OPCW

Technical Secretariat

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NOTE BY THE DIRECTOR-GENERAL

PROGRESS REPORT ON THE USE OF SAMPLING AND ANALYSIS DURING ARTICLE VI INSPECTIONS

Introduction

1. Paragraph 27 of Part VII of the Verification Annex to the Chemical Weapons Convention (hereinafter "the Verification Annex") emphasises the importance of the use of sampling and analysis (S&A) as an important verification tool for Schedule 2 inspections, stating specifically that "[s]ampling and analysis shall be undertaken to check for the absence of undeclared scheduled chemicals."

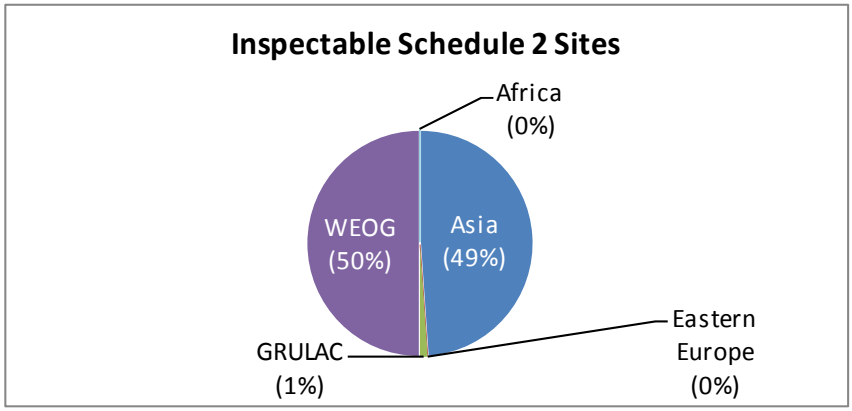
2. Paragraph 22 of Part VIII (Schedule 3 Regime) and paragraph 19 of Part IX (Other Chemical Production Facilities) of the Verification Annex state that "[s]ampling and on-site analysis **may** be undertaken to check for the absence of undeclared scheduled chemicals. In cases of unresolved ambiguities, samples may be analysed in a designated off-site laboratory, subject to the inspected State Party's agreement."

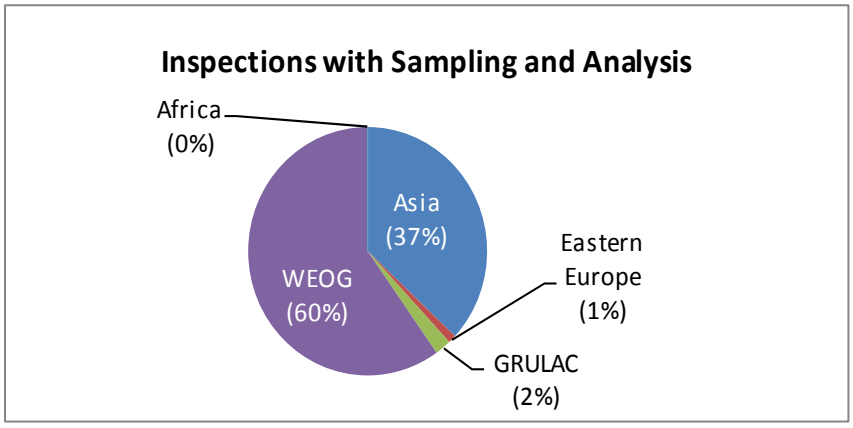
3. This Note summarises the progress made with regard to inspections at Schedule 2 plant sites that make use of S&A. It supplements the other Notes by the Director-General reporting on the use of S&A (S/688/2008, dated 10 April 2008; S/719/2008, dated 10 November 2008; and S/953/2011, dated 29 July 2011) and provides information on the results of the two inspections with S&A conducted on a trial basis at an OCPF and at a Schedule 3 plant site.

Schedule 2 inspections

4. Between September 2006 (when S&A inspections began) and February 2016, the Technical Secretariat (hereinafter "the Secretariat") conducted 82 S&A inspections at Schedule 2 plant sites. Of the 42 total Schedule 2 inspections conducted annually by the Secretariat since 2007, eight to nine of them have involved S&A.

5. A total of 22 States Parties have already hosted at least one S&A inspection at a Schedule 2 plant site. Five States Parties have hosted between seven and nine S&A inspections, seven have hosted three to six S&A inspections, and the remaining nine have hosted one S&A inspection each. The charts below show the number of inspectable sites and the number of S&A inspections hosted by each region[1] since September 2006.





6. Although 67% of the inspectable Schedule 2 plant sites are in five States Parties, the Secretariat has so far managed to geographically distribute S&A inspections by limiting each State Party to one S&A inspection per calendar year.

7. Schedule 2 plant sites selected for S&A are chosen from the pool of sites annually selected in view of the risk posed by the relevant chemical to the object and purpose of the Convention, the characteristics of the plant site, and the nature of the activities carried out there.

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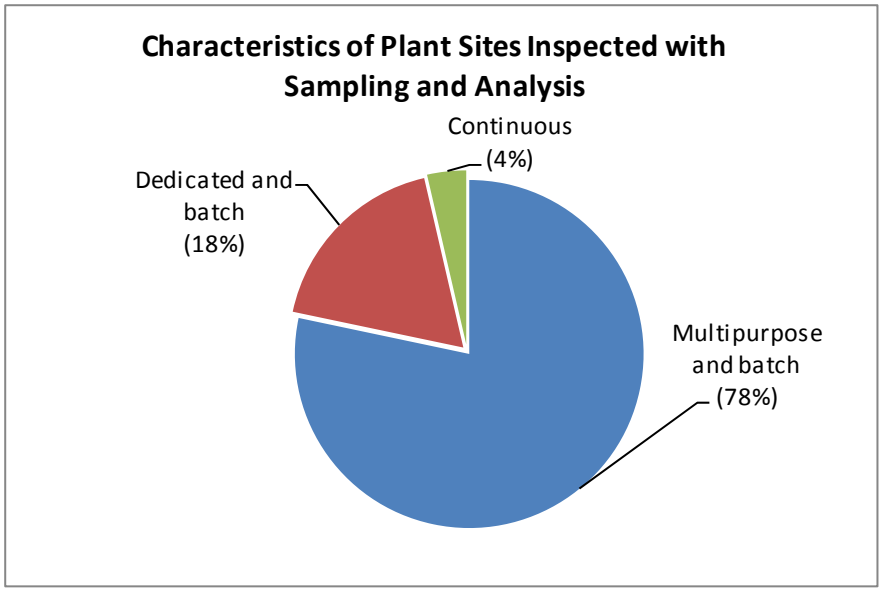
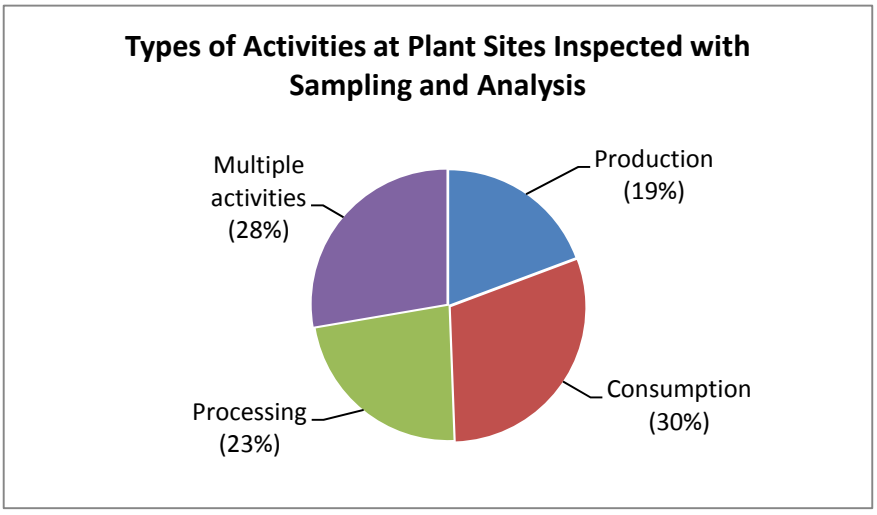
1 Africa, Asia, Eastern Europe, Latin America and the Caribbean (GRULAC), and Western Europe and Other States (WEOG).

8. Priority in the selection process is given to plant sites that have as characteristics the equipment and capability to be converted for activities prohibited by the Convention: sites operating in batch mode (as opposed to continuous mode) and multipurpose sites (rather than dedicated sites). The following chart provides the distribution of such characteristics for the sites inspected with S&A during the reporting period (2006 to 2015).



9. The nature of the activities related to Schedule 2 chemicals is also taken into account in the selection of sites for S&A; the highest priority is given to sites with more than one activity, followed by production, consumption, and processing. The distribution of activities is shown in the following chart.



10. The inspection teams were able to take and analyse samples in accordance with the inspection mandate, under a wide variety of conditions and within the maximum period of inspection (96 hours). The S&A operational instruction was not fulfilled in only one inspection, owing to problems with the equipment that could not be resolved on site.

11. Matches against the OPCW Central Analytical Database (OCAD) with respect to scheduled chemicals other than those declared were routinely reported. Such matches were identified by the inspection teams either as process impurities below the declaration threshold or as "false positives",[2] which were resolved through detailed analysis of the rest of the data.

12. With regard to the Scientific Advisory Board's assessment that it is technically feasible for some Schedule 1 chemicals (nitrogen mustard or sulfur mustard) to be formed through impurities in low concentrations during industrial production, the Secretariat issued, as an interim measure, a procedure for handling such cases (S/1272/2015, dated 1 May 2015).

13. S&A was used twice in initial Schedule 2 inspections, providing further reassurance of the Secretariat's capability to deal with scenarios for which it has received minimal information in advance.

14. As for the practical implementation of S&A, the continuous improvement of practices and procedures has enhanced the overall efficiency and effectiveness of S&A inspections. Examples of such improvements include:

    (a) the introduction of new features such as the auto-sampler and sample preparation kits with automatic pipettes, which allowed inspectors to perform more injections (by running analysis during the night), to improve the precision of injections (because of better repeatability), and to reduce sample preparation time;

    (b) the shortening of sample preparation time using the analytical method involving the spiking of the liquid samples/extracts directly onto Tenax tubes, in-tube derivatisation, and the analysis of samples/extracts by thermal desorption gas chromatography/mass spectrometry (GC/MS), developed by the OPCW Laboratory, especially for the analysis of difficult sample matrices (such as emulsions and organic-aqueous mixtures); and

    (c) the generation of electronic sample booklets, reducing the time spent on printing and reporting on site.

Schedule 3 and OCPF inspections

15. In 2012 the Secretariat proposed to the Industry Cluster the introduction of S&A into Schedule 3 and OCPF inspections. Because the Convention limits the inspection period for these regimes (24 hours), the procedures had to be optimised before the trials were started.

16. In 2015, the Secretariat conducted one Schedule 3 and one OCPF inspection using S&A. These were conducted with the prior agreement and preparation of the inspected States Parties, which had never before received an S&A inspection.

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[2] In some instances, the structural features of unscheduled chemicals generated signals that fell within the match criteria for scheduled chemicals.

Although the results of the trials were encouraging and confirmed the Secretariat's ability to conduct these inspections within 24 hours, some flexibility on the part of States Parties may be required in more complicated scenarios.

17. In February 2016, an OCPF inspection using S&A was conducted at a plant site selected by the Secretariat, with limited prior knowledge of the inspected State Party. After notification of the inspection was issued, the Secretariat provided detailed information to familiarise the State Party with the S&A procedures. The inspection was conducted fully successfully, and within the 24-hour time frame.

Additional information

18. The OCAD has continued to expand through the preparation of analytical data (mostly by designated laboratories), the validation of data by the Validation Group, and the approval of data by the Executive Council. The latest version of the OCAD (v.18) contains mass spectral data for 4,022 chemicals.

19. The conduct of S&A inspections has proved important in ensuring that the Secretariat is adequately prepared to carry out related tasks that require higher standards of logistical and technical skills (for example, challenge inspections or investigations of alleged use).

20. The support from inspected States Parties hosting S&A inspections and many States Parties that have provided additional analytical data has continued to be excellent. The Secretariat thanks States Parties for their continuous support.

21. Building on the experience in the Syrian Arab Republic, the Secretariat started to use, on a trial basis in industrial inspections, "FirstDefender™", a hand-held Raman spectrographic detector. The advantage of this analytical device is that there are no additional operational costs to use it. However, there are limitations to the information it can provide when compared to that obtained with the currently used GC/MS equipment. In addition, adjustments have to be made in the instrument library to avoid identification of non-scheduled chemicals. At present, therefore, the application of the FirstDefender™ is limited to that of a useful adjunct, e.g. to determine sample points for GC/MS analysis or to confirm the content of drums of chemicals.

The way forward

22. Inspections with S&A will continue at Schedule 2, Schedule 3, and OCPF plant sites.

23. In the view of the Secretariat, the annual number of S&A inspections, currently between eight and 12, provides a balance between the verification requirements stipulated in the Convention and the availability of resources. Any further increase in the number of S&A inspections would require additional resources.

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