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Agenda item 4: Progress achieved regarding implementation of the Programme of Work 2020-2021 related to Land-Based Pollution and Governance Themes

Results of 2019 and 2020 Proficiency Tests on the Determination of Trace Elements and Organic Contaminants in Sediment and Biota Samples along with the Results of related Training Courses

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UNEP/MAP
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List of Abbreviations / Acronyms

CORMON	Correspondence Group on Monitoring
DQA	Data Quality Assurance
IAEA	International Atomic Energy Agency
ILC	Interlaboratory Comparison
ILRM	International Laboratory of Marine Radioactivity
IMAP	Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria
MAP	Mediterranean Action Plan
MED POL	Programme for the Assessment and Control of Marine Pollution in the Mediterranean Sea
MESL	Marine Environment Studies Laboratory of the IAEA Environmental
OCs	Organochlorine pesticides
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated Biphenyls
PT	Proficiency Test
QA/QC	Quality Assurance/Quality Control
TC	Training Course
TE	Trace Elements
UN	United Nations

1 Introduction

1. Reliable and good quality environmental monitoring can only be achieved if laboratories producing the data have the capacity to do so. This capacity not only includes the availability of suitable equipment, but also the appropriate training of staff and a Data Quality Assurance (DQA) programme. The UNEP/MAP - MED POL monitoring programme, in collaboration with the IAEA Marine Environment Studies Laboratory (MESL), continue to assist the Contracting Parties of Barcelona Convention enhance the capacities of the Mediterranean laboratories to implement trace elements and organic contaminants monitoring programmes for IMAP Common Indicator 17.
2. This document provides an overview of the outcomes of the following activities undertaken in 2019 and 2020 to implement comprehensive and interactive strategy for the quality assurance and quality control related to IMAP Common Indicator 17:
 - a) Organization of the trace elements and organic Proficiency tests (PTs);
 - b) Preparation of the good laboratory practice (GLP) training courses;
 - c) Organization of the expert missions to laboratories in special need to support strengthening of their capacities.

2 Proficiency Tests (PT)

3. The meeting of CorMon on Pollution Monitoring (2-3 April 2019, Podgorica, Montenegro), considered results of the last 10 years PTs. While results, based on the z-score^{1,2} of trace element PT's improved significantly over the period by approx. 2% every year therefore resulting in 88% acceptable results in 2018's PT, the overall results of organic contaminants PT's did not improve significantly. While these results are discouraging, giving the effort that is put into overcoming this gap, it should be noted that in many countries different laboratories were nominated each year to participate in the annual PTs. This makes it very difficult to build capacity of specific laboratories over time, but it also makes the evaluation of the effectiveness of the efforts very difficult.
4. Another point of concern raised during Meeting of CorMon on Pollution Monitoring held in 2019 was the rather low participation of designated laboratories that were sent samples in order to undertake proficiency testing. In the last two years MEDPOL, with the help of MESL, has improved efficiency of the procedure for sending and receiving of PT samples, so that no-shows could not be blamed on samples actually not getting delivered, or laboratories being unaware of their nomination to participate. Every step is now being followed up by direct communication with the contact person of the participating in the PT laboratory.
5. Below in this chapter the results of 2019 and 2020 PTs for TE and organic contaminant are summarized. The full 2019 PT reports, along with detailed National Reports, have already been shared with respective MEDPOL Focal Points. The National Report provides an overview of the key results of the PTs. They have been prepared to provide details of the performance of the laboratories regarding their participation in proficiency testing in line with the conclusions of the Meeting of the CorMon on Pollution Monitoring held in 2019 in Podgorica. The national reports included the codes assigned to each of the participating laboratories, whilst MEDPOL Focal Points have been asked to treat the codes of the laboratories as confidential information and not share any information related to

¹ Quality of participants PT data is categorized in z- and zeta-scores according ISO135282. The z-score represents a simple method of giving each reported data a normalized performance score; it can also be used to verify the performance of individual or country's laboratories. $z = \frac{x_{lab} - x_{ass}}{\sigma_p}$, with x_{lab} is the measurement result reported by the participant, x_{ass} is the assigned value and σ_p is the target standard deviation or standard deviation for proficiency assessment. The target standard deviation is 12.5% from the assigned value. It is noted that for organic contaminants, target standard deviation has only been set to 12.5% from 2013 on. Z-scores are deemed satisfactory/acceptable if $|z| \leq 2$, questionable for $2 < |z| < 3$, and unsatisfactory/outlying for $|z| \geq 3$. Zeta score shows if the participant's result agrees with the assigned value within the respective uncertainties. The denominator of equation is the combined uncertainty of the assigned value and the measurement uncertainty reported by the participant. $zeta = \frac{x_{lab} - x_{ass}}{\sqrt{u_{lab}^2 + u_{ass}^2}}$; The full definition of z-, and zeta-scores and quality evaluation of

results is given in full PT reports found in UNEP/MED WG.492/Inf.3-6

² INTERNATIONAL ORGANISATION FOR STANDARDISATION, Guide 13528 (2005), Statistical Methods for Use in Proficiency Testing by Interlaboratory Comparisons, ISO, Geneva, Switzerland.

a specific laboratory which participated in the PT exercise in part or whole with other laboratories. Furthermore, the individual evaluation reports have been shared by MESL with each specific laboratory that participated in 2019 PT. The full 2019 and 2020 PTs are provided in information documents UNEP/MED WG.492/Inf.3-6, whilst all individual evaluation reports have already been shared with the laboratories. The National Reports for all 2020/2021 activities, including the 2020 PTs will be prepared for submission to respective MEDPOL Focal Points respectively to designated IMAP laboratories in November 2021.

6. In the process of the PT participating laboratories get assigned a code, which enables them to link back results to their laboratory. This coding of laboratories warrants that laboratories maintain anonymous towards other laboratories receiving the report. This is one of the key requirements for conducting a PT. However, during Meeting of CorMon on Pollution Monitoring held in 2019 in Podgorica, the Parties decided that the identity of laboratories should be made available to national MEDPOL Focal Points in order to better assess the quality of their designated laboratories. Therefore, since the 2019 PT organized by MESL, the participating laboratories are informed in the information letter they receive with the sample that the lab code will be shared with their National Focal Point. In case they oppose they are requested to notify MESL and decline the participation in the PT organized specifically for MEDPOL. None of the laboratories designated for the 2019 and 2020 PT have so far declined the participation for that reason. However, it should be noted that national MEDPOL Focal Points have also been requested from MEDPOL to not share information from one national lab to the other as this is against the rules of the PT organized by MESL.

7. Laboratory codes are defined for every PT, starting from 1. Therefore, the same laboratory may have a different numerical code in different years, or for TE-PT and OC-PT during same annual cycle. The codes can be requested from the MEDPOL by national MEDPOL Focal Points for their country's laboratories.

2.1. Trace Element Proficiency Tests (TE-PT)

8. Designated national laboratories participating in the TE-PT receive together with the sample a clear instruction on how to proceed with the PT sample and how to report results. They are requested to use their established analytical methods for the determination of total contents of the mandatory elements: Cd, Hg and Pb in the sample sent to them. In addition, the laboratories can also report some additional analytes, for which mass concentrations have been assigned by MESL, e.g. As, Co, Cr, Cu, Fe, MeHg, Mn, Ni and Zn depending on the material sent. The laboratories are requested to apply procedures of quality control and laboratory quality assurance are recommended to be applied. The results of the analyses of a matrix matching quality control (QC) sample must be reported together with the results from the PT sample. A questionnaire requesting important information necessary to evaluate the capacity in the laboratory is sent along with each PT. Below the evaluation of TE-PT 2019 and TE-PT 2020 are given.

2.1.1. 2019 Trace Element Proficiency Test (2019 TE-PT)

9. The sample for 2019 Trace Element Proficiency Test (TE-PT) was a sediment matrix. From 19 laboratories designated from 17 Parties that were sent the PT samples, 14 returned results, which is 74% of total number of participating laboratories, and compared to previous years an average turnout. The full TE-PT 2019 report is found in UNEP/MED WG.492/Inf.3. Below a summary of most important results is given.

10. Five out of all 14 designated and participating laboratories reported all satisfactory results (z-score <2), not only for the IMAP mandatory elements, Cd, Hg, Pb and Al required for sediment monitoring, but also for the other elements that could be reported from the Parties on voluntary basis (Cr, V, As, Fe, Cu, Mn and Zn). One other laboratory (# 18) had all results reported with a z-score < 3, still being acceptable, however 23% of those results were above the threshold of being satisfactory z-score < 2. Three laboratories had satisfactory results for more than 80% of all elements, however the other results were unsatisfactory, i.e. z-score > 3. For the rest of the laboratories, results were unsatisfactory for more than 20% of the elements. The results are provided in Figure 1a.

11. Looking at the quality of results per element, Hg was reported satisfactory by 82% of all laboratories reporting this element, and the remaining 9% of laboratories reported questionable results (z-score between 2 and 3), and another 9% of laboratories reported unsatisfactory results (z-score > 3). For Pb, 23% of all laboratories reporting this element with unsatisfactory z-score > 3. For Cd, the third priority element, the number of unsatisfactory results was even higher, with 31% of laboratories that reported unsatisfactory results. Al, which for normalization reasons also should be analyzed in sediment samples, only 62% of laboratories returned satisfactory results, with the remaining being unacceptable. The results, including those for the other, non-priority elements that could be reported from Parties on voluntary basis, can be seen below in Figure 1b.

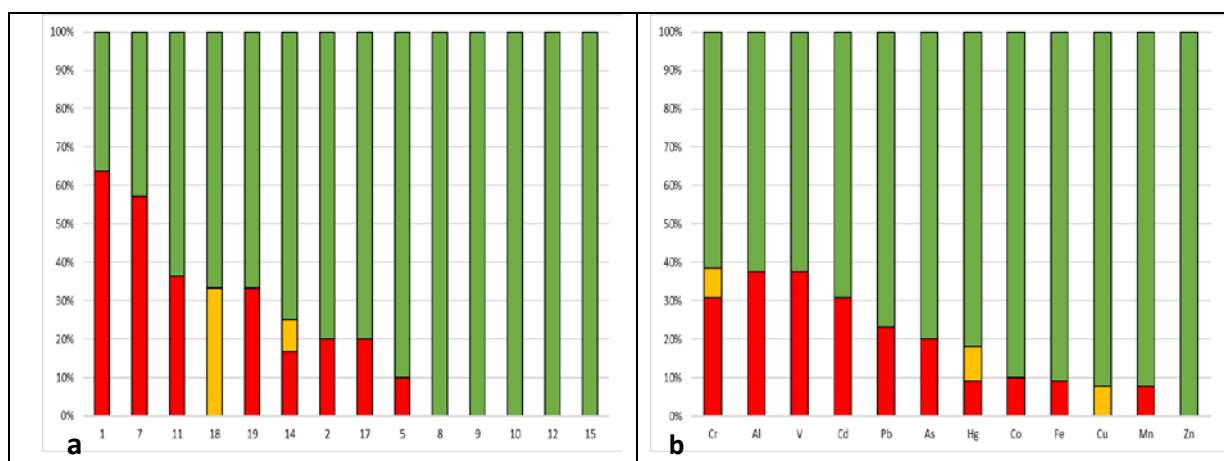


Figure 1: Evaluation of results from 2019 Trace Element MEDPOL/IAEA-MESL Proficiency Test. Quality of reported results per laboratory (a) and per element (b). $|z| \geq 3$ = unsatisfactory/outlying, $2 < |z| < 3$ = questionable, $|z| \leq 2$ = satisfactory.

12. As part of the requirements to report results for this TE-PT, participating laboratories were requested to reply to questions on analytical methods used and quality assurance measures taken to assure the traceability of their results. Of the 14 laboratories returning results to this PT, 4 laboratories did not report any of the requested additional information. Nine laboratories claimed to be accredited, however 4 of them did not report measurement uncertainties, which should be part of a result provided by an accredited laboratory. Nine laboratories applied preliminary validated methods, while 11 laboratories declared to have quality system in place. Although nine laboratories declare to be accredited, only 2 of them are accredited for the analytes and matrix of this PT. Two laboratories did not explain how they have assured the traceability of obtained results.

2.1.2. 2020 Trace Element Proficiency Test (2020 TE-PT)

13. The sample for 2020 Trace Element Proficiency Test was a fish matrix. From 17 laboratories, which were sent the PT samples, 15 returned results, which is 88% of total number of laboratories designated by the Parties. Compared to previous years and given the unprecedented situation in 2020 caused by major restrictions due to the Covid pandemic, this is a very good turnout. The full TE-PT 2020 report is found in UNEP/MED WG.492/Inf.5 Below a summary of most important results is given.

14. Eight out of 15 laboratories reported all satisfactory results, not only for IMAP mandatory elements, Cd, Hg and Pb, but also for the other elements that could be reported from the Parties on voluntary basis (Ni, Co, As, Cu, Fe, Zn, and Mn). A further four had less than 20% results that were above the threshold of being satisfactory. Three laboratories returned less than 33% of results being acceptable, of which one only had 33% of results within the acceptable range. The results are provided in Figure 2a.

15. Looking at the quality of results per element, Hg was reported with satisfactory quality by 92% of all laboratories reporting this element, and the remaining 10% of laboratories reported questionable results. For Cd, 85% of all laboratories reporting this element returned satisfactory results, however, the other 15% of laboratories' results were unsatisfactory. For Pb, the third priority element, the

number of unsatisfactory results was even higher with 27% of all laboratories that reported this element. The results, including those for the other, non-priority elements that could be reported from Parties on voluntary basis, can be seen below in Figure 2b.

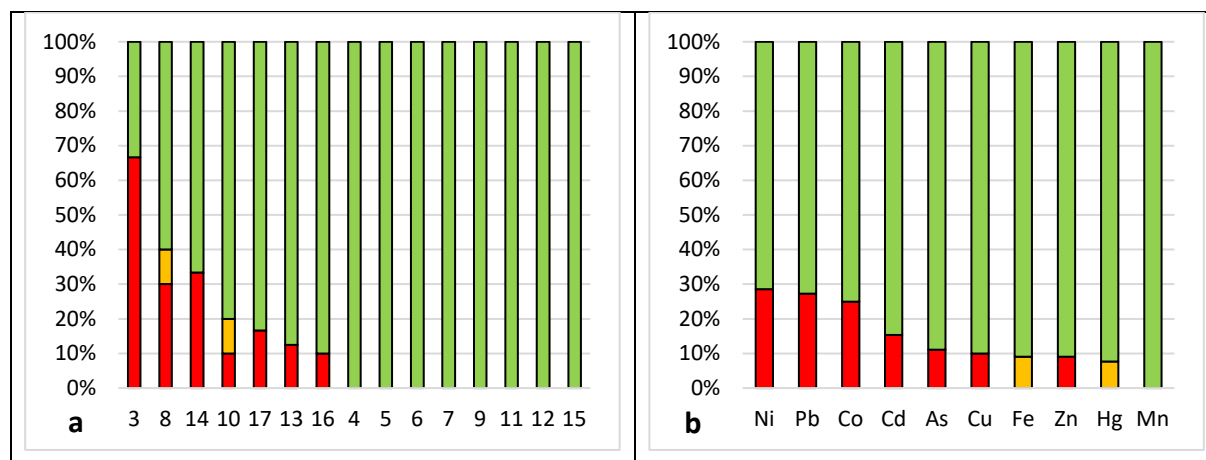


Figure 2: Evaluation of results from 2020 Trace Element MEDPOL/IAEA-MESL Proficiency Test. Quality of reported results per laboratory (a) and per element (b). $|z| \geq 3$ = unsatisfactory/outlying, $|z| < 3$ = questionable, $|z| \leq 2$ = satisfactory.

16. As part of the requirements to report results for this PT-TE, participating laboratories were requested to reply to questions on analytical methods used and quality assurance measures taken to assure the traceability of their results. Two laboratories did not report any information. The evaluation of the information provided by the remaining 13 laboratories showed that seven of them claimed to be accredited, however 2 of them did not report measurement uncertainties and did not claim using validated methods, which should be part of a result provided by an accredited laboratory. Ten laboratories applied preliminary validated methods, and 10 laboratories declared to have a quality system in place. Although 7 laboratories declared to be accredited, 2 of them are not accredited for biological matrix, and 1 is accredited only for Hg. Four laboratories did not explain how they have assured the traceability of obtained results.

2.2. Organic Contaminants Proficiency Tests (OC-PT)

17. Designated national laboratories participating in the OC-PT receive together with the sample a clear instruction on how to proceed with the PT sample and how to report results. They are requested to use their established analytical methods for the determination of total contents of the mandatory organic contaminants within the organochlorine (OC) pesticides, polychlorinated biphenyl (PCBs) and polycyclic aromatic hydrocarbons (PAHs), considering the IMAP requirements. The laboratories are requested to apply procedures of quality control and laboratory quality assurance are recommended to be applied. The results of the analyses of a matrix matching quality control (QC) sample must be reported together with the results from the PT sample. A questionnaire requesting important information necessary to evaluate the capacity in the laboratory is sent along with each PT. Below the evaluation of OC-PT 2019 and OC-PT 2020 are given.

2.2.1. 2019 Organic Contaminants Proficiency Test (2019 OC-PT)

18. The sample for 2019 Organic Contaminant Proficiency Testing was a sediment sample. Contaminants were requested to be analyzed and reported for the following contaminant classes: organochlorine (OC) pesticides, polychlorinated biphenyl (PCBs) and polycyclic aromatic hydrocarbons (PAHs). Fourteen laboratories representing 88% of total number (i.e. 16) of the laboratories that received the PT samples, reported results, which is compared to previous years a very good return. Seven laboratories reported results for both OC pesticides, PCB congeners and PAHs; five laboratories reported results only for OC pesticides and PCB congeners and only eight laboratories submitted results for PAHs, of those one laboratory reported results only for PAHs and no other organic contaminant class. The summarized evaluation of the quality of the results for the 2019

OC-PT can be seen in Figure 3, based on their z-score. The full OC-PT 2019 report is found in UNEP/MED WG.492/Inf.4 Below a summary of most important results is given.

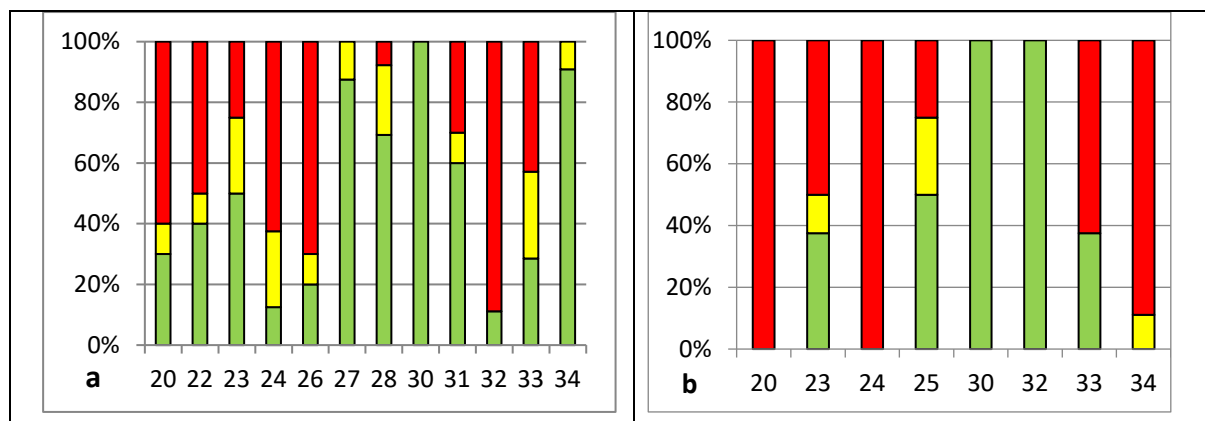


Figure 3: Evaluation of results from 2019 Organic Contaminants MEDPOL/IAEA-MESL Proficiency Test. Z-Scores for OC Pesticides and PCB congeners (a) Z-Scores for PAHs (b). $|z| > 3$ = unsatisfactory/outlying, $2 < |z| < 3$ = questionable, $|z| \leq 2$ = satisfactory.

19. Five laboratories representing 42% of all the laboratories reporting results for organochlorine pesticides and PCB congeners, were able to produce all “satisfactory” or very few “questionable” or outlying results, (i.e. laboratories 27, 28, 30, 31 and 34). Five laboratories (i.e. laboratories 20, 22, 24, 26 and 32), representing 42% of all the laboratories reporting results for organochlorine pesticides and PCB congeners, reported a high percentage of outlying or questionable results.

2.2.2. 2020 Organic Contaminants Proficiency Test (2020 OC-PT)

20. The for 2020 Organic Contaminants Proficiency Test was a sediment matrix. Twelve laboratories representing 80% of total number of laboratories (i.e. 15) that received the PT samples reported results. Six laboratories reported results for both OC pesticides, PCB congeners and PAHs; four laboratories reported results only for organochlorine pesticides and PCB congeners and two laboratory reported results only for PAHs. The full OC-PT 2019 report is found in UNEP/MED WG.492/Inf. 6. Below a summary of most important results is given.

21. The evaluation of the quality of the results for the 2020 OC-PT can be seen in Figure 4, based on their z-score.

22. Five laboratories, representing 50% of all the laboratories reporting results for OC pesticides and PCB congeners performed well and reported more than 80% of results mainly fully satisfactory (z score < 2) or questionable (z score between 2 and 3), i.e. laboratories 1, 3, 9, 10 and 14. Four laboratories (i.e. laboratories 4, 6, 11 and 13), representing 40% of laboratories reporting OC pesticides and PCB congeners, exhibited a high percentage of outlying or questionable results. Three laboratories (i.e. laboratories 4, 11 and 13) reported some results which differed by one order of magnitude from the assigned value. This may be due to a “reporting” mistake, e.g. wrong unit conversion or wrong dataset reported or due to more severe analytical issues which would require immediate root cause analysis and consequent corrective actions.

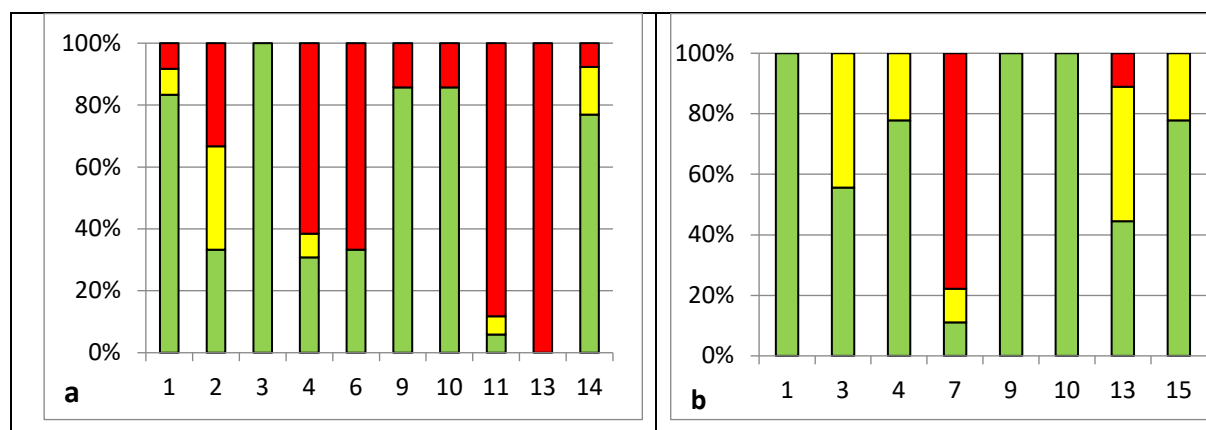


Figure 4: Evaluation of results from 2020 Organic Contaminants MEDPOL/IAEA-MESL Proficiency Test. z-scores for Organochlorinated Pesticides and PCB congeners (a), z-scores for PAHs (b).

$|z| > 3$ = unsatisfactory/outlying, $2 < |z| < 3$ = questionable, $|z| \leq 2$ = satisfactory.

23. Five laboratories, representing 50% of all the laboratories reporting results for OC pesticides and PCB congeners performed well and reported more than 80% of results mainly fully satisfactory (z score < 2) or questionable (z score between 2 and 3), i.e. laboratories 1, 3, 9, 10 and 14. Four laboratories (i.e. laboratories 4, 6, 11 and 13), representing 40% of laboratories reporting OC pesticides and PCB congeners, exhibited a high percentage of outlying or questionable results. Three laboratories (i.e. laboratories 4, 11 and 13) reported some results which differed by one order of magnitude from the assigned value. This may be due to a “reporting” mistake, e.g. wrong unit conversion or wrong dataset reported or due to more severe analytical issues which would require immediate root cause analysis and consequent corrective actions.

24. Five laboratories, representing 63% of all eight laboratories reporting results for PAHs reported all or most satisfactory results. Although, one laboratory (i.e. laboratory 7) reported almost all outlying or questionable results it should be noted that this year results for PAHs were considerably better than in 2019 (see 2.2.1) and earlier years (see UNEP_MED WG.463/7).

25. In general, best performing laboratories reported to have a quality system in place, to use internal standards/surrogates and validated methods and in some cases to be accredited.

2.3. Summary of Proficiency performances in 2019 and 2020

26. The use of reference materials and replicate analysis of the samples are key points in every QA/QC system to produce accurate results. PT exercises to test and demonstrate laboratory performances is required by ISO Guide 17025 and must be part of each analytical laboratory providing IMAP monitoring data. Reference materials must match the test sample matrix and must undergo the same exact procedure of the test sample to be as effective as possible to avoid inaccuracy and precision issues. However, still some participants are not consistent in providing requested information together with the PT results. Most of the laboratories, although using certified reference materials, failed to report their QA/QC data along with the test sample. This makes it impossible to get a better understanding where problems might be. Designated laboratories should be aware of importance of complying with all requirements of the PT in order to make the most of this opportunity being offered free of charge for the laboratories.

27. Although the participation to the annual proficiency test organized by MED POL in collaboration with MESL is mandatory for IMAP competent laboratories, over the years, the participation rate had been quite low, especially for OC-PTs, and only intensive communication during every step of the PT organization has made it possible to improve the participation over the last two years. The participation in TE-PTs are steady.

28. Still, many laboratories do not report results for all mandatory contaminants. This holds specifically for organochlorinated pesticides (OC) and PCB congeners. It should be reminded that the proficiency testing organized for trace elements and organic contaminants is considered mandatory for

monitoring of IMAP Common Indicator 17; therefore, all IMAP competent laboratories should be able to measure them.

3 Good Laboratory Practice Training Courses (TC)

29. Since 1986 sixty-two Training Courses on the analysis of trace elements and organic pollutants in marine samples were organized, with more than 360 analytical laboratory practitioners having been trained in the MESL's laboratories. Statistics on the last decade's training courses were presented during the Meeting of CorMon on Pollution Monitoring held in 2019 (see UNEP_MED WG.463/7).

30. The courses are aimed at laboratory practitioners that are actively involved in the analysis of marine samples within realization of MEDPOL IV monitoring programme. In line with the conclusions of the Meeting of CorMon on Pollution Monitoring held in 2019, the candidates for the 2021 Training Courses will need to be nominated from the staff members of the national laboratories that were designated for participation in 2020 Proficiency Tests. Only one candidate per Training Course can be nominated. If there is more than one IMAP laboratory responsible for implementation of IMAP Common Indicator 17, their participation at rotating principle is recommended; however, ensuring representation from the same laboratory at Proficiency Testing and Training Courses in the biennial cycle.

31. In 2019 the IAEA MESL in collaboration with UNEP/MAP – MED POL organized two training courses on good laboratory practice for the sampling, sample preparation and analysis of trace elements and the organic contaminants, using different instrumental techniques.

32. In 2019 Training Course much care was put on the selection criteria, in order to have participants and their laboratories benefit as much as possible from the training. The following criteria were observed: i) employment and employers relation to monitoring of IMAP Common Indicator 17; ii) education and work experience of relevance for monitoring of IMAP Common Indicator 17 and iii) English proficiency; iv) optimal geographical distribution and v) overall merit of the nominees and repetitive nomination.

33. The candidates for the 2021 Training Courses will be nominated by following further improved criteria in line with the recommendation of the Meeting of CorMon on Pollution Monitoring held in 2019. The nominated candidates have to be able to i) apply knowledge that is expected to be built during 2021 Training Courses, in their regular work related to sampling and assessment; ii) ensure use and maintenance of analytical equipment, selection of the appropriate reference materials and iii) provide the quality assurance of monitoring data that will be produced by their respective national laboratories participating in monitoring of IMAP Common Indicator 17. The candidates cannot be selected among those participants who participated in the same course before.

34. Six participants from Albania, Bosnia & Herzegovina, Croatia, Lebanon, Morocco and Tunisia were selected for participation in 2019 Training Course for Organic Contaminants, whilst five participants from Albania, Bosnia & Herzegovina, Croatia, Morocco and Turkey were selected for participation in 2019 Training Course for TEs. One nominee from Syria did not receive his visa in time and the runner up from Montenegro was unable to accept the nomination on the short notice of only 2 weeks.

35. The content and full evaluation of 2019 Training Courses for Organic Contaminants and Trace Elements can be found in information documents UNEP/MED WG.492/Inf. 7-8

36. The courses comprise lectures on recommended methodology for sampling, sample preparation and analysis for monitoring of IMAP Common Indicator 17, as well as for data evaluation. The lectures are supported by practical components showcased during the sampling field trips and in the chemical and computer laboratories. Special focus is given to QA/QC procedures necessary and recommended by ISO guide 17025³. By the end of the courses participants should be aware of good laboratory practice necessary to produce reliable monitoring results for the respective contaminants. This includes the correct choice of certified reference material, use of verified methodology, reporting

³ INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, ISO/IEC 17025:2017. General requirements for the competence of testing and calibration laboratories, Geneva, (2017)

of measurement uncertainties and other measures to assure the quality of the produced data. Both 2019 training courses went satisfactory and the reports have been submitted and were revised by MESL.

37. The 2021 Training Courses are foreseen to take place from 4-15 October 2021 in the IAEA Marine Studies Laboratories in Monaco, subject to the possibility of travel organization due to negative impacts of COVID-19 pandemic. The registration of the candidates and selection of six participants for each training course will be undertaken in period from March to April 2021.

4 Missions to national laboratories, participating in IMAP Pollution Cluster Monitoring Programme

38. As decided during the Meeting of CorMon on Pollution Monitoring held in 2019, the laboratory expert missions were organized in 2019 and took place early 2020 in order to strengthen the capacities of the laboratories that demonstrate difficulties to report good quality monitoring data. The laboratories in need of assistance were proposed by MESL in line with the results of Proficiency Tests organized during previous 3 years, as the PT 2019 was not finalized yet. In collaboration with MEDPOL, Albania, Bosnia and Herzegovina, Morocco and Tunisia were addressed to nominate laboratories that would benefit from a gap-finding expert visit, relying on the expression of national interests during the Meeting of CorMon on Pollution Monitoring held in 2019, as well as considering a need for a balanced regional participation. Consequently, two gap-finding missions were organized to national laboratories participating in national marine environment monitoring programmes within implementation of MEDPOL IV/monitoring of IMAP Common Indicator 17, respectively one laboratory in Albania and another laboratory in Bosnia and Herzegovina.

39. Discussions with the appointed contact persons were initiated in November 2019 to prepare the visits and to make them most efficient. The focus of the gap-finding visits was aimed at the identification of technical (e.g. acquisition of laboratory equipment) and knowledge needs to strengthen the knowledge for applying the analytical methods and good laboratory practices in line with the requirements of IMAP Common Indicator 17.

40. The reports from the two expert missions were provided to national MED POL Focal Points through MEDPOL. Briefly, the laboratories were open for the assistance offered to them and collaborated well. Gaps observed in the laboratories varied between institutions, but also between trace elements and organic contaminants laboratories. For confidentiality reasons, more specific comments are not shared other than with the respective national MED POL Focal Points.

41. It should be noted that in 2020 these expert missions may be prepared through email and virtual meeting discussions and should COVID-19 restrictions allow on-site visits, they will take place in the second half of the year.

42. The Secretariat would like to bring to attention of MEDPOL FPs that there is a need to follow up that designated IMAP/MEDPOL national competent laboratories apply the recommendations provided in the framework of 2019 and 2020 PTs, ensuring that identified gaps are optimally addressed.

Annex I

References

INTERNATIONAL ORGANISATION FOR STANDARDISATION, Guide 13528 (2005), Statistical Methods for Use in Proficiency Testing by Interlaboratory Comparisons, ISO, Geneva, Switzerland.

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, ISO/IEC 17025:2017. General requirements for the competence of testing and calibration laboratories, Geneva, (2017).