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NOTE BY THE DIRECTOR-GENERAL

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

1. This Note presents the Director-General's comments on the report of the Twenty-Seventh Session of the Scientific Advisory Board (SAB) (SAB-27/1, dated 23 March 2018) and the ongoing work of the SAB.
2. Ensuring that all relevant scientific and technological dimensions are considered in decision making strengthens the implementation of the Chemical Weapons Convention (hereinafter "the Convention"). As the work of the OPCW increasingly finds the Technical Secretariat (hereinafter "the Secretariat") conducting contingency operations and assistance missions, the need to review technical results alongside the scientific literacy required to evaluate them will only continue to grow. The SAB serves as a valuable resource in this regard, providing sound scientific advice for decision making, keeping the Secretariat aware of opportunities to harness technological change to enhance key capabilities and to maintain and grow a strong science-policy maker partnership.
3. The SAB has published its report and recommendations (RC-4/DG.1, dated 30 April 2018) to the Fourth Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (hereinafter "the Fourth Review Conference"), which marks the culmination of the past five years of the Board's activity. The Director-General notes that the intensive workload during this period has substantially reduced the SAB trust fund and encourages States Parties to carefully consider the call for voluntary contributions to support the SAB issued in January this year (S/1569/2018, dated 16 January 2018).
4. Furthermore, the Director-General would like to remind States Parties that four members of the SAB will be leaving the Board in 2018; a formal call for nominations has been issued (S/1568/2018, dated 16 January 2018), with a deadline for submissions of 31 August 2018.

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

5. The SAB, under Chairperson Dr Christopher Timperley and Vice-Chairperson Mr Cheng Tang, met in The Hague, the Netherlands, for its Twenty-Seventh Session from 19 to 23 March 2018. Opening remarks were delivered by the Deputy



Director-General (paragraphs 5.1 to 5.4 of SAB-27/1)¹ and the report of the session was issued as SAB-27/1.

6. After a careful review of the report of the Twenty-Seventh Session of the SAB, the Director-General is pleased to submit the comments that follow to the Executive Council (hereinafter “the Council”).

Updates from the Technical Secretariat (paragraphs 6.1 to 6.23, 9.9 to 9.10 and 14.8 to 14.9 of SAB-27/1)

7. The Director-General continues to encourage Secretariat staff to engage with the SAB; this discourse is key to ensuring that the Board’s considerations take into account views from those who may benefit from its advice, and that it receives feedback on how previous advice has moved forward.

Advisory Board on Education and Outreach (paragraphs 6.3 to 6.5 of SAB-27/1)

8. The work of the SAB and the Board’s engagement across technical and non-technical communities alike are complementary to the OPCW’s education and outreach objectives. The Director-General appreciates the willingness of the SAB to contribute, and he encourages the Secretariat and the Advisory Board on Education and Outreach to consider how the experiences of the SAB might benefit education and outreach initiatives. See also paragraphs 6.2 and 11.9 of SAB-27/1 for an overview of recent and forthcoming engagement activities related to the work of the SAB.

Declarations Branch (paragraphs 6.6 to 6.7 of SAB-27/1)

9. The Director-General wishes to remind States Parties that the SAB had previously recommended that the Secretariat move toward a comprehensive, systems-based approach in which all the separate elements of information are combined and analysed in a systematic manner.² He notes that the analytical tools being developed by the Declarations Branch are fundamental to the capabilities required to implement such an approach.
10. Supporting the SAB’s view on the need for uniformity of data, the Director-General encourages States Parties to work with the Secretariat and adopt the most current versions of the available electronic declaration tools. He has also requested that the Secretariat take into account suggestions and recommendations for useful feature enhancements when updating these tools; this might include structure search capability, as noted in subparagraph 6.7(d) of SAB-27/1.

¹ Opening remarks by the Deputy Director-General at SAB-27 are available at:
www.opcw.org/fileadmin/OPCW/DDG/180326.FR.ODDG.SPH.SAB27.WEB.pdf.

² See recommendations 1 and 3 of the final report of the temporary working group (TWG) on verification (SAB/REP/1/15, dated June 2015);
www.opcw.org/fileadmin/OPCW/SAB/en/Final_Report_of_SAB_TWG_on_Verification_-_as_presented_to_SAB.pdf.

The future of industry verification (paragraphs 6.8 to 6.11 of SAB-27/1)

11. The Director-General notes that the informal consultations on chemical industry-related issues (the Industry Cluster) has served as a useful platform for discussion of many SAB recommendations, in particular those arising from the TWG on verification.³ The SAB's recommendations to the Fourth Review Conference (RC-4/DG.1) include new perspectives on the Board's previous advice, as well as new considerations of relevance to industry verification. The Director-General encourages States Parties and their National Authorities to continue to use the Industry Cluster to share views and discuss the way forward on SAB advice. The Secretariat's Industry Verification Branch will continue to facilitate, and the Office of Strategy and Policy will continue to assist, in this discourse.
12. Feedback and continued engagement with the SAB on its recommendations are necessary for effective implementation. The Director-General appreciates the SAB's willingness to assist in bringing recommendations forward and in reviewing and providing new perspectives on previous advice.

Contingency operations, the Rapid Response and Assistance Mission, and the OPCW Laboratory (paragraphs 6.12 to 6.13, 6.18 to 6.20, 9.9 to 9.10, and 14.8 to 14.9 of SAB-27/1)

13. Contingency operations, assistance missions, and the OPCW Laboratory are priority areas for SAB consideration and advice. The Director-General has encouraged relevant Secretariat staff to give critical consideration to the scientific and technological needs of their units, and to develop proposals on which the SAB could provide useful insight.
14. The Director-General appreciates the SAB's endorsement of the upgrade of the OPCW Laboratory to a Centre for Chemistry and Technology. Furthermore, he invites States Parties to support this project, which will further augment the Secretariat's chemical analysis and research capabilities.⁴

Challenges of old chemical weapons and verification (paragraphs 6.14 to 6.17 of SAB-27/1)

15. The Director-General recognises the value of technical and operational knowledge resulting from the analysis and disposal of old and abandoned chemical weapons. This knowledge is usefully augmented through keeping abreast of research on legacy chemical weapons from outside the Secretariat (which includes studies on sea-dumped chemical weapons). Lessons learned and findings from such work provide useful insight on the environmental fate and transport of chemical warfare agents, as well as the handling of toxic chemicals under non-routine operating

³ See SAB/REP/1/15, dated June 2015. A quick reference guide to the recommendations is also available at: www.opcw.org/fileadmin/OPCW/SAB/en/VER_Poster_5102015.pdf.

⁴ For additional information on the Laboratory upgrade project, see S/1512/2017 (dated 10 July 2017), S/1561/2017 (dated 8 December 2017), and S/1564/2017 (dated 22 December 2017) and Corr.1 (dated 3 January 2018).

conditions. The Director-General views the Secretariat's experience and associated knowledge in these areas as valuable input for the knowledge management initiative.

Schedule 1 chemicals and facilities (paragraphs 7.1 to 7.6 of SAB-27/1)

16. The Director-General welcomes the Schedule 1 Users Forum initiative and supports the involvement of the SAB and the Secretariat. Knowledge about Schedule 1 chemistry and chemicals is key to ensuring that the OPCW maintains fit-for-purpose capabilities in support of its mission. The skills and methods developed for working with Schedule 1 chemicals provide a number of transferable learnings that also apply to highly toxic unscheduled chemicals, as recently demonstrated in support of a request for technical assistance by the United Kingdom of Great Britain and Northern Ireland (S/1612/2018, dated 12 April 2018). The Director-General commends the Spiez Laboratory for hosting the 2018 Schedule 1 Users Forum⁵ and encourages other designated laboratories to consider hosting future workshops in the series.
17. The Director-General wishes to call States Parties' attention to the recently published guidelines for the verification of cessation of activities at closed Schedule 1 facilities and for the commissioning of new Schedule 1 facilities following such closure (S/1608/2018, dated 29 March 2018). He further acknowledges the support of China in cooperating with the Secretariat to develop these guidelines. As the Verification Annex to the Convention does not explicitly provide procedures for the situation in which a State Party wishes to close down a Schedule 1 facility in order to commission a new Schedule 1 facility, it is important to have such procedures in place. The development of these guidelines demonstrates how the processes through which the Convention is implemented can evolve when unanticipated situations arise, ensuring that the obligations of States Parties under the Convention are upheld.

Developments in science and technology (paragraphs 7.7 to 7.9, 8.1 to 8.4, 9.1 to 9.8 and 9.11 to 9.12 of SAB-27/1)

18. Recognising that monitoring scientific and technological change and predicting its impact is a non-trivial endeavour, the Director-General welcomes the SAB's engagement with experts in technology foresight and horizon scanning. The importance of understanding the strength, limitations, and uncertainties of approaches and their applications cannot be overstated if the SAB and Secretariat are to continue monitoring developments and providing useful advice on the findings.

Computational tools for chemical synthesis (paragraphs 7.7 to 7.9 of SAB-27/1)

19. Advances in the power of computational tools and artificial intelligence are making an impact in the science of chemistry. The Director-General notes that the transdisciplinary nature of scientific advancement requires the science review process to maintain awareness of the changing face of chemistry and to ensure the Secretariat and States Parties remain adequately informed.

⁵ See OPCW news item of 1 February 2018, "OPCW Schedule 1 Users Forum Held in Switzerland"; www.opcw.org/news/article/opcw-schedule-1-users-forum-held-in-switzerland/.

Scientific and technological elements of verification technologies, emerging technologies, new equipment, and developments in science and technology (paragraphs 9.1 to 9.8 and 9.11 to 9.12 of SAB-27/1)

20. The Director-General supports the approach the SAB has followed for addressing potential challenges from scientific developments for the Convention. Given the immensity of technological developments that would need to be considered, the Board has emphasised the value of innovative tools that enable recognition of unusual and unexpected (bio)chemical change. The Director-General views this as a practical approach that can provide opportunities to engage with innovation communities and those at the forefront of driving technological change.
21. The topics addressed in the three technical presentations on the potential for observing animals, insects, and/or vegetation, and monitoring non-invasive physiological indications as a means to recognise the potential presence of toxic chemicals, provide pertinent examples of what may be possible through the integration of data analysis and informatics tools with phenotypic observations of biological effects from toxic chemical exposure. Such tools could potentially enable real-time on-site guidance for precautionary action and sample collection, with off-site analytical tools required for identification and validation of chemical exposure. Recalling advice from the SAB's 2017 workshop on emerging technologies on the value of engagement with technology developers (SAB-26/WP.1, dated 21 July 2017), the Director-General has asked relevant units within the Secretariat to identify capability needs that might be addressed through engagement with innovators such as Dr Worek and Dr Swiston.
22. In regard to building data sets for visual recognition of toxic chemical exposure to vegetation ("If Plants Could Talk"; paragraphs 9.7 to 9.8 of SAB-27/1), the Director-General encourages States Parties and scientific experts willing to share data on chemical exposure to vegetation to contact the SAB Secretary.

Advice on chemical forensics and investigative technologies (paragraphs 10.1 to 10.6 of SAB-27/1)

23. The TWG on investigative science and technology, under Chairperson Dr Veronica Borrett and Vice-Chairperson Dr Ed van Zalen, met in The Hague, the Netherlands, for its first meeting from 12 to 14 February 2018. The report of the session was issued as SAB 27/WP.1 (dated 26 February 2018). The Director-General commends Dr Borrett for her able chairing and is pleased with the approach of the TWG in taking forward its mandate. The findings of this TWG will provide insights into how the Secretariat develops future inspector training programmes, the Laboratory upgrade, and the development of capabilities of assistance missions. The TWG will hold its second meeting from 14 to 16 November 2018.
24. Lessons learned from the experiences of the Secretariat and others in conducting chemical weapons-related investigations are highly informative to the deliberations of this TWG. The Director-General appreciates the presentation from Dr Seto on the 1994 Matsumoto and 1995 Tokyo subway sarin attacks (paragraphs 10.5 to 10.6 of SAB-27/1).

Advice to the Fourth Review Conference (paragraphs 11.1 to 11.7 and 13 of SAB-27/1)

25. The SAB's report to the Fourth Review Conference has been published as RC-4/DG.1. This report contains substantive recommendations that reach across Divisions of the Secretariat and it provides informative inputs to the forthcoming Fourth Review Conference. The Director-General encourages States Parties to familiarise themselves with the recommendations contained within the executive summary and the detailed technical analysis contained within Annex 1. The Director-General will submit his views on the SAB's recommendations in a forthcoming note.
26. The SAB Chairperson and Vice-Chairperson will brief States Parties on RC-4/DG.1 at the Tenth Meeting of the Open-Ended Working Group for the Preparation of the Fourth Review Conference (OEWG-RC) on 6 June 2018. The SAB is also preparing to brief the Fourth Review Conference itself in November 2018.

FUTURE WORK AND OTHER BUSINESS OF THE SCIENTIFIC ADVISORY BOARD

27. The Director-General was pleased to have had the opportunity to discuss the work of the SAB and its future directions during the Board's Twenty-Seventh Session (paragraphs 14.1 to 14.7 of SAB-27/1).⁶

New requests for advice to the Scientific Advisory Board

28. The Director-General has asked for the Board's support in raising awareness of the benefits to the Convention that will result through the project to upgrade the OPCW Laboratory. He has additionally requested the SAB to provide recommendations for research and associated capabilities that would add value to the Laboratory as a Centre for Chemistry and Technology. These recommendations will be compiled by the SAB Secretary and discussed during SAB briefings to States Parties.
29. Following the Twenty-Seventh Session of the SAB, the Director-General in his concluding remarks to the Council at its Fifty-Ninth Meeting (EC-M-59/DG.1, dated 18 April 2018), informed States Parties of his intention to seek the advice of the SAB in regard to issues raised after the technical assistance visit requested by the United Kingdom of Great Britain and Northern Ireland.
30. The request has been initiated and the SAB tasked with providing advice on toxic chemicals that have been identified as, or suspected of being, new types of nerve agents. The SAB is currently working on this request, and intends to issue a report before the Eighty-Eighth Session of the Executive Council and to brief States Parties. The Director-General has additionally requested States Parties that are in a position to do so to make available any information that could assist the SAB in its work. Further details on the Director-General's requests to the SAB and to States Parties can be found in S/1621/2018 (dated 2 May 2018).

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The Director-General's remarks to SAB-27 are available at:
www.opcw.org/fileadmin/OPCW/ODG/uzumcu/180326.FR.ODG.SPH.SAB27.WEB.pdf.

Other business of the Scientific Advisory Board

31. As the SAB's scientific review for the Fourth Review Conference has demonstrated, engagement with the scientific community is a valuable and necessary aspect of the work of the Board. The Director-General notes how these interactions serve as an opportunity to broaden awareness of the Convention and the OPCW across diverse (transdisciplinary) scientific networks, and to enable the SAB and Secretariat to stay abreast of technological evolution. Maintaining and expanding these connections require visibility and credibility within scientific communities, including participation in scientific conferences and publications in peer-reviewed scientific literature.
32. In regard to publications, the Director-General welcomes the first peer-reviewed joint publication authored by the entire membership of the SAB, a review article based on the advice provided on sample stability and storage from 2016 (SAB-23/WP.2, dated 25 May 2016).⁷ The Director-General looks forward to seeing additional submissions of the work of the SAB in peer-reviewed scientific fora.
33. Implementation of the Convention needs sound and actionable technical advice, requiring suitable scientific literacy amongst the Convention's decision makers to ensure that they benefit through consideration of that advice. The Director-General encourages States Parties to attend briefings from the SAB Chairperson,⁸ and the Science for Diplomats events.⁹ He commends the Board for its commitment to the implementation of the Convention, and for the quality and substance of its reports and recommendations.
34. The SAB will hold its Twenty-Eighth Session from 3 to 7 June 2019.

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⁷ Advice on chemical weapons sample stability and storage provided by the Scientific Advisory Board of the Organisation for the Prohibition of Chemical Weapons; *Talanta*, 2018, *article in press*, DOI: 10.1016/j.talanta.2018.04.022.

⁸ The SAB Chairperson and Vice-Chairperson last briefed States Parties on the margins of the Board's Twenty-Seventh Session on 22 March 2018; the presentation from this briefing is available at: www.opcw.org/fileadmin/OPCW/SAB/en/SAB-27_Briefing_to_States_Parties.pdf.

⁹ More information about, and materials from, Science for Diplomats briefings are available at: www.opcw.org/special-sections/science-technology/science-for-diplomats/.