OPCW Technical Secretariat

S/2032/2022
28 February 2022
Original: ENGLISH

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; S/1715/2019, dated 6 February 2019; S/1850/2020, dated 24 February 2020; and S/1931/2021, dated 22 February 2021.

4. This Note provides an overview of the performance of the methodology in its tenth year of implementation (for inspections planned in 2021), as specified in S/962/2011 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 results achieved in 2021 have been compared to those of 2020 and 2019 and, in specific cases, to 2013.

FINDINGS

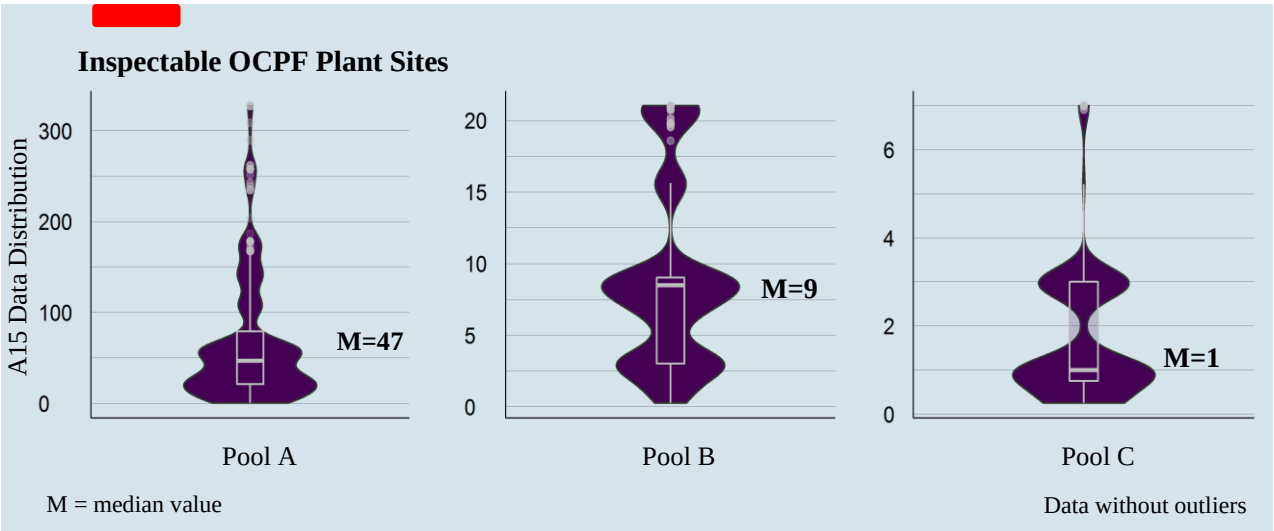
5. Using the plant site selection (PSS) process based on the S/962 methodology, the Secretariat selected 162 OCPF plant sites which were budgeted for inspection in 2021. Due to the COVID-19 pandemic and its impact on OPCW activities, the actual number of OCPF inspections conducted in 2020 was 55 (33% of the budgeted number of 169 in 2020) and 38 in 2021 (23% of the budgeted number of 162 in 2021). Since not all budgeted inspections were conducted in 2020, the inspection plan for 2021 (162 inspections) included uninspected plant sites from the 2020 inspection plan. Thus,

the 2021 inspection plan (162 sites), including the actual number of inspections conducted in 2021 (38 sites), was based on two PSS processes (i.e., for 2021 and 2020). The purpose of this document is to report on the performance of the site selection methodology for plant sites selected for inspection in 2021, based on the 2021 PSS process. Because of the unusual circumstances of 2021, reporting based on the actual inspections (38) conducted in 2021 would not accurately reflect the performance of the methodology. Thus, this report bases its findings solely on the site selection results for the 2021 inspection plan without including any uninspected plant sites from the 2020 inspection plan.

6. In general, in 2021 the S/962 methodology achieved the objectives of the EC-66/DEC.10 guideline regarding 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. There were 40 States Parties that were planned to receive at least one OCPF inspection, and an additional four States Parties that were planned to receive only Schedule 1, Schedule 2, or Schedule 3 inspections. Furthermore, there were 79 States Parties with at least one inspectable Article VI facility. Thus, this total of 44 States Parties represents 56% (44/79) of States Parties with inspectable facilities declared under Article VI.

7. The goal to select the most relevant plant sites for inspection (as reflected in the A15[1] value) continues to be achieved. Figure 1 depicts the A15 data distribution for inspectable plant sites in Pools A, B, and C. To prevent a skewed display, statistical outliers (A14 values) have not been included in Figure 1. For OCPF plant sites not yet inspected in a given State Party, the one-third most relevant plant sites are allocated to Pool A, the next one-third are allocated to Pool B, and the one-third least relevant are allocated to Pool C. Pool A, from which roughly 70% of all inspections are carried out, has a higher median A15 score (47) than the other two pools.

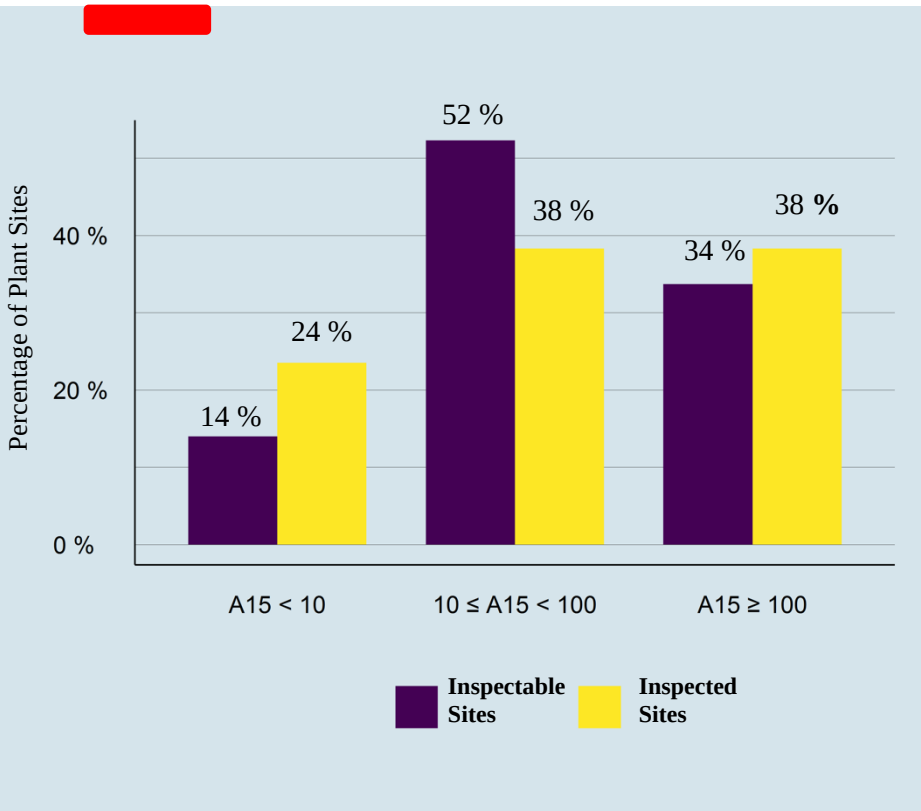
FIGURE 1: DISTRIBUTION OF A15 SCORES IN POOLS A, B, AND C FOR INSPECTABLE OCPF PLANT SITES (2021)



1 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.

8. However, within each 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 calculations within each pool are not significantly affected by relevance weighting factors. To illustrate this point, Figure 2 below depicts the A15 data distribution from Pool A (from which roughly 70% of all inspections are carried out) 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.

FIGURE 2: DISTRIBUTION OF A15 SCORES IN POOL A FOR INSPECTABLE AND INSPECTED OCPF PLANT SITES (2021)



Number of OCPF inspectable sites and inspections per State Party

9. 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 3 below. The data gathered to prepare the charts in Figure 3 includes outliers as presented in Table 1.

FIGURE 3: DISTRIBUTION OF INSPECTABLE OCPF PLANT SITES PER STATE PARTY IN 2021 (POOLS A, B, AND C)[2]

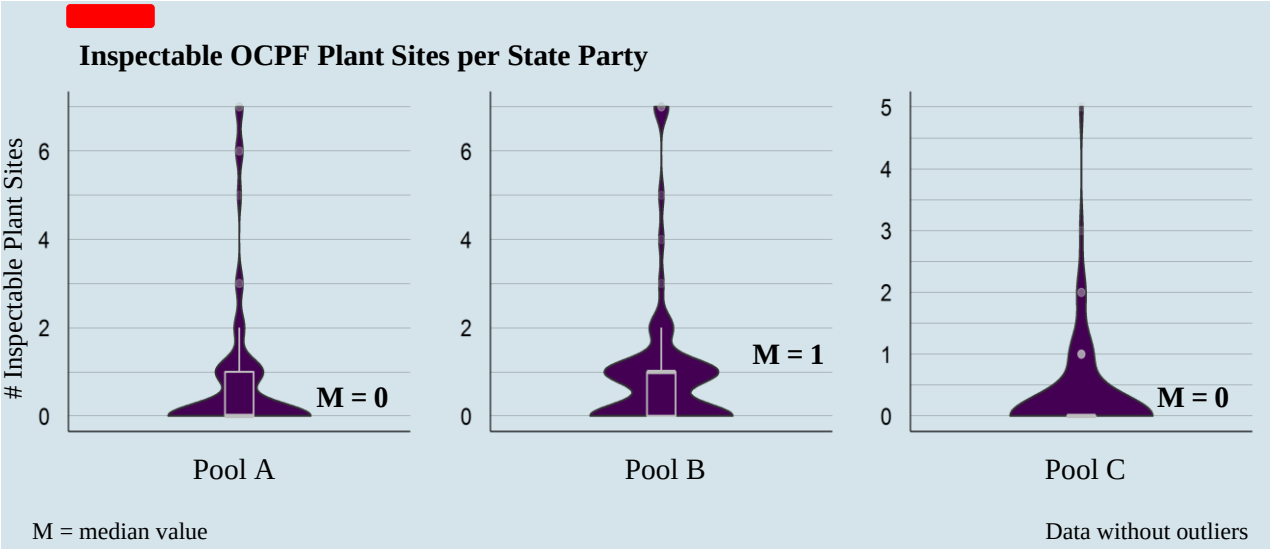


TABLE 1: OBSERVATIONS ON THE DISTRIBUTION OF INSPECTABLE OCPF PLANT SITES PER STATE PARTY (POOLS A, B, AND C)

Pool	Observations
A	The first chart in Figure 3 indicates that more than 50% of the 79 States Parties (with inspectable sites) had zero inspectable plant sites in Pool A. Furthermore, 75% of the States Parties had three or fewer inspectable plant sites in Pool A. In addition, 14 States Parties had between five and 40 inspectable plant sites, and four States Parties had between 50 and 330 inspectable plant sites in Pool A.
B	The second chart in Figure 3 indicates that more than 50% of the 79 States Parties (with inspectable sites) had one or no inspectable plant sites in Pool B. Furthermore, 75% of the States Parties had three or fewer inspectable plant sites in Pool B. In addition, 15 States Parties had between four and 40 inspectable plant sites, and four States Parties had between 50 and 330 inspectable plant sites in Pool B.
C	The third chart in Figure 3 indicates that more than 50% of the 79 States Parties (with inspectable sites) had zero inspectable plant sites in Pool C. Furthermore, 75% of the States Parties had two or fewer inspectable plant sites in Pool C. In addition, 14 States Parties had between five and 40 inspectable plant sites, and four States Parties had between 50 and 330 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.[3]

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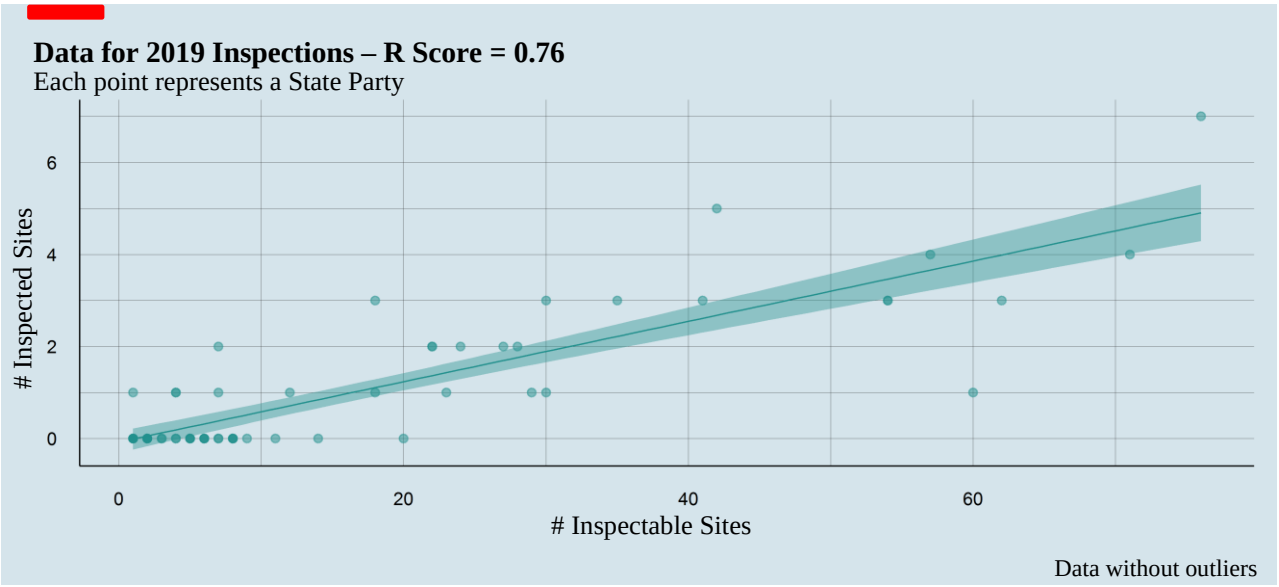
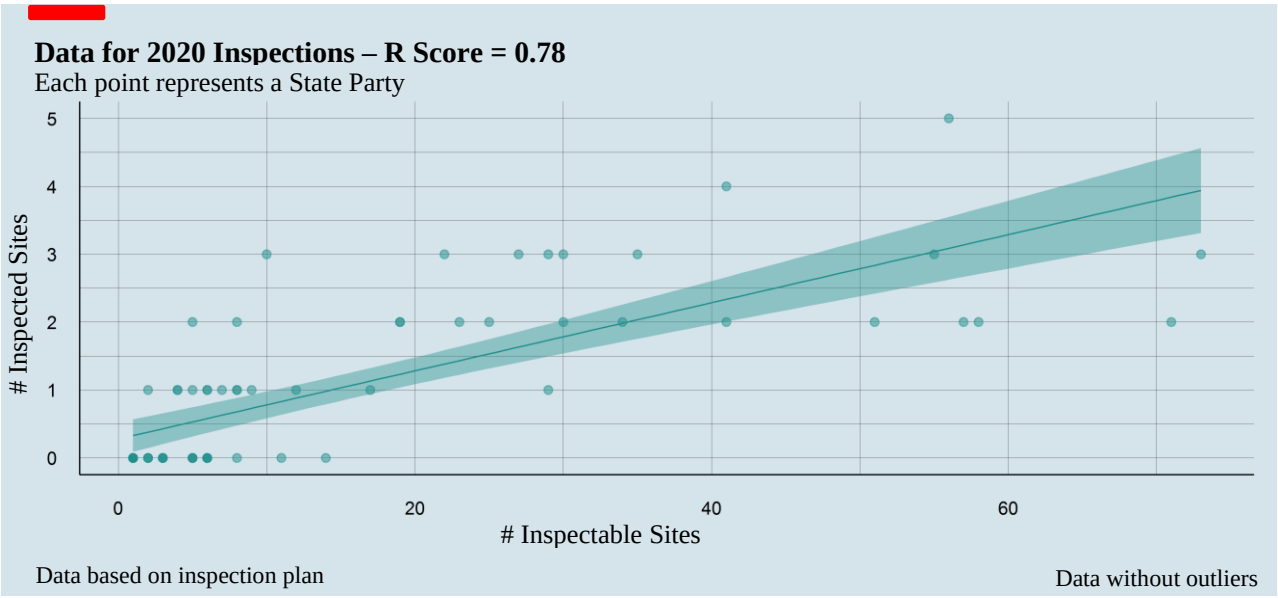
2 Figure 3 to be read in conjunction with Table 1.

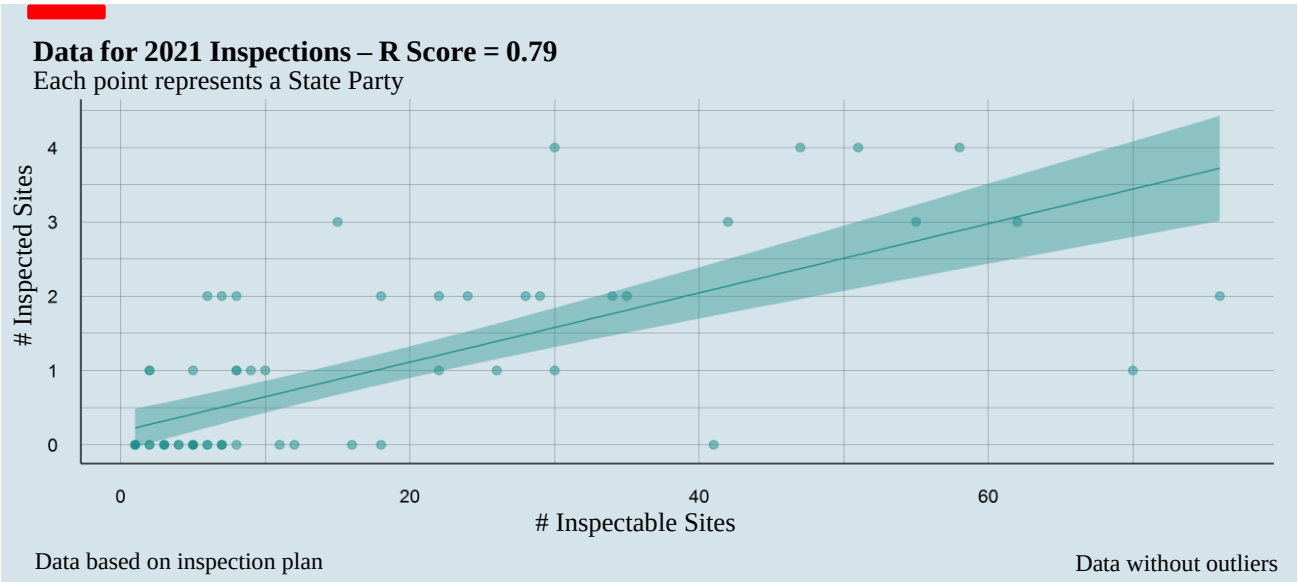
3 This issue was discussed with States Parties at the 4 October 2021 meeting of the Industry Cluster. The corresponding Secretariat non-paper entitled "OPCW Considerations on the Number of States Parties with Uninspected OCPF Plant Sites" is available on the Catalyst portal.

11. 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 4 for the period from 2019 to 2021, across all pools. To prevent a skewed display, statistical outliers (inspectable plant sites) have not been considered in the data set below. The data on the number of OCPF plant sites in each State Party is based on the information declared by States Parties. In 2020, as in 2019, the Secretariat planned 169 OCPF inspections and in 2021, 162 OCPF inspections.

FIGURE 4: NUMBER OF OCPF INSPECTIONS PER STATE PARTY AGAINST THE TOTAL NUMBER OF INSPECTABLE OCPF PLANT SITES (2019 – 2021)







12. 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 4 above. The correlation coefficient (R),[4] which measures the strength of the relationship between the two variables, is also displayed for each year.

13. 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 5 below with the 2021 chart in Figure 4 above. There is a stronger positive correlation (higher R value) in Figure 5 (selected plant sites) than in Figure 4 (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 which varied within a limited range. For instance, States Parties declaring between 105 and 160 plant sites were scheduled to receive between five and 10 inspections in 2021. This fact is represented in Figure 6 below.

4 Based on entire data set, i.e., includes outliers.

FIGURE 5: NUMBER OF SELECTED OCPF PLANT SITES PER STATE PARTY AGAINST THE TOTAL NUMBER OF INSPECTABLE OCPF PLANT SITES (2021)

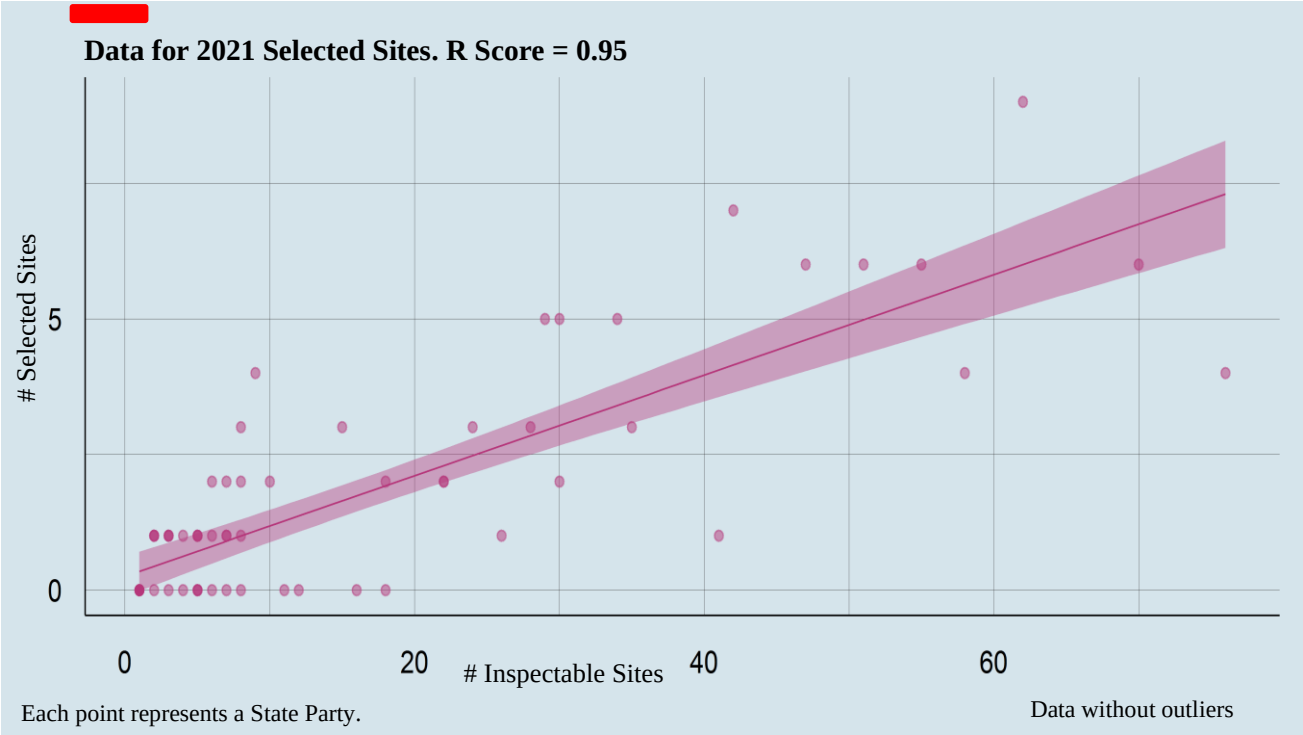
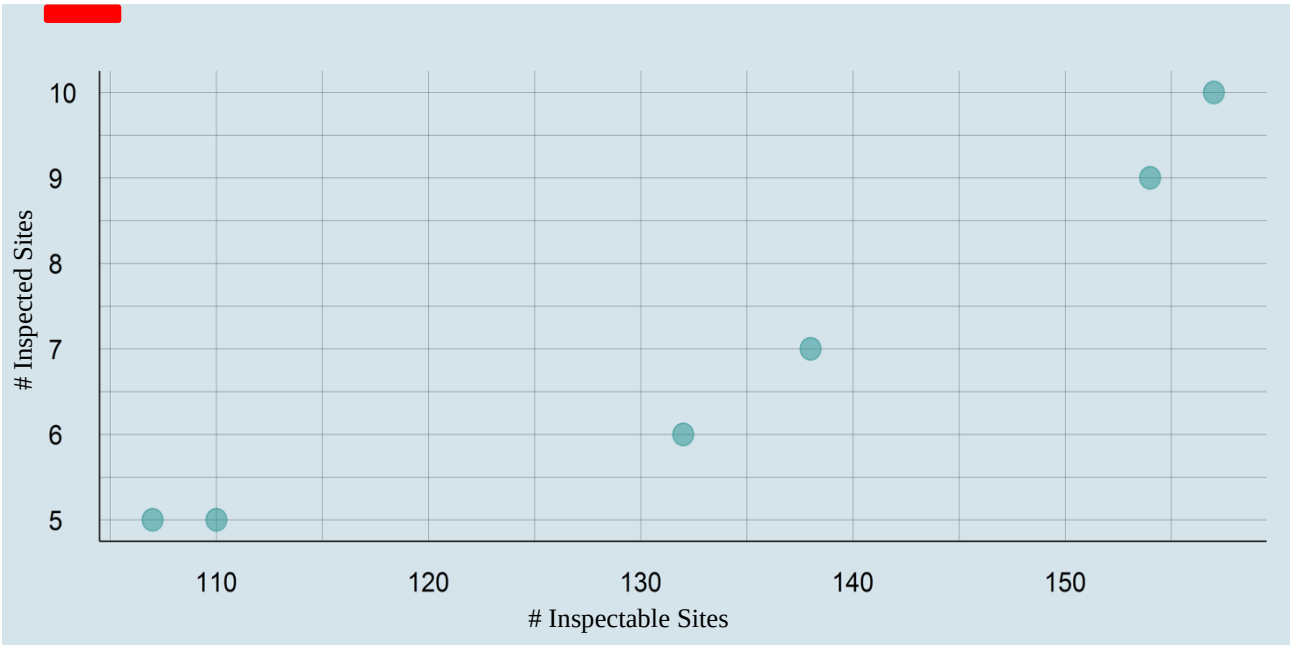


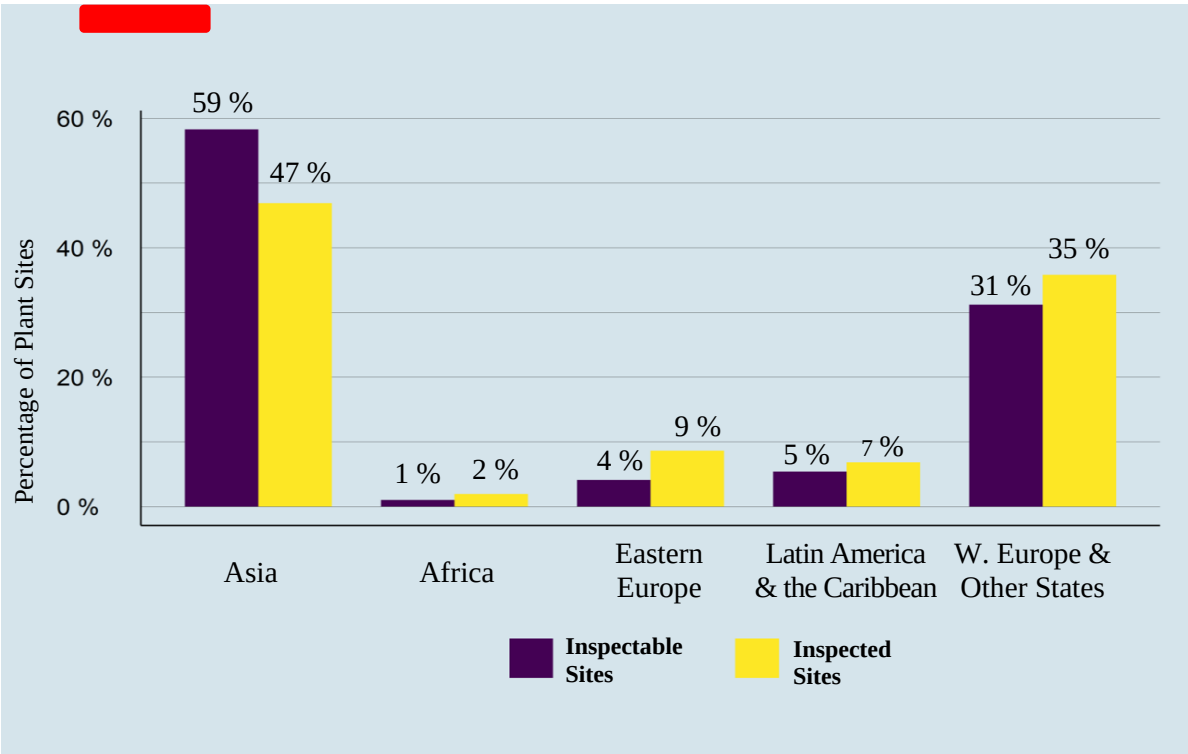
FIGURE 6: NUMBER OF OCPF INSPECTIONS PER STATE PARTY AGAINST THE NUMBER OF INSPECTABLE OCPF PLANT SITES (2021 – EXPANDED VIEW)



Geographical distribution of OCPF plant sites and inspections in 2021

14. The geographical distribution of plant sites and inspections among regional groups is shown in Figure 7 below. The chart shows the share of inspectable plant sites in each regional group in 2020, based on the information declared by States Parties as at 28 October 2020, when the plant site selection was performed. The same chart also shows the share of inspections in 2021 in each regional group, out of a total of 162 inspections in the complete inspection plan of 2021.

FIGURE 7: COMPARISON OF THE REGIONAL DISTRIBUTION OF OCPF PLANT SITES AND INSPECTIONS (BASED ON THE INFORMATION DECLARED BY STATES PARTIES AS AT 28 OCTOBER 2020)



15. By comparing the two distributions, the following conclusions can be drawn:

(a) 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 were scheduled to receive a larger proportion of inspections in 2021.

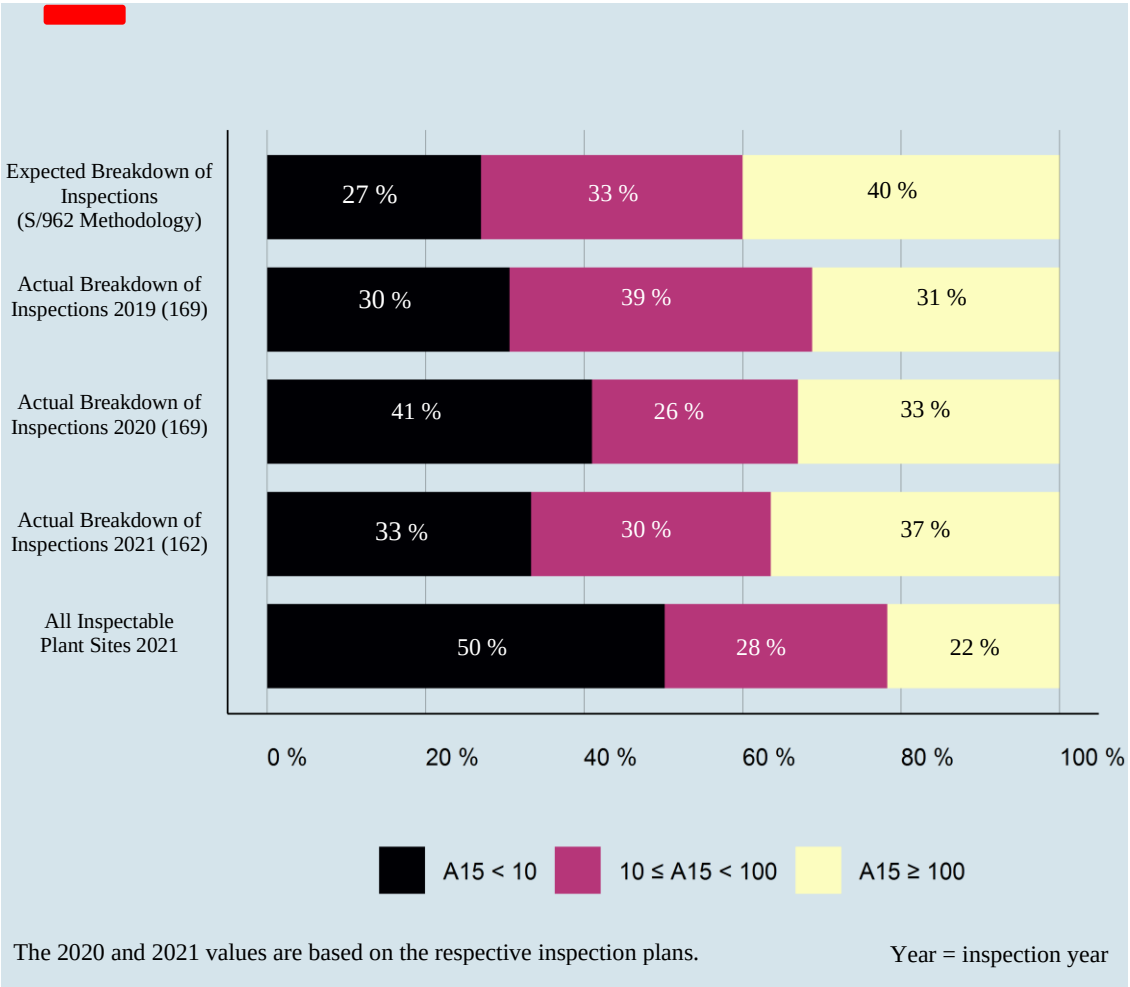
(b) The vast majority of inspectable plant sites (about 90%) were declared by States Parties belonging to the Asian Group and to the Western Europe and Other States Group. Accordingly, States Parties located in these two regional groups received most of the total OCPF inspections planned for 2021 (about 82%).

(c) 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 2021 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

16. The distribution of plant sites according to relevance is shown in Figure 8 below, which describes the share of inspected OCPF plant sites each year from 2019 to 2021 in each of the low- (A15 < 10), medium- (≤10 A15 < 100), and high-relevance (A15 ≥ 100) groups according to the A15 values for those years, as well as the breakdown of all inspectable sites in the pool for 2021 inspections according to the same criteria. The breakdown is shown according to the value of the A15, both in terms of the expected distribution[5] according to the respective methodology, and the actual selection of sites for inspection in each period.

FIGURE 8: RELATIVE SHARE OF INSPECTIONS ACCORDING TO THE RELEVANCE OF OCPF PLANT SITES



5 The expected distribution is generated based on the results of the simulation runs of the algorithm using 2017 declaration data.

17. The evolution of the distribution over time and the characteristics of the pool of inspectable sites lead to the following observations:

(a) The S/962 methodology resulted in the selection of relatively more OCPFs with low A15 values (i.e. lower relevance).

(b) The S/962 methodology resulted in the selection of relatively fewer OCPFs with higher A15 values (i.e. higher relevance).

(c) Concerning the distribution of all inspectable plant sites for 2021 inspections, the S/962 methodology targets the higher relevance sites; even though such sites constitute only 22% of all inspectable plant sites, 37% of the inspections were planned at the higher relevance sites. While Figure 8 depicts the distribution across all OCPF pools, it is worth reiterating that within each 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 2 below, which shows two A15 data distributions for Pool A (from which roughly 70% of all inspections are carried out).

TABLE 2: A15 DATA DISTRIBUTION FOR POOL A (2021)

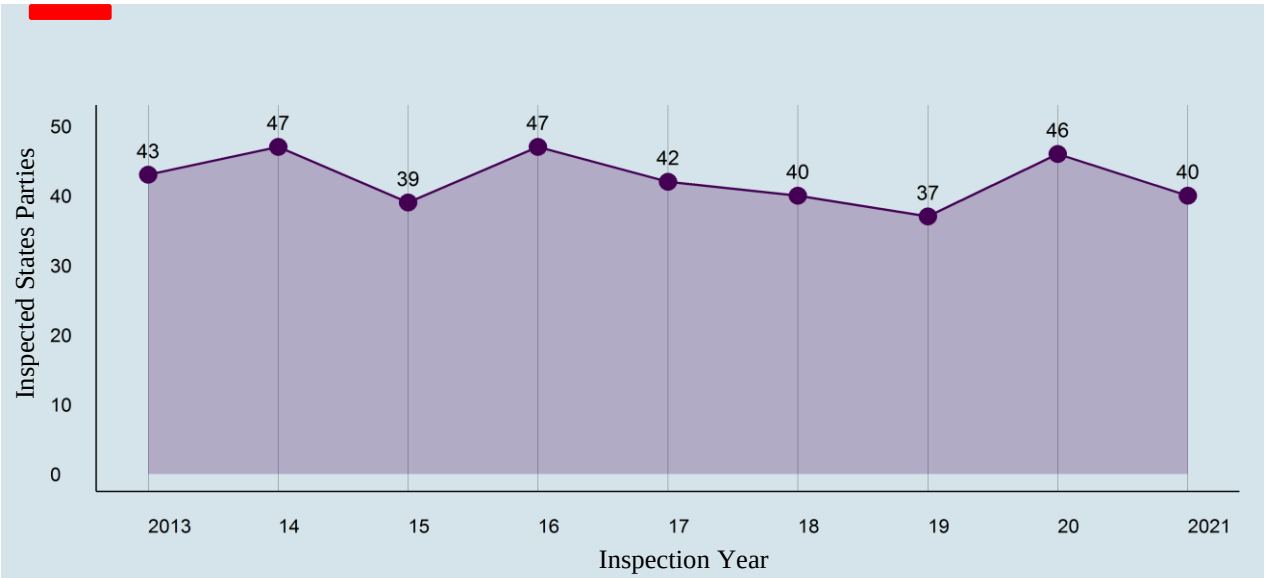
Pool	A15 <10	≤10 A15 < 100	A15 ≥ 100
Pool A (Inspectable)	14 %	52 %	34 %
Pool A (Inspected)	24 %	38 %	38 %

Number of States Parties selected to receive inspections

18. The number of States Parties selected for OCPF inspection can be compared over time. Figure 9 below shows the total number of States Parties inspected each year from 2013 to 2021. Between 2016 and 2019, the number of States Parties receiving inspections shows a steady decrease. However, the changes applied to the methodology in 2019[6] have had a positive impact on this number; the number of States Parties with inspections planned in 2020 increased to 46, resulting in a positive impact on the objective for a balanced geographical distribution of inspections.

6 https://c.connectedviews.com/assets/878981bf-42ee-4b61-bf7c-cfc9bb9be901.pdf.

FIGURE 9: NUMBER OF STATES PARTIES SELECTED TO RECEIVE OCPF INSPECTIONS

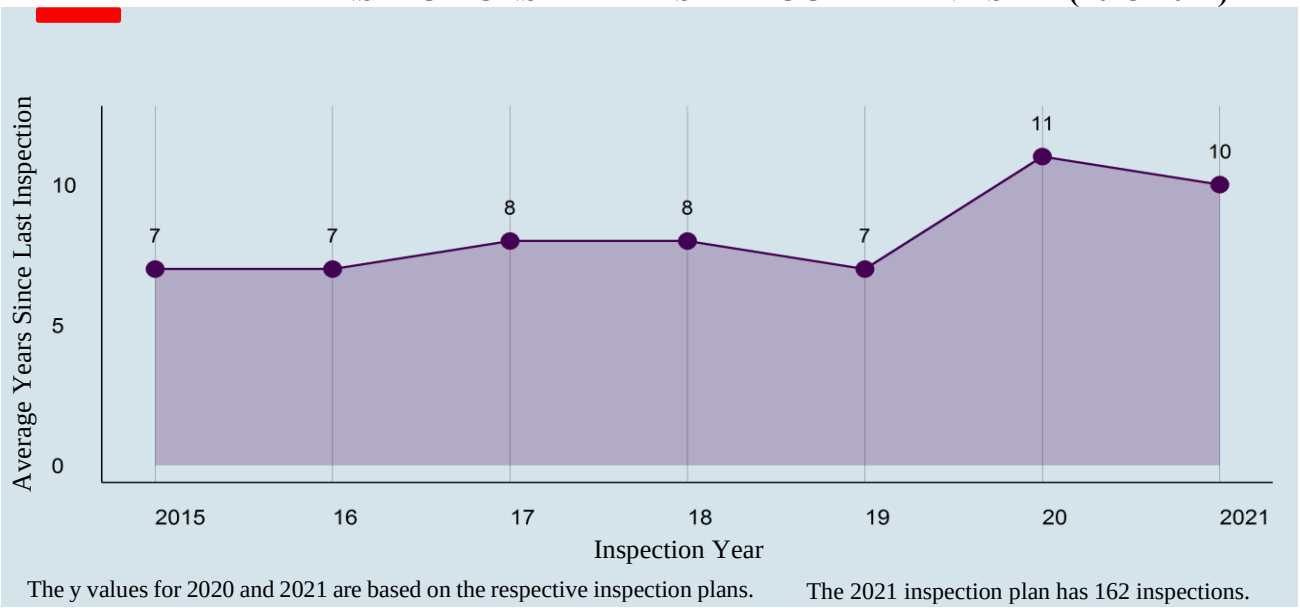


The y values for 2020 and 2021 are based on the respective inspection plans. The 2021 inspection plan has 162 inspections.

Average number of years since last inspection

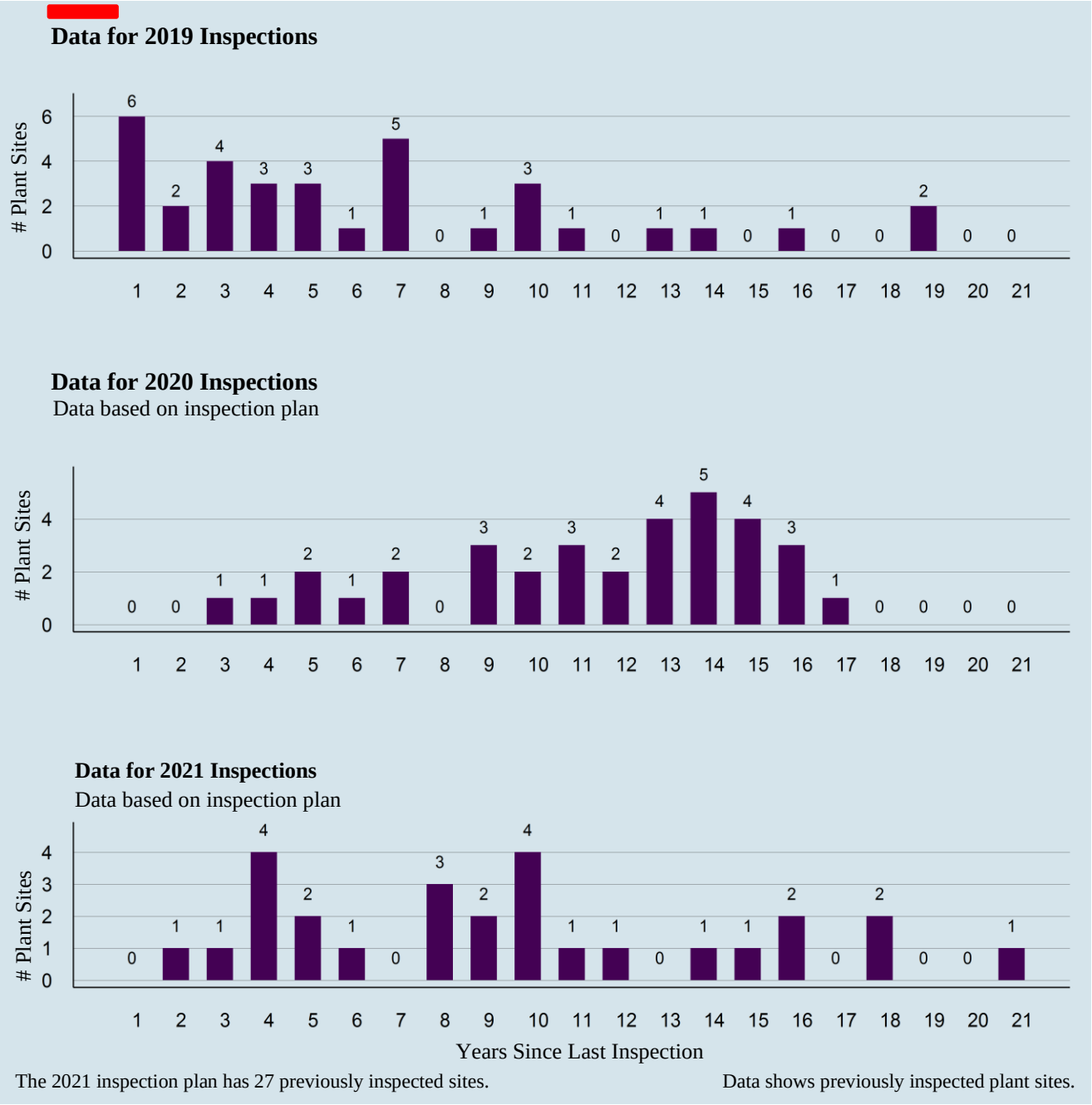
19. Concerns by some States Parties have been raised in the Industry Cluster about the frequency of subsequent inspections at a number of declared plant sites. To address this concern, the changes applied to the methodology in 2019 further reduce (but do not completely eliminate) the chances of a recently inspected plant site from being selected again in short succession. Figure 10 below shows the average number of years since the last inspection of all sites receiving subsequent inspections between 2015 and 2021. The average is significantly higher in 2020 and 2021, after changes were made to the methodology. Along similar lines, Figure 11 below shows the distribution of years since the last inspection for each of the 34 plant sites receiving subsequent inspections between 2019 and 2020, and 27 plant sites receiving subsequent inspections in 2021.

FIGURE 10: AVERAGE NUMBER OF YEARS BETWEEN SUBSEQUENT INSPECTIONS AT THE SAME OCPF PLANT SITE (2015-2021)



The y values for 2020 and 2021 are based on the respective inspection plans. The 2021 inspection plan has 162 inspections.

FIGURE 11: NUMBER OF YEARS BETWEEN SUBSEQUENT OCPF INSPECTIONS (2019-2021)



The 2021 inspection plan has 27 previously inspected sites. Data shows previously inspected plant sites.

CONCLUSIONS

20. The analysis of the results from the PSS process to select OCPF plant sites for inspection in 2021 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 2021 are as follows:

(a) In general, in 2021 the S/962 methodology achieved the objectives of the EC-66/DEC.10 guideline regarding 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. There were 40 States Parties that

were selected to receive at least one OCPF inspection, and an additional four States Parties that were planned to receive only Schedule 1, Schedule 2, or Schedule 3 inspections. Furthermore, there were 79 States Parties with at least one inspectable Article VI facility. Thus, this total of 44 States Parties represents 56% (44/79) of States Parties with inspectable facilities declared under Article VI.

(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 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.

(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 plant sites, 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 a 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 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.

21. In conclusion, the S/962 methodology 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. The Secretariat will continue to monitor this performance and recommend any adjustments that might become necessary in the future.

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