

**NOTE BY THE DIRECTOR-GENERAL****RESPONSE TO THE REPORT OF THE THIRTY-FOURTH SESSION  
OF THE SCIENTIFIC ADVISORY BOARD  
15 – 17 MARCH 2022**

1. This Note presents the Director-General's comments on the report of the Thirty-Fourth Session of the Scientific Advisory Board (SAB) (SAB-34/1, dated 17 March 2022) and its ongoing work.
2. The Chemical Weapons Convention (hereinafter "the Convention") is underpinned by science and technology. Effective implementation of the Convention requires constant monitoring of developments in science and technology and subsequent guidance related to these developments. The SAB continues to serve as a critical source of scientific advice, assisting the Director-General, the Technical Secretariat (hereinafter "the Secretariat") and, ultimately, the States Parties in monitoring the key scientific and technological developments that are relevant to the Convention.
3. The Director-General appreciates the Board's sustained efforts to convene and conduct its work. He welcomes the six new members who participated in their first session of the SAB: Professor Elisa Souza Orth of Brazil, Professor Ines Primožič of Croatia, Dr Matteo Guidotti of Italy, Mr Raza Ellahi of Pakistan, Dr Crister Åstot of Sweden, and Dr Robert Kristovich of the United States of America. The year 2022 is a significant one for the OPCW, both in terms of celebrating important milestones, such as its twenty-fifth anniversary, but also in terms of looking forward: the construction of the Centre for Chemistry and Technology (hereinafter "the ChemTech Centre") will be completed by year's end and preparations will increase in anticipation of next year's Fifth Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (hereinafter "the Fifth Review Conference"). The work of the SAB will prove instrumental in ensuring the Secretariat remains fit for purpose and can continue to meet the expectations of States Parties.

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SCIENTIFIC ADVISORY BOARD**

4. The SAB met virtually for its Thirty-Fourth Session from 15 to 17 March 2022. The session was chaired by Mr Günter Povoden, with Dr Andrea Leisewitz serving as Vice-Chairperson. The report of the session was issued as SAB-34/1.
5. In her opening remarks (paragraphs 5.1 to 5.5 of SAB-34/1), the Deputy Director-General, H.E. Odette Melono, began by conveying the Director-General's well wishes. She congratulated and welcomed the six new Board members and acknowledged the Board's professionalism and dedication over the challenging past two years.



6. The Deputy Director-General provided an update on the progress of the ChemTech Centre, noting that the construction phase will be completed on time later this year. She reminded the Board that the Centre will help the OPCW more effectively prevent and respond to chemical weapons use, as well as support peaceful uses of chemistry. To that end, the Secretariat is now busy defining anticipated programmes and activities at the ChemTech Centre. She stated the value of the Board's considerations and support in defining the appropriate scientific activities to pursue in the Centre.
7. The Deputy Director-General then highlighted the decision that States Parties adopted at the Twenty-Sixth Conference of the States Parties entitled "Understanding Regarding the Aerosolised Use of Central Nervous System-Acting Chemicals for Law Enforcement Purposes" (C-26/DEC.10, dated 1 December 2021). She reminded the Board that in light of the decision, the SAB should continue its consideration of central nervous system-acting chemicals both in its continued monitoring of scientific developments, and in its Report on Developments in Science and Technology for the Fifth Review Conference. She further emphasised the timeliness of the Board's report for the Fifth Review Conference so that the Secretariat and States Parties can fully profit from the independent analysis of science and technology trends of relevance to the Convention.
8. The Deputy Director-General closed by reiterating her appreciation for the SAB's work and wished them a productive session.

**UPDATES FROM THE OPCW TECHNICAL SECRETARIAT  
(PARAGRAPHS 6.1 TO 6.13 OF SAB-34/1)**

9. The Board received updates from several Secretariat staff members on developments at the OPCW relevant to the work of the SAB. The Secretary of the SAB provided an update of important activities that have taken place and their impact. He also highlighted the path forward for the Board and reminded them of important deadlines related to the Fifth Review Conference. The Board also received updates from Dr Jo-Anne Rasmussen (Analytical Chemist Inspector, OPCW) on sampling and analysis missions that the OPCW has conducted over the past few years and how the Inspectorate is adapting and refining its approach to better conduct its missions and serve States Parties. The Director-General encourages Secretariat staff to continue to provide periodic updates to the Board on internal scientific activities and reiterates that the SAB will only be better positioned to provide effective advice when it is fully informed on relevant activities taking place in the Secretariat.

**STUDIES OF CHEMICAL ATTRIBUTION SIGNATURES OF VX AND THE  
FORENSIC SIGNATURE(S) OF THE CHEMICAL WEAPON PRECURSOR  
DMPADC<sup>1</sup> (PARAGRAPHS 8.1 TO 8.9 AND 10.1 TO 10.3 OF SAB-34/1)**

10. Understanding the signatures and observables that may provide additional information related to the origins of a chemical warfare agent or precursor chemical is beneficial to the ongoing work of the OPCW. Chemical attribution signatures (CAS) can provide additional context on a given sample, such as how a chemical was synthesised, where it came from, or how it has been stored. There is ongoing research at various institutions worldwide looking to discover the CAS that may exist for different

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<sup>1</sup> DMPADC is the abbreviation used for N,N-dimethylphosphoramidic dichloride, a key precursor for the nerve agent Tabun.

chemical warfare agents or the precursors thereof. The Director-General recognises the utility of this work and how it can provide additional scientific and technical context to investigations into the alleged use of chemical weapons.

11. The Director-General welcomes the willingness of Dr Simon Ovenden and Prof Hongmei Wang to present to the SAB on this topic. Having a better understanding of chemical signatures related to chemical warfare agents like VX and scheduled precursor chemicals like N,N-dimethylphosphoramidic dichloride assist the work of the Secretariat not only in investigations into the alleged use of chemical weapons, but also in maintaining a strong verification regime. The Director-General also recognises that additional data may also become available to further enhance the OPCW Central Analytical Database and therefore be of benefit to the Secretariat, OPCW designated laboratories, and States Parties. He urges the continued sharing of relevant analytical data related to scheduled chemicals, especially newly scheduled chemicals,<sup>2</sup> with the Secretariat. The Director-General also supports the continued consideration by the SAB of chemical forensics and CAS at its sessions.

**ADDITIVE MANUFACTURING: CHEMICAL WEAPONS PROLIFERATION RISKS AND EXPORT CONTROL CHALLENGES (PARAGRAPHS 9.1 TO 9.10 OF SAB-34/1)**

12. Disruptive technologies are those innovations that help create new markets and go on to disrupt an existing market, often displacing an earlier technology. Additive manufacturing is one example of a disruptive technology and certainly may have ramifications for the OPCW and the Convention. The ability to create items in almost any shape or form from various base materials is a powerful tool for industry. However, the potential for additive manufacturing to be misused to create dual-use equipment or weapons components is of concern. The Director-General read with interest the synopsis of Mr Brockmann's presentation outlining the current state of additive manufacturing and the dual-use considerations that should be discussed.
13. The nuanced picture surrounding the potential misuse of additive manufacturing technology creates a complex space that needs continual monitoring. The Director-General supports the Board's continued examination of advances in additive manufacturing in order to understand the potential effects thereof on the Convention, the verification regime, and non-proliferation efforts writ large. He looks forward to seeing the Board's expanded views on this topic in its Report on Developments in Science and Technology for the Fifth Review Conference.

**COLORIMETRIC PAPER-BASED SENSOR ARRAYS FOR SIMULTANEOUS DETECTION AND DETERMINATION OF PESTICIDES (PARAGRAPHS 11.1 TO 11.6 OF SAB-34/1)**

14. Critical to the ongoing work of the Secretariat is an up-to-date understanding of available and in-development approaches to the detection of toxic chemicals. Having a toolbox of different orthogonal approaches to chemical detection will ensure that there are appropriate options to confirm the presence and identification of chemicals in different situations. Staying abreast of these developments is challenging given the multitude of approaches and technologies that are in development.

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<sup>2</sup> See: "Note by the Technical Secretariat: Consolidated Text of Adopted Changes to Schedule 1 of the Annex on Chemicals to the Chemical Weapons Convention" (S/1820/2019, dated 23 December 2019).

15. While there are different paradigms to consider in relation to chemical detection, one interest involves approaches that are inexpensive and scalable, thus lending themselves to widespread dissemination and use, even in resource-constrained environments. Certain technologies are more appropriate than others in this regard. Colorimetric sensing has gained esteem as a potentially useful way to inexpensively and easily detect, and even identify, different types of chemical species. The Director-General read with interest about the presentation by Dr Hasan Bagheri on the use of colorimetric paper-based sensor arrays for the detection and identification of pesticides. While still early in its development, the Director-General hopes the Board will continue to monitor this research and other research in this field, since the potential for colorimetric sensing is considerable.

**UPDATES ON SCIENTIFIC ADVISORY BOARD-RELATED BUSINESS  
(PARAGRAPHS 12.1 TO 12.13 OF SAB-34/1)**

16. The SAB is scheduled to convene three sessions in 2022. The next sessions are scheduled in June and September and are planned to be in-person events. The Director-General looks forward to being able to address and meet the Board in person after three years. The Board is also in the planning stages to hold two topical workshops: one on artificial intelligence-assisted chemistry, and another focused on advances in the chemical industry. These workshops will help the Board draft its Report on Developments in Science and Technology for the Fifth Review Conference.
17. The Director-General acknowledges the continued reliable work of the SAB, including the able leadership of its Chairperson and Vice-Chairperson, and looks forward to its efforts this year. In particular, he awaits the Board's Report on Developments in Science and Technology for the Fifth Review Conference. There have been a number of impressive developments across the scientific spectrum over the last five years, and he notes that some of these have direct relevance to the Convention and the work of the OPCW. The Board's scientific report will not only be of great benefit to States Parties, but will also provide an in-depth, extensive overview of different areas of science that will provide context to the potential scientific activities to take place in the ChemTech Centre.
18. The Director-General thanks the European Union for its Council decision 2019/538, dated 1 April 2019, which provides funding for both the Plant Biomarker Challenge and the work of the TWGs.

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