Expected outcomes/results
<p><b>Recommendation 1:</b> The Secretariat should consider adopting a comprehensive, more analytical approach to verification utilising all available and verifiable information.</p>	<ul style="list-style-type: none"> <li>• <u>Secretariat</u>: Strengthen the overall approach to verification. Explore different ways of working – based on past experiences, notably non-routine missions since 2013 as well as best practices from verification regimes of other organizations. Enhance cross-unit interaction by using project-based management coupled with clear accountabilities. Review the organisational structure to ensure it is fit for purpose in light of future verification needs. Simplify the internal-control regime. Augment the systematic information analysis – conceptual frameworks (including determination of the key information needed for effective verification and how to obtain it), staff posts, and information tools. Assess the degree of implementation of the CWC and determine how to address any gaps. Augment training in the relevant technologies/techniques/tools, e.g. data analysis and geographical mapping capabilities.</li> <li>• <u>Resource implications</u> (Medium-Term Plan and annual Programme and Budget): Staffing and investments in and maintenance of IT systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced risk of re-emergence of chemical weapons through a comprehensive verification regime that is relevant to all future challenges.</li> <li>• Increased completeness of declarations.</li> <li>• Reduced declaration discrepancies.</li> </ul>
<p><b>Recommendation 2:</b> The Secretariat should acquire the capability to use open-source information on a routine basis.</p>	<ul style="list-style-type: none"> <li>• Secretariat informal paper of 31 July 2012 refers.</li> <li>• <u>Secretariat</u> – current use of publicly available information includes:               <ul style="list-style-type: none"> <li>○ Maintaining technical expertise of staff members for effective verification.</li> <li>○ Assessing developments and trends in the chemical industry</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Tailored assistance to current and emerging States Parties for full and effective implementation of Article VI.</li> <li>• Increased completeness of declarations.</li> </ul>

# Can Verification Benefit from a Change in Mindset?(1)

- **DG's response to the Report of 24<sup>th</sup> Session of the SAB (EC-84/DG.9):**
  - Recommendation 1 and 6 require further consideration in regard to any potential implications for the verification regime; discussions in the OEWG-FP could be useful
- **Recommendation 1:** “The Secretariat should adopt a comprehensive, more analytical approach to verification utilizing all available and verifiable information.”
  - Limitation of current verification regime is that it has no provisions for assessing the completeness of declarations – only possible to assess the correctness of declarations
  - Current practice at the TS seems to involve a compartmentalized approach vis-à-vis management and analysis of information relevant to verification process
  - Experiences from other international organizations revealed the importance of gathering and analysing information from complementary sources and conducting comprehensive review
  - Implementation of Recommendation 1 could allow the TS to respond to issues addressed in the “Vision Paper”(S/1252/2015)
    - ✓ Supports Medium-term goals 2 and 3 of the 2017-2021 Medium Term Plan (EC-83/S/1)
    - ✓ Medium-term goal 2: Augmented routine verification activities with risk management system
    - ✓ Medium-term goal 3: Enhanced capability of the Organisation to conduct contingency operations

# Can Verification Benefit



**OPCW**

**Executive Council**

Eighty-Fourth Session  
7 – 10 March 2017

EC-84/DG.9  
18 January 2017  
Original: ENGLISH

## **NOTE BY THE DIRECTOR-GENERAL**

### **RESPONSE TO THE REPORT OF THE TWENTY-FOURTH SESSION OF THE SCIENTIFIC ADVISORY BOARD**

1. This Note sets out the Director-General's comments on the report of the

12. In regard to recommendation 10, this issue, if warranted, could usefully be considered in relation to outcomes from ongoing discussions on SAB recommendations related to the verification of OCPFs. Recommendations 1 and 6 require further consideration in respect of any potential implications for the verification regime; discussions in the Open-Ended Working Group on the Future Priorities of the OPCW (OEWG-FP) could be useful.

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## Can Verification Benefit from a Change in Mindset? (2)

- **Recommendation 6:** The TS should visit National Authorities (NAs) to obtain assurance on the accuracy and completeness of declarations - the outcome of such visits may impact on the inspection frequency
  - Technical Assistance Visits are adopted by the TS to provide assistance to SPs on declaration and other issues
  - Other international organisations, like IAEA, conduct visits at the request of a State and these result in a confidential report to the State, with detailed recommendations on the improvement, if any
  - Idea of visits by TS to NAs in DG's address to CSP-14 and "OPCW in 2025"
  - Visits by NAs could be valuable to look at alternative approaches for providing assurance of compliance to the CWC:
    - Closer relationship and increased information exchange between TS and NAs could be a key element
    - Introduction of audit-type visits to NAs would be a "significant departure" from current practices; however the verification regime must evolve with time

## Discussions on the questions posed to the SAB by the co-chairs

- What has changed in the area of verification since the last Review Conference in spring 2013?
- How do you assess the current state of the verification regime?
- Which challenges do you foresee for the verification regime in the next ten years?
- Which issues would you like to see the OEWG-FP address in its recommendations to the Fourth Review Conference in 2018?

## What has changed in the area of verification since the last Review Conference in spring 2013? - (1)

- The Organisation has gained tremendous experience in conducting IAUs and contingency operations, but challenges still lie ahead
  - Supported UN investigation
  - Inspected (initial and systematic) CW sites in Syria
  - Monitored removal of the declared CW outside Syria
  - Verified destruction at sea and commercial facilities
  - Oversaw removal of chemical precursors from Libya
  - Set up the Rapid Response and Assistance Mission
  - Shortages identified
    - *No investigative capabilities*
    - *New skills and technologies identified for FFM and contingency operations*

# What has changed in the area of verification since the last Review Conference in spring 2013? - (2)

- **TS Has Made Notable Efforts to Ensure Effectiveness of Verification**
  - **Declarations:**
    - Only one State Party yet to submit its initial declaration to the TS under Article III and VI
    - Timeliness of submission of annual declaration on past activities (ADPAs) has reached historical high (79 SPs or 86% submitted on time in 2015)
    - New version of Electronic Declarations Tool for NAs (EDNA) was released
    - Secure Information Exchange System (SIX) was launched
  - **Inspections:**
    - Inspections at CW-related facilities remained steady, new development for Article VI inspections has been made
    - Sampling and Analysis has been conducted in Sch. 3 and OCPF inspections on a routine basis, in addition to Sch. 2 inspections
    - Reporting templates for industrial inspections have been updated and implemented
  - **Analytical capabilities strengthened**
    - OPCW designated laboratories for biomedical sample analysis for the first time in 2016 – 17 laboratories from 14 countries on the list
    - The TS has started proficiency tests on toxins – just conducted this month
    - Some laboratories have developed environmental and biomedical analytical techniques for retrospective identification of chlorine exposure, and use of plants as indicators of CW use



## What has changed in the area of verification since the last Review Conference in spring 2013? (3)

- Verification is no longer exclusively an intergovernmental issue between states
  - Non-state, civil society actors such as NGOs, scientific communities or informed individuals have increasingly engaged over the last years on the issues of verification

## What has changed in the area of verification since the last Review Conference in spring 2013? (3)

199. Analytical tools have been implemented to improve the tracking and measuring of the results of digital communications strategies. Analytics enable data-driven decision-making for assisting with targeted use of limited resources, especially across social media platforms, including Facebook, Twitter, LinkedIn, Facebook Live, and YouTube. In line with the recommendation by the Third Review Conference to improve interaction with civil society organisations engaged in issues relevant to the Convention, the OPCW continues to attract high levels of participation by non-governmental organisations (NGOs) in the annual sessions of the Conference of the States Parties. Fifty-seven NGOs were approved to participate in this Twenty-First Session, which will include a special plenary sitting for NGOs to address delegates, as well as a number of NGO side events and exhibits. To facilitate participation by NGOs from developing and transitioning economies in OPCW activities, 20% of the registered NGOs are able to attend the session thanks to support from European Union funds provided to the OPCW for this purpose.

# What has changed in the area of verification since the last Review Conference in spring 2013? (3)

## OPCW and World Customs Organization Expand Cooperation to Prevent Misuse of Toxic Chemicals

Friday, 13 January 2017

**International organisations act together to improve oversight of trade in dual-use chemicals and reduce risk of chemicals used as weapons**



THE HAGUE, Netherlands — 13 January 2017 — The Organisation for the Prohibition for Chemical Weapons (OPCW) and [the World Customs Organization](#) (WCO) signed a Memorandum of Understanding (MOU) today that expands cooperation to tighten national and international controls on the trade of toxic chemicals.

The new agreement puts in place procedures that will further enhance cooperation between the OPCW

## OPCW and International Union of Pure and Applied Chemistry Take Partnership to New Level

Thursday, 01 December 2016



OPCW Director-General Ahmet Üzümcü (right) and the President of the

The Director-General of the Organisation for the Prohibition for Chemical Weapons (OPCW), Ambassador Ahmet Üzümcü, and the President of the International Union of Pure and Applied Chemistry (IUPAC), Professor Natalia Tarasova, signed a Memorandum of Understanding (MOU) today pledging to enhance cooperation to keep abreast of developments in chemistry, responsibility and ethics in science, and education and outreach.

registered NGOs are able to attend the session thanks to support from European Union funds provided to the OPCW for this purpose.

# How do you assess the current state of the verification regime? (1)

- **The current verification regime of routine inspections has greatly supported the main objective of the CWC – towards a world free of chemical weapons**
  - Inspections and continuous monitoring of destruction activities has provided confidence in the chemical demilitarization process
  - And provided assurance on non-production by chemical industry
- **However, recent and ongoing contingency operations were not envisaged by the drafters of the Convention**
  - Fact Finding Mission & Joint Investigation Mechanism are different from IAUs
  - Lack of investigative technical capabilities (e.g. chemical forensics)
  - Difficult to identify perpetrators of chemical attacks given this lack of forensic capability despite enhancement in recent years of the overall capabilities of the Designated Laboratories for biomedical analysis etc.
  - Mandates of contingency operations may hamper ability to cross reference information across multiple operations (e.g. not conducted in a manner that supports investigative procedures)

## How do you assess the current state of the verification regime? (2)

- **Verification regime can be constrained in its adaption to recent S&T developments**
  - **TWG: “For the verification regime to stay relevant, it must be able to evolve with time, which requires the adoption of improved methodologies and introduction of new technologies.”**
  - **All the recommendations by the TWG are results from the assessment of the current state of the verification regime**
  - **Independent technical examination on the state of the verification regime between Review Conferences (similar to TWG) would be valuable**

# Which challenges do you foresee for the verification regime in the next ten years?

- **How can the verification regime meet the challenges of preventing the re-emergence the chemical weapons and countering terrorism?**
  - Needs to be able to recognize scientific indicators of re-emergence
  - Must understand differences between State and terrorist CW agents
  - How does OPCW respond to the use of unfamiliar toxic chemical agents?
- **How could the verification regime respond to the challenges of and recognize the opportunities of convergence?**
  - Raise awareness of chemical production through biological processes
  - Continue monitoring advances at the chemistry-life sciences interface
  - Central Nervous System (CNS) active chemicals are drawing increasing attention; their analytical data should be added to the OCAD database
  - Need to approach “convergence” as an opportunity - it spans all scientific disciplines, enabling new beneficial capabilities
- **Can the organisation maintain the necessary level of scientific literacy (from the operational units through to the decision makers) to remain relevant and prevent re-emergence?**

# Which issues would you like to see the OEWG-FP address in its recommendations to the Fourth Review Conference in 2018? (1)

- Verification regime (technologies/methodologies) must evolve with the development of science and technology
  - ✓ New or emerging technologies identified by SAB and the TS may add value to the existing capabilities for verification purposes
    - Unfamiliar toxic chemicals as chemical weapons – SAB recommended addition of data to OCAD (CNS-active & riot control agents)
    - More attention on “environmental fate” of toxic chemicals – understanding fate on plants/environment will improve capability to confirm use and can enable methods for broad ranges of industrial and known toxic chemicals
    - What investigative capability will the organisation need to meet its mandate in future? (To be addressed by new TWG on investigative science)
  - ✓ Technology/methodology used for verification purposes in other international treaties may benefit CWC verification regime
    - ✓ Recommend continued scientific interaction with other treaty organizations
  - ✓ Comprehensiveness and effectiveness of verification regime should be strengthened & future-oriented approaches considered
    - ✓ e.g. TWG Verification recommendation 1 & recommendation 6

**Which issues would you like  
to see the OEWG-FP address in its recommendations  
to the Fourth Review Conference in 2018? (2)**

- **Qualified organisation needs retain qualified people**
  - **TWG: “A number of the recommendations by the TWG are linked to the availability of adequate resources and expertise for their implementation. Additionally, and in view of tenure policy implemented in the organisation, sound knowledge management and transfer and retention of rare expertise are considered crucial in support of sustaining or enhancing verification capabilities.”**
  - **Is the current tenure policy is really a good policy for the organisation?**
  - **Do we need to address the tenure policy again?**
  - **SAB advises that the position of Science Policy Adviser is a vital bridge between science and technology and policy-making – a key ingredient for success**



# Conclusion Remarks

**“Trust, but verify.”**

*-Reagan*

The Technical Secretariat must be  
Fully Prepared Technically  
to meet future challenges.



OPCW

**Thanks for your attention  
&  
Questions?**