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**NOTE BY THE DIRECTOR-GENERAL****REPORT ON THE PERFORMANCE OF THE REVISED METHODOLOGY  
FOR THE SELECTION OF OTHER CHEMICAL PRODUCTION FACILITIES  
FOR INSPECTION****BACKGROUND**

1. In 2011, the Director-General introduced—as an interim measure and on the basis of consultations within the Industry Cluster—a revised methodology to select other chemical production facilities (OCPFs) for inspection (S/962/2011, dated 8 September 2011).
2. In line with the recommendation of the co-facilitators for the consultation on the site selection methodology for OCPFs, contained in their report to the Executive Council (hereinafter “the Council”) at its Sixty-Fifth Session (EC-65/WP.1, dated 10 June 2011) and with the reaffirmation by the Council in its report of that same session (paragraph 6.32 of EC-65/4, dated 15 July 2011), the Technical Secretariat (hereinafter “the Secretariat”) reports annually to States Parties on the performance of the interim OCPF site selection methodology.
3. The previous reports on this topic are contained in Notes by the Secretariat S/1070/2013, dated 14 February 2013; S/1157/2014, dated 10 February 2014; S/1240/2015, dated 6 February 2015; S/1348/2016, dated 4 February 2016; S/1461/2017, dated 6 February 2017; S/1582/2018, dated 12 February 2018; and S/1715/2019, dated 6 February 2019.
4. This Note provides an overview of the performance of the methodology in its eighth year of implementation (for inspections conducted in 2019), as specified in S/962 and the policy guidelines approved by the Council in its decision EC-66/DEC.10 (dated 7 October 2011). For the purpose of making an assessment, the actual results achieved in 2019 have been compared to those of 2018 and 2017 and, in a specific case, as far back as 2013.

**FINDINGS**

5. Using the plant site selection (PSS) process based on the S/962 methodology, the Secretariat selected 169 OCPF plant sites which were budgeted for inspection in 2019.
6. In general, the findings from the PSS results for 2019 show that the S/962 methodology and the policy guidelines contained in EC-66/DEC.10 just about



achieved the defined objectives for a balanced geographical distribution of inspections in at least 50% of States Parties with inspectable Article VI facilities, but did not achieve the preferred 60% level. Indeed, in 2019, OCPF inspections were received in 37 States Parties. Given the fact that the number of States Parties that did not receive OCPF inspections but which received Schedule 1, 2, or 3 inspections stands at four, and the fact that there were 79 States Parties with at least one inspectable Article VI facility, 51.9% (41/79) of the 79 States Parties received at least one Article VI inspection in 2019. There is concern about the geographical distribution of inspections as a consequence of the declining number of States Parties receiving OCPF Article VI inspections (also illustrated later in this document). However, the changes applied to the methodology in 2019<sup>1</sup> have had a positive impact on this objective; for 2020, the Secretariat noted that this number will increase to approximately 55% to 65% taking into account only OCPF inspections. However, this is not likely to be sustained in the long term.

7. Targeting of OCPFs according to the relevance pool in which they were placed for the selection is still effective, as it is fixed.
8. However, within each relevance pool, the A15 value has a limited impact on the selection of sites with higher A15 values. Furthermore, the A15 calculation and the subsequent selection probability calculation within each pool are not significantly affected by relevance weighting factors. The probability calculation should be optimised to better target most relevant plant sites within each pool. In order to illustrate this point, Table 1 and Figure 1 below depict the A15 data distribution from Pool A (from which roughly 70% of all inspections were carried out in 2019) for inspectable and inspected plant sites. The data demonstrates that the relevance factor A15 does not have any significant impact on the selection of plant sites for inspection within a pool.

**TABLE 1: DISTRIBUTION OF A15 SCORES IN POOL A FOR INSPECTABLE AND INSPECTED PLANT SITES (2019)**

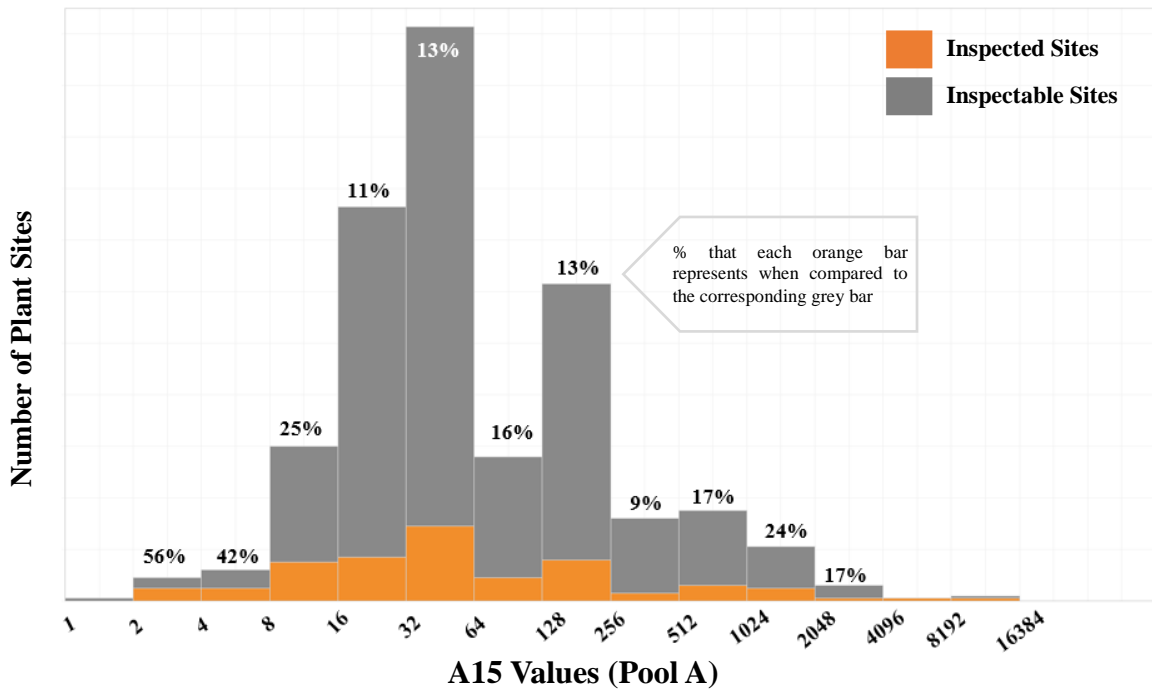
<b>Pool</b>	<b>A15 &lt; 10</b>	<b>≤10 A15 &lt; 100</b>	<b>A15 ≥ 100</b>
Pool A (Inspectable)	8%	57%	35%
Pool A (Inspected)	17.7%	47.8%	34.5%

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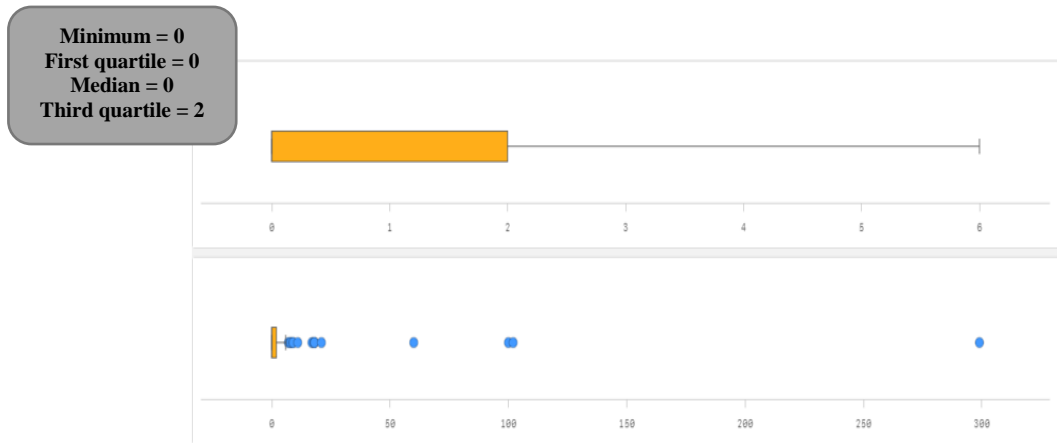
**FIGURE 1: DISTRIBUTION OF A15 SCORES IN POOL A FOR INSPECTABLE AND INSPECTED PLANT SITES (2019)**



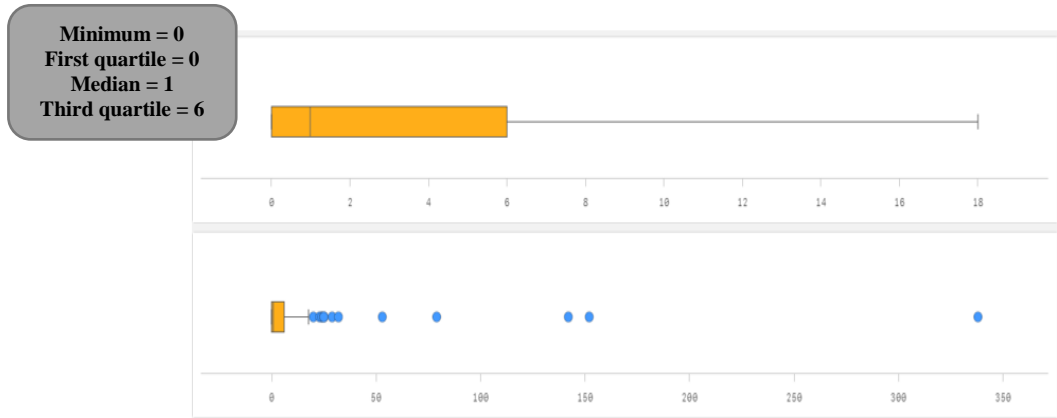
**Number of OCPF inspections per State Party**

- The distribution of the number of inspectable OCPF plant sites per State Party (for each of the 79 States Parties with inspectable sites) for each of the pools (A, B, and C) is depicted in Figure 2 below, with Table 2 below outlining observations from the three charts in Figure 2.

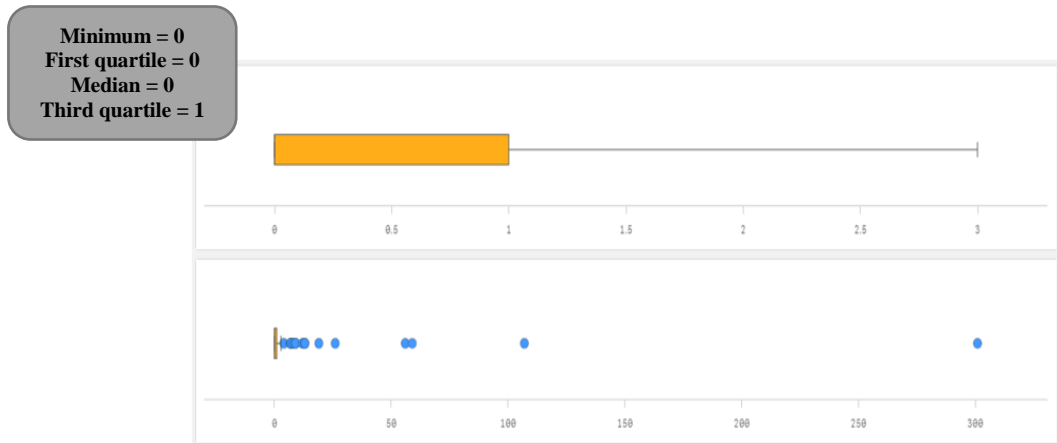
**FIGURE 2: DISTRIBUTION OF INSPECTABLE OCPF PLANT SITES PER STATE PARTY WITHOUT AND WITH OUTLIERS DISPLAYED (2019, POOLS A, B, AND C)**



**Pool A - Number of Inspectable OCPF Plant Sites per State Party**



**Pool B - Number of Inspectable OCPF Plant Sites per State Party**



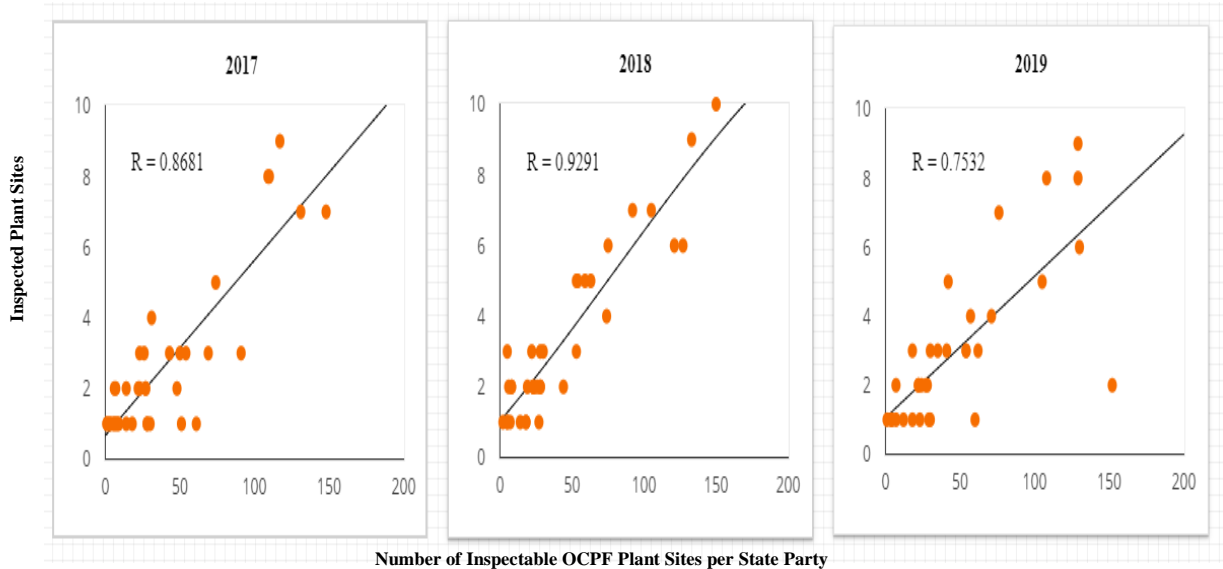
**Pool C - Number of Inspectable OCPF Plant Sites per State Party**

**TABLE 2: OBSERVATIONS ON THE DISTRIBUTION OF INSPECTABLE OCPF PLANT SITES PER STATE PARTY FOR POOLS A, B, AND C**

<b>Pool</b>	<b>Observation</b>
<b>A</b>	The first chart in Figure 2 indicates that more than 50% of the 79 States Parties (with inspectable sites) had 0 inspectable plant sites in Pool A. Furthermore, 75% of the States Parties had 2 or fewer inspectable plant sites in Pool A. In addition, 15 States Parties had between 3 and 21 inspectable plant sites, and 4 States Parties had between 60 and 299 inspectable plant sites in Pool A.
<b>B</b>	The second chart in Figure 2 indicates that more than 50% of the 79 States Parties (with inspectable sites) had 1 or fewer inspectable plant sites in Pool B. Furthermore, 75% of the States Parties had 6 or fewer inspectable plant sites in Pool B. In addition, 15 States Parties had between 7 and 32 inspectable plant sites, and 5 States Parties had between 53 and 338 inspectable plant sites in Pool B.
<b>C</b>	The third chart in figure 2 indicates that more than 50% of the 79 States Parties (with inspectable sites) had 0 inspectable plant sites in Pool C. Furthermore, 75% of the States Parties had one or fewer inspectable plant sites in Pool C. In addition 15 States Parties had between two and 26 inspectable plant sites, and 4 States Parties had between 56 and 301 inspectable plant sites in Pool C.

10. Based on the above observations, three-quarters of States Parties have zero or close to zero uninspected plant sites left, and another 15 States Parties will have zero or very few uninspected plant sites left in the coming few years. Four to five States Parties will probably have a large number of inspectable plant sites left at that point.
11. There are few States Parties with a high number of inspectable plant sites (outliers). This data is also displayed for each of the three pools. It is to be noted that the display of outliers skews the data distribution.
12. The distribution of plant site inspections conducted in each State Party against the number of inspectable OCPF plant sites in that State Party is plotted in Figure 3 for the period from 2017 to 2019. In order to prevent a skewed display as mentioned above, statistical outliers (inspectable plant sites) have not been considered in the data set. The data on the number of OCPF plant sites in each State Party is based on the information declared by States Parties. In 2019, as in 2018 and 2017, the Secretariat conducted 169 OCPF inspections.

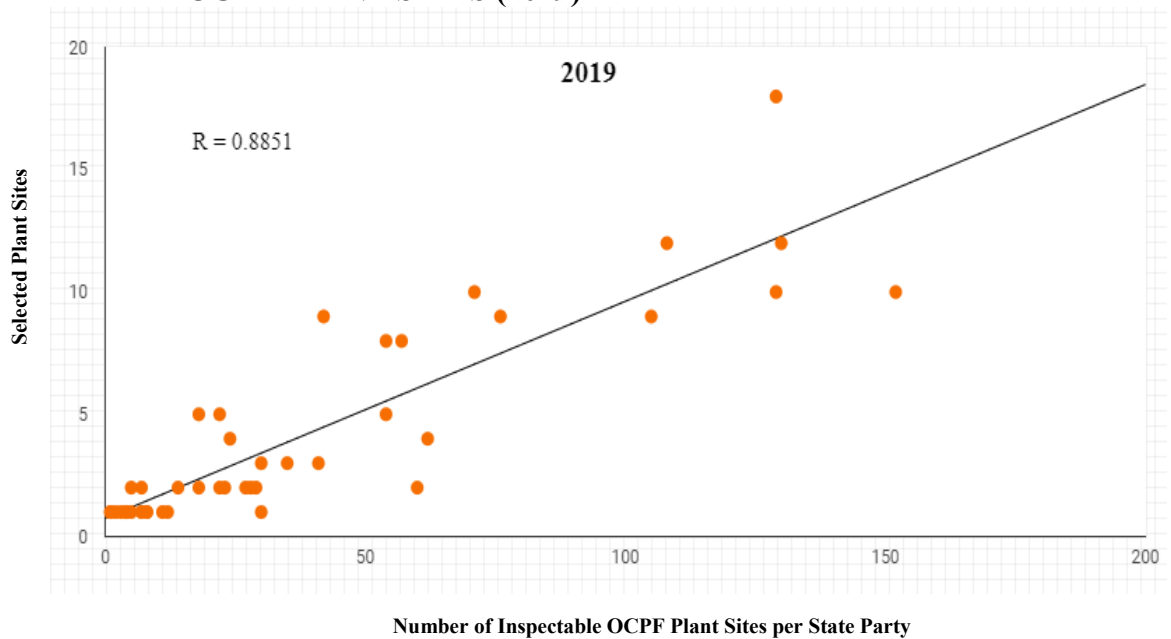
**FIGURE 3: NUMBER OF OCPF INSPECTIONS PER STATE PARTY AGAINST THE TOTAL NUMBER OF INSPECTABLE OCPF PLANT SITES (2017 TO 2019)**



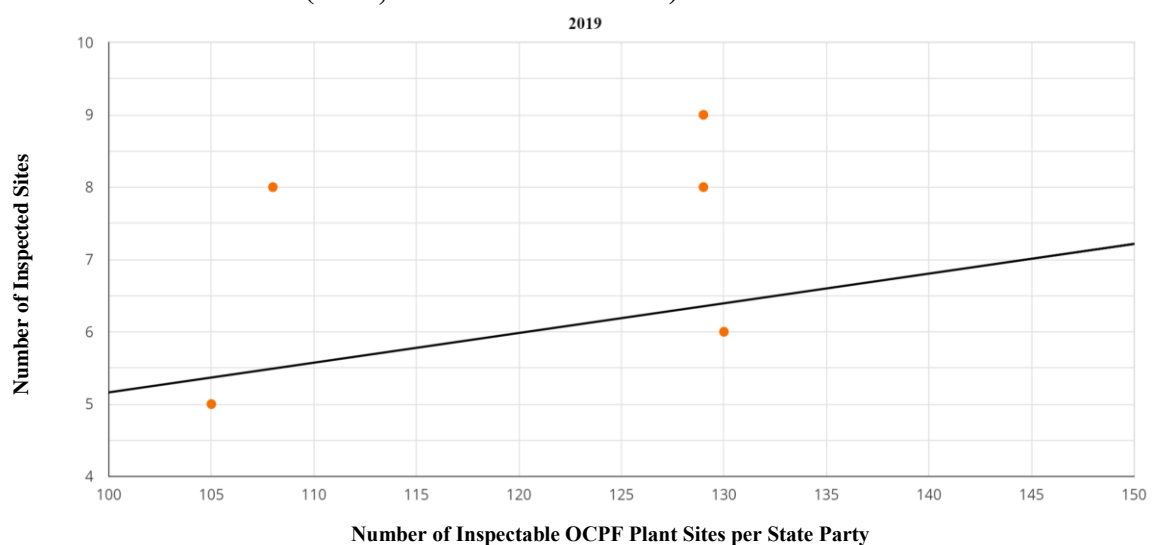
13. In order to provide more clarity with respect to the methodology currently used, only the analysis for the last three years is included in Figure 3 above. The number of inspectable OCPF plant sites is presented on a linear scale, and a trend-line analysis is added to depict the correlation between the number of inspectable plant sites and the number of inspections received for the same three-year period. The correlation coefficient (R), which measures the strength of the relationship between the two variables, is also displayed for each year.
14. From this analysis, several facts can be observed, which are common to all three years:
  - (a) The number of inspections conducted in each State Party is positively correlated with the number of inspectable OCPF plant sites in that State Party. The R values indicate a strong positive correlation, which means that high inspection values concur with high inspectable sites values (and vice versa).
  - (b) In accordance with the provisions of paragraph 13 of Part IX of the Verification Annex to the Chemical Weapons Convention (hereinafter “the Verification Annex”), within a State Party there is an upper limit to the combined number of inspections per year received under both Parts VIII (Schedule 3) and IX (OCPF) of the Verification Annex. While the selection of plant sites under both Parts of the Verification Annex is determined by a weighted random selection process, in some States Parties the total number of inspections reached the limit, causing the reallocation of inspections to other States Parties and subsequently distorting the positive correlation. This is seen by comparing the chart in Figure 4 with the 2019 chart in Figure 3. There is a stronger positive correlation (higher R value) in Figure 4 (selected plant sites) than in Figure 3 (inspected plant sites).

- (c) The weighted random selection process makes use of a probabilistic methodology that takes into account both the characteristics of the plant sites and the activities carried out there. Therefore, States Parties with a similar number of inspectable plant sites received a comparable number of inspections, but varying within a limited range. For instance, States Parties declaring between 100 and 150 plant sites received between five and nine inspections in 2019. This fact is represented in Figure 5 below.

**FIGURE 4: NUMBER OF SELECTED OCPF PLANT SITES PER STATE PARTY AGAINST THE TOTAL NUMBER OF INSPECTABLE OCPF PLANT SITES (2019)**



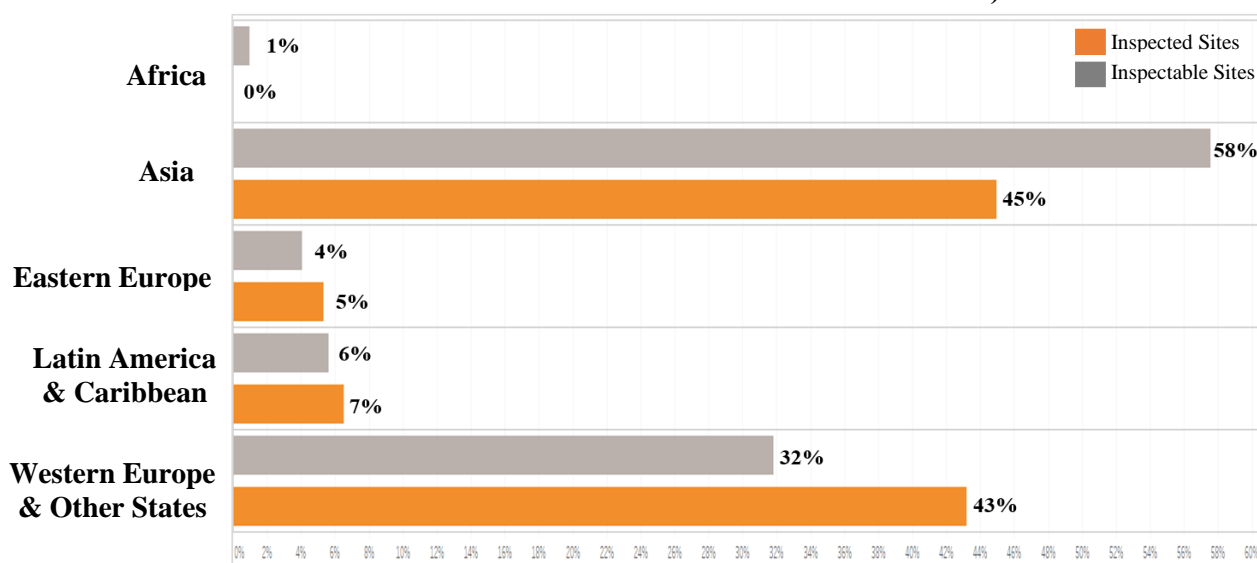
**FIGURE 5: NUMBER OF OCPF INSPECTIONS PER STATE PARTY AGAINST THE NUMBER OF INSPECTABLE OCPF PLANT SITES (2019, EXPANDED VIEW)**



### Geographical distribution of OCPF plant sites and inspections in 2019

15. The geographical distribution of plant sites and inspections among regional groups is shown in Figure 6 below. The chart shows the share of inspectable plant sites in each regional group in 2018, based on the information declared by States Parties as at 7 November 2018, when the plant site selection was performed. The same chart also shows the share of inspections in 2019 conducted in each regional group, out of a total of 169 inspections.

**FIGURE 6: COMPARISON OF THE REGIONAL DISTRIBUTION OF PLANT SITES AND INSPECTIONS (BASED ON THE INFORMATION DECLARED BY STATES PARTIES AS AT 7 NOVEMBER 2018)**



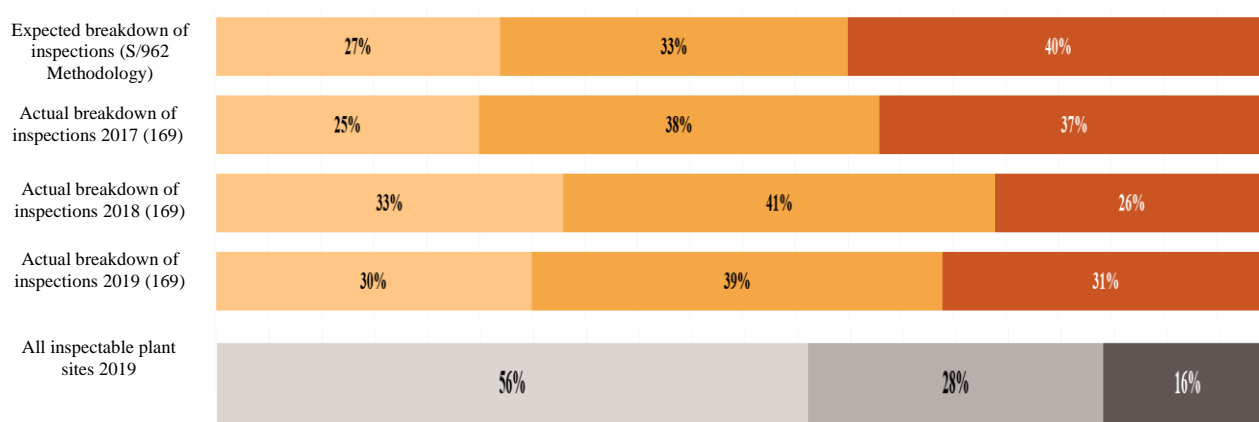
16. By comparing the two distributions, the following conclusions can be drawn:
- Even though the PSS methodology does not include any mechanism for achieving an adequate regional balance, regions declaring a higher number of inspectable OCPF plant sites received a larger proportion of inspections in 2019.
  - The vast majority of inspectable plant sites (about 90%) were declared by States Parties belonging to the Asian Group and to the Western Europe and Other States Group. Accordingly, States Parties located in these two regional groups received most of the total OCPF inspections carried out in 2019 (about 88%).
  - In accordance with the provisions of paragraph 13 of Part IX of the Verification Annex, when in some States Parties the total number of sites selected for inspection in 2019 reached the threshold, inspections were reallocated to other States Parties according to the order of the selection process.



### Distribution of OCPF inspections according to the relevance of plant sites

17. The distribution of plant sites according to relevance is compared in Figure 7 below, which describes the share of inspected OCPF plant sites each year from 2017 to 2019 in each of the low- ( $A15 < 10$ ), medium- ( $10 \leq A15 < 100$ ), and high-relevance ( $A15 \geq 100$ ) groups according to the  $A15^2$  values for those years, as well as the breakdown of all inspectable sites in the pool for 2019 inspections according to the same criteria. The breakdown is shown according to the value of the  $A15$ , both in terms of the expected distribution<sup>3</sup> according to the respective methodology, and the actual selection of sites for inspection in each period.

**FIGURE 7: RELATIVE SHARE OF INSPECTIONS ACCORDING TO THE RELEVANCE OF OCPF PLANT SITES**



18. The evolution of the distribution over time and the characteristics of the pool of inspectable sites lead to the following observations:
- The S/962 methodology resulted in the selection of relatively more OCPFs with low  $A15$  values (i.e. lower relevance).
  - The S/962 methodology resulted in the selection of relatively fewer OCPFs with higher  $A15$  values (i.e. higher relevance).
  - Concerning the distribution of all inspectable plant sites for 2019 inspections, the S/962 methodology targets the higher-relevance sites; even though such sites constitute only 16% of all inspectable plant sites, 31% of the inspections were conducted at the higher-relevance sites. While Figure 7 depicts the distribution across all OCPF pools, it is worth reiterating that within each relevance pool, the  $A15$  value has generally little to no impact on the selection of sites with higher  $A15$  values. This point is illustrated again in Table 3

<sup>2</sup>  $A15$  (formerly  $A14$ ) is an algorithm that determines the relevance of an OCPF site for inspection, as defined in the current S/962 selection methodology.

<sup>3</sup> The expected distribution is generated based on the results of the simulation runs of the algorithm utilising 2017 declaration data.

below, which shows two A15 data distributions for pool A (from which roughly 70% of all inspections were carried out in 2019).

**TABLE 3: A15 DATA DISTRIBUTION FOR POOL A FOR 2019**

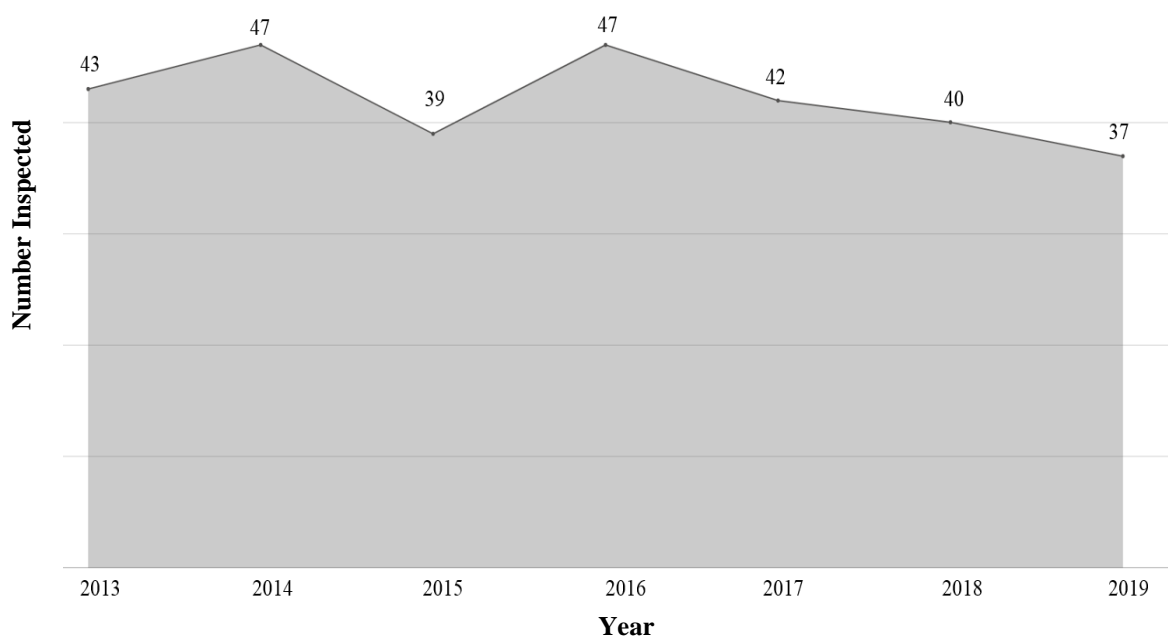
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Pool A (Inspectable)	8%	57%	35%
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19. The difference in the distribution of inspections between 2017 and 2019 could be attributed to the changes in the characteristics of the selection pools; since a greater percentage of inspections are conducted in high-relevance sites within a given year, the number of non-inspected high-relevance sites is reducing each year.

**Coverage of States Parties selected to receive inspections**

20. The coverage of States Parties selected for OCPF inspection can be compared over time. Figure 8 below shows the total number of States Parties inspected each year from 2013 to 2019. Between 2016 and 2019, the number of States Parties receiving inspections shows a steady decrease.

**FIGURE 8: COVERAGE OF STATES PARTIES SELECTED TO RECEIVE OCPF INSPECTIONS**



**CONCLUSIONS**

21. The analysis of the results from the PSS process to select OCPF plant sites for inspection in 2019 confirms that the use of the S/962 methodology takes into account both the number and the relevance of plant sites declared by States Parties. The key aspects of the selection results for 2019 are as follows:

- (a) In general, the findings from the PSS results for 2019 show that the S/962 methodology and the policy guidelines contained in EC-66/DEC.10 just about achieved the defined objectives for a balanced geographical distribution of inspections in at least 50% of States Parties with inspectable Article VI facilities, but did not achieve the preferred 60% level. Indeed, in 2019, OCPF inspections were received in 37 States Parties. Given the fact that the number of States Parties that did not receive OCPF inspections but which received Schedule 1, 2, or 3 inspections stands at four and the fact that there were 79 States Parties with at least one inspectable Article VI facility, 51.9% (41/79) of the 79 States Parties received at least one Article VI inspection in 2019. There is concern about the geographical distribution of inspections as a consequence of the declining number of States Parties receiving OCPF Article VI inspections. However, the changes applied to the methodology in 2019<sup>4</sup> have had a positive impact on this objective; for 2020, the Secretariat noted that this number will increase to approximately 55% to 65% taking into account only OCPF inspections. However, this is not likely to be sustained in the long term.
- (b) In pools, A, B, and C, three-quarters of States Parties (having inspectable plant sites) have zero (or close to zero) uninspected plant sites left, and another 15 States Parties will have no or very few uninspected plant sites left in the coming few years. Four to five States Parties will probably have a large number of inspectable plant sites left at that point.
- (c) Within each relevance pool, the A15 value has a limited impact on the selection of sites with higher A15 values. Furthermore, the A15 calculation and the subsequent selection probability calculation within each pool are not significantly affected by relevance weighting factors. The probability calculation should be optimised to better target the most relevant plant sites within each pool.
- (d) The number of inspections conducted in each State Party is positively correlated with the number of declared OCPF plant sites in that State Party. States Parties that declare a higher number of OCPF plant sites can expect more inspections than those that declare fewer, within the limitations set by the Chemical Weapons Convention.
- (e) The PSS process using the S/962 methodology continues to result in more inspections in medium and highly relevant sites: relatively fewer OCPFs with low A15 values are being selected, and a higher proportion of more relevant plant sites with medium and high A15 values are being selected.
- (f) In the early implementations of the selection algorithm a trend towards decreasing number of States Parties receiving inspections was observed. When the S/962 methodology was adopted in order to address this trend, the number of States Parties receiving inspections was expected to be 32. Since its adoption, the number of the States Parties receiving inspections remains above

the expected number, reflecting the effect of the three-pool approach in the selection methodology, the increase in the rate of subsequent inspections, and the impact of the limitation on the number of inspections in accordance with paragraph 13 of Part IX of the Verification Annex.

22. In conclusion, the PSS process using the S/962 methodology partially achieves the goals set forth in the report of the co-facilitators (EC-65/WP.1), namely, to better target OCPF inspections without the need for States Parties to provide additional information in declarations. Improvements are therefore recommended.

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