



**REPORT OF THE THIRD SESSION OF THE  
SCIENTIFIC ADVISORY BOARD**

**1. Introduction**

- 1.1 The Scientific Advisory Board (hereinafter referred to as the “Board”) held two meetings during its third session, which took place from 14 - 16 December 1999 and from 15 - 16 March 2000 in The Hague.
- 1.2 Dr Claude Eon of France, the Chairman of the Board, presided over its proceedings.
- 1.3 The Board considered the following issues:
  - (a) adamsite;
  - (b) analytical procedures;
  - (c) equipment issues;
  - (d) destruction technologies;
  - (e) bio-medical samples;
  - (f) future contributions of the Board to the preparation of the first Review Conference; and
  - (g) any other business.
- 1.4 In preparation for its meeting the Board had received reports from its temporary working groups (TWGs) on adamsite and analytical procedures, and a report on a joint meeting of the temporary working groups on equipment issues and on chemical weapons destruction technologies.
- 1.5 During its meeting in December 1999, the Board received a briefing by the Deputy Director-General on the status of implementation of the Convention and on work priorities. The Board was also briefed by staff from the Verification and Inspectorate Divisions on experiences with the conduct of different types of inspection, as well as on analytical and equipment-related matters. It was further briefed on the results of an expert meeting on bio-medical samples conducted by the Secretariat in December 1999.

## 2. Work on substantive issues

### Adamsite

- 2.1 The Board received and discussed the draft report of the TWG on adamsite dated 7 October 1999, noted additional comments, and decided to include in its report the following considerations in relation to this matter:
- 2.2 Adamsite (10-chloro-5,10-dihydro-phenarsazine, code name DM, CAS registry number 578-94-9) is a yellow-green crystalline solid with a boiling point of 410°C and a melting point of 195°C. It is an organoarsenical which is practically insoluble in water, and it has a very low vapour pressure ( $2 \times 10^{-13}$  mm Hg at 20°C). If the agent is aerosolised into inhalable particles, its riot control properties will take effect. The incapacitating dose ( $I_{ct50}$ ) of DM is between 2 and 20 mg.  $\text{min m}^{-3}$ , while its lethal dose ( $L_{ct50}$ ) is 15,000 mg.  $\text{min m}^{-3}$ . If one compares adamsite with other riot control agents such as CN (2-chloro-1-phenyl-ethanone) or CS ((2-chlorophenyl)methylene)-propanedinitrile), considerably fewer investigations into its toxicity and way of action have been published.
- 2.3 Historically DM was produced for warfare purposes, although it was rarely in actual use on the battlefield. Although it was used in the past as a training agent for mask fit testing, better alternatives are available. It has also been used as a riot control agent (RCA) for many decades. In recent years, however, its use as an RCA has been exceptional. Other RCAs have proven to be better suited for the purpose of riot control, and safer. While there were some legitimate uses of adamsite in the recent past in other areas (given its fungicidal properties it was, for example, used in paints for ships - patents with respect to the possible utilisation of the antimicrobial properties of adamsite and its derivatives were filed as recently as 1991), these uses are no longer acceptable, given its arsenic content. In any case, DM was not developed and manufactured for these purposes, and existing stocks were instead used to these ends.
- 2.4 The Board took note of the methodology used by the temporary working group: the use of a decision-making approach usually applied in strategic management to answer what were considered key questions in addressing adamsite - whether it was an acceptable riot control agent, and how it compared to accepted RCAs such as CN or CS on the one hand, and to known chemical agents on the other.
- 2.5 On the basis of the conclusions of the TWG, the Board reached the following conclusions:
  - (a) although DM is not listed in the Schedules of Chemicals annexed to the Convention, it has a history as a chemical weapon, albeit as one which is inferior in effectiveness if compared to other agents. It has also been used for riot control purposes;
  - (b) at present DM has no medical, industrial or other legitimate uses, except for research;
  - (c) it is not contested that, when DM is used as an RCA with restraint, and in the open, the occurrence of deaths or permanent damage is unlikely. However, some fatalities have nevertheless been reported (presumably as a result of the dissemination of excessive quantities of DM); and

- (d) DM should accordingly no longer be used as an RCA, as it fails to meet today's concerns for safety. In addition, it also does not meet today's concerns with respect to environmental protection (in particular in relation to arsenic contamination). Should a country decide to maintain the option of retaining DM as an RCA, its holdings should be consistent with such intended uses (the quantities should not exceed a few tonnes, and any holdings should not be in a weaponised<sup>1</sup> form).
- 2.6 The Board did not consider it appropriate to address the legal implications of its findings on adamsite. Given that adamsite is not listed in the Schedules to the Convention, the Board recommended that the conclusions contained in subparagraphs 2.5(a) - (d) above be used as a basis for defining the legal status of adamsite in relation to the Convention.

### **Analytical procedures**

- 2.7 The Board's temporary working group on analytical procedures met twice during the period since its second session, from 24 - 25 May 1999 and from 13 - 14 January 2000. It prepared two reports on the issues of the use of inspected State Party analytical equipment, the use of alternative analytical techniques (simplified, yet still meeting the requirements), matters relating to the Central OPCW Analytical Database, and - at the request of the Director-General - the results of the Sixth Official OPCW Proficiency Test. The reports of the TWG, once reviewed by the Board, led to the following considerations and conclusions:
- 2.8 Chemical analysis is an important tool provided by the Chemical Weapons Convention to demonstrate adherence to, or violation of, its provisions. Chemical analysis has been considered necessary during:
- (a) routine inspections - to verify the accuracy of declaration data and to demonstrate the absence of undeclared scheduled chemicals;
  - (b) challenge inspections; and
  - (c) investigations of alleged use.
- 2.9 The Board concluded that the expertise and instrumentation available to the OPCW for sampling and analysis is state of the art, and that any practical difficulties relate to cost, time requirements and logistics, and not to the performance of the instruments as such. At the moment there are no developments on the market that would lead to a significant change in this situation.
- 2.10 The analytical requirements for routine inspections should be quite different from those used in challenge inspections or investigations of alleged use. In routine inspections experience has shown that sampling and chemical analysis are rarely ever necessary, except when the identity of a declared chemical needs to be confirmed.

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<sup>1</sup> It may be kept either in smoke candles, smoke grenades and similar devices, or in bulk, for use in suspensions.

In such cases, however, simple methods such as infrared spectroscopy will suffice. Alternatively, analytical equipment belonging to the inspected State Party could be used when this has been regulated in a facility agreement and when conditions are fulfilled which ensure the independence of the analytical results (for example, if the quality assurance system is accepted by the OPCW, or if control samples are used by inspection teams).

- 2.11 Such simple screening techniques will not be sufficient if, in a routine inspection, sampling and analysis become necessary to demonstrate the absence of scheduled chemicals (in particular the absence of Schedule 1 chemicals in industry inspections). At the same time, the removal from the inspection site of a large number of samples for analysis at designated laboratories would be impractical and expensive. The best approach, the Board concluded, would be to collect an appropriate number of samples and to leave them on site under controlled conditions, and then to undertake chemical analysis by an analytical team sent by the OPCW after the inspection has been completed, but before the inspection file has been closed. This could be part of a clarification procedure initiated by the Director-General.
- 2.12 If the procedure set out in subparagraphs 2.10 and 2.11 above were adopted by the OPCW, the role of designated laboratories would relate primarily to cases that cannot otherwise be resolved, and to both challenge inspections and investigations of alleged use. The Board considered the availability of a sufficient number of highly competent laboratories in different States Parties to be essential. This has implications both for the standards required of these laboratories, and for OPCW proficiency testing.
- 2.13 Until now proficiency testing has been directed towards a limited number of chemical warfare agents and some of their degradation products, at relatively high concentrations. Problems have nevertheless been encountered in the identification of spiking chemicals. There is clearly a need to further practice the methodology for analysing verification samples. Trace analysis and the analysis of samples of biological origin may create even greater demands, and may increase the likelihood of failure in tests. The Board considered that the current concept of OPCW proficiency testing may be counterproductive. At the administrative level too much attention is being given to the mechanics of the scoring process, while too little attention is being devoted to an examination of the lessons to be learned from a test, and to the consequent refinement of sampling and analytical procedures. It is important for any system of analysis using designated laboratories in different countries to be sustainable for many years, and to be designed, not only to cope with samples with an unexpected composition, but also to meet the changing demands caused by scientific advances. The training component of proficiency testing, rather than its examination component, should have highest priority. The Board considered that a mechanism for recognising the analytical competence of a designated laboratory should be developed which is more flexible than the one presently in use.
- 2.14 In relation to the further development of the Central OPCW Analytical Database, the above considerations led the Board to conclude that:
  - (a) the incorporation of data relating to selected unscheduled degradation products and standard riot control agents is essential; and

(b) priorities must be set for any inclusion of additional spectra (for example, the inclusion of compounds with a P-methyl or P-ethyl group is more important than the inclusion of other homologues).

- 2.15 The Board stressed that such extensions would not in any way affect the composition of the Schedules of Chemicals annexed to the Convention. At the same time it needs to be understood that the database will not suffice in all cases, and that the synthesis of compounds for reference purposes may be required in specific cases.
- 2.16 Given the need to initiate a process of evaluating simplified alternative analytical (and screening) techniques, the Board encouraged the Secretariat to contact potentially interested laboratories in Member States to assist in such an evaluation.

### **Destruction technologies**

- 2.17 The Board welcomed the initiative of this TWG to prepare, for diplomats and other governmental experts, a brochure on the destruction technologies for chemical weapons. The Board requested the Secretariat to provide the necessary assistance for this publication.
- 2.17 The Board noted that Poland was preparing a seminar on the destruction of adamsite, to be held from 26 - 28 April 2000 in Krynica and Tarnow, Poland. Members of the Board and of its temporary working groups on destruction and adamsite had been invited to attend the seminar as experts. The Board welcomed this meeting as another step towards addressing destruction issues within the context of the OPCW.
- 2.18 The Board received and welcomed a proposal by one of its members to organise a seminar on the destruction of abandoned chemical weapons. It discussed the possible time and venue for such a meeting, and considered that it should be convened, if possible, in the autumn of 2000. The following Board members and members of its temporary working group on destruction will form the programme committee for the seminar, and will, inter alia, solicit presentations: Joe Bunnett, Claude Eon, Li Weimin, Giorgio Modena, Victor Petrunin, and Stanislaw Witek. The participation of industry will be an important aspect of the symposium, and contacts with the industry should be used without delay to ensure its active involvement and participation. The Secretariat was requested to consider the merits of organising such a symposium, and to provide the necessary logistical support for it.

### **Equipment issues**

- 2.19 The Board noted the considerations presented during the TWG's report with respect to the possible use of neutron generators and non-cooled as well as electrically cooled detectors for NDE equipment (as an alternative to the NIPPS currently in use). The Board was also advised that the Secretariat is studying such instruments at present.
- 2.20 When addressing the issue of how, in the future, the personnel requirements for the permanent monitoring of chemical weapons destruction operations may be reduced and replaced by the use of appropriate equipment, the Board noted that the Secretariat had prepared a non-paper on the issue in 1998. The TWG on equipment will study

this non-paper in detail and will develop, as soon as possible, comments and, as appropriate, additional recommendations to the Director-General on the issue.

- 2.21 The Board recalled that one of its members had invited the Secretariat to discuss in detail the use of a high temperature fast GC/MS as an option for on-site screening and analysis.

### **Bio-medical samples**

- 2.22 The issue of the analysis of bio-medical samples was brought to the Board's attention by the Director-General. At present it had not been invited to address any specific questions. The Board considered that, when detailed questions are drawn to its attention by the Director-General, a temporary working group under the leadership of Victor Petrunin should be established to address them.

### **First Review Conference**

- 2.23 The Board had a general discussion on how it should contribute to the preparations for the first Review Conference to be convened not later than one year after the expiry of the fifth year after the entry into force of the Convention, in accordance with paragraph 22 of Article VIII of the Convention. The Board considered that it would be useful to identify areas of science and technology that should be analysed in some detail, with respect to how current developments will impact on the scientific foundations of the Convention. Areas that may deserve detailed study could include chemical analysis, equipment and instruments, biosynthesis and other trends in chemical manufacturing, biotechnology, remote sensing, nano-technology (both with respect to analysis and synthesis), and bioassays. The Board considered that, as a next step, the areas to be studied in detail need to be further clarified. This should be done in consultation with both the OPCW and scientific institutions and associations outside the OPCW. As a result those scientific fields whose assessment should be prioritised would be identified, and a mechanism under the guidance of the Board would be developed to assess new developments in these fields and their bearing on the Convention.

### **3. Any other business**

The Board confirmed the continuation of the chairmanship of Claude Eon, and of the vice chairmanship of Will Carpenter, for one more year.