



## Worldwide Proficiency Test Exercise Webinar

3-5 December 2024

### Participant Questions

#### Day 1: 3 December 2024

1. “Will the slides be shared with the participants?”
  - a. Yes, presentations will be sent to participants.
  
2. “Regarding the planned training - will there be option to follow remotely via webinar for example?”
  - a. Yes, if training is organized on-line.
  
3. “How can we join the ALMERA network? Our lab (NMISA) has been participating in the IAEA PTS since 2016 and would like to join ALMERA?”
  - a. For more information on ALMERA network, please get in contact with the Radiometrics Laboratory in Monaco. Please get in touch with Iolanda Osvath ([i.osvath@iaea.org](mailto:i.osvath@iaea.org))
  
4. “Was the Pa-234m determined directly by gamma spectrometry or was an equilibrium assumed?”
  - a. The Pa-234m has been determined directly by gamma-ray spectrometry taking into consideration interferences from Ac-228. Also, Th-234 was done with the sample approach considering Th-232. Some of radionuclides are confirmed by alpha spectrometry as well. Also, equilibrium was considered.
  
5. “Do you have the contact details for the Radiometrics Lab in Monaco?”
  - a. Iolanda Osvath ([i.osvath@iaea.org](mailto:i.osvath@iaea.org))
  
6. “Hi, fish samples as well as vegetation samples in the IAEA proficiency test. Is there any future plan to include them?”
  - a. Fish sample was PT sample in 2020, bamboo in 2021. Of course, in the future we plan to have biota and plant-based samples.

7. “Could you provide chemical composition for bauxite, so participants can recalculate the activities with actual values?”
  - a. Bauxite reference material will be released in 2025 and elemental composition will be available in the Certification report, available on-line.
  
8. “Would PT tests on oil and gas samples be in the future as it is a growing sector for radiation decontamination.”
  - a. The suggestion is very good, and we will consider the possibilities.
  
9. “True values for gross alpha and beta results?”
  - a. This topic was discussed was discussed in detail during the Webinar, and recordings will be sent to participants soon.
  
10. “Can u include a training on summing corrections?”
  - a. Training on Advanced gamma-ray spectrometry (including summing corrections) was organized previously. We could consider organizing them again.
  
11. “Any possible if we can have PT solid sample of 500 ml equivalent volume for gamma spec testing?”
  - a. Due to restricted quantity of bulk PT sample material and shipment requirements, this would not be possible.
  
12. “The interference from Ac-228 is very low. I found an IAEA publication from 2007 with the title UPDATE OF X RAY AND GAMMA RAY DECAY DATA STANDARDS FOR DETECTOR CALIBRATION AND OTHER APPLICATIONS with the following text about Pa-234m: The recommended  $P_{\gamma}(1001 \text{ keV})$  of 0.00832(10) is based on a series of extensive measurements in the 1980/1990s. However, three of these studies yielded significantly higher values (by ~10 %, about 0.0091) than the other six measurements. Further studies are needed to clarify this discrepancy. Is more research being done here?”
  - a. The interferences from Ac-228 are indeed very low, but there are other interferences which should be considered, as mentioned during the webinar, and they are listed in presentation. For the yields, please use up-to-date nuclear decay data, e.g. [Données nucléaires – tableau – Laboratoire National Henri Becquerel](#) or [NUCLÉIDE-LARA on the web \(2022\)](#)
  
13. “Would you share how you get the MARB? in this webinar.”
  - a. The MARB values were estimated considering previous experience, complexity of the analysis and method used.
  
14. “Why 3H level in water sample was so low difficult to measure using simple distillation?”

- a. As explained during the webinar, the activity was not so low. It could be measured even directly, if background of LSC used is low enough.
15. "Will we have access to the summary report, so that we can gauge our performance?"
- a. The summary report will be available on IAEA website.
16. "Will next years "reference values" using participants results be trimmed? The relative variance this year was quite wide for some nuclides/techniques."
- a. Target values for all PT samples have been determined by two methods: by characterisation and by formulation (if the sample was spiked).
17. "Are there any plans for in-situ intercomparison exercise. For example, in our lab we have prepared our own "sample" with ilmenite of irregular shape as part of ISO 17025 accreditation of in-site method.... We could have it sent around to interested laboratories."
- a. For now, we do not plan this kind of ILC but we will take it into the consideration.
18. "I would like to ask if you have taken into account the sample density in the calculations. As most labs have liquid source for calibration."
- a. Yes, the density was taken into the consideration in efficiency transfer process.
19. "We tried the XRF over the samples. Are our data of your interest? We are still developing the technique so a feedback will be very helpful."
- a. Thank you, if you provide your results we could compare them against the one obtained from another laboratory engaged in this characterisation.
20. "Please, because we have higher values for Pa-234m and we dont know why?"
- a. Possible interferences were explained during the webinar.
21. "Whether transuranic analysis will be asked in future?"
- a. Yes, if such sample is used as PT sample.
22. "I have observed Ra-226 daughter products in water samples do not attain equilibrium even after sealing for month?"
- a. If you need to seal water sample, please check your sealing technique, container used, etc.
23. "Regarding the QC sample withdrawl, what if there was an option for participants to check that they would like to receive it and have them pay a fee to cover its inclusion?"
- a. Will be considered.

24. In the light of the wide scattering of results in Sample 1: are Ra-226 and Th-232 then appropriate radionuclides for a gross alpha intercomparison?
- Any radionuclide that could be found in the environment, either natural or artificial, is suitable for gross alpha and gross beta measurements. Prerequisite for avoiding scattered results could be comparison of results obtained with the same techniques.
25. “Any chance to send us in advance geometry requirements so we can finish the calibration before sample arrive?”
- Appropriate efficiency calibration (including the self - attenuation correction) for unknown sample should be a part of analysis.
26. “Do the secular equilibrium count in PT or once the sample is prepared, its counted immediately?”
- If the question is understood properly, equilibriums should always be considered in spectra analysis.
27. “You can use a fluor as a carrier. save a fluor sample and use it like a background, then mix a real sample with same flour to fill geometry, than strip flour sample as a background. it works very well.”
- Thank you for sharing your experience.
28. “Where can we find training resources for efftran?”
- [Efficiency transfer and true coincidence summing corrections for environmental gamma-ray spectrometry | EFFTRAN](#)
29. “Is it possible to organise a training which will cover whole process? from sampling to reporting of results?”
- It would be a very comprehensive training, but we will take it into the consideration.
30. “Please include a hand on on EFFTRAN in some future workshop for both efficiency transfer and TCC corrections.”
- We will take it into the consideration.
31. “In case of EFFTRAN, what are the necessary consideration when performing efficiency transfer for surface samples (other than TCS correction) eg. what is the correct sample thickness and density?”
- Analysts is responsible for determination/assessment of relevant parameters.
32. “Which species of seaweed is used? Can he write for me please?”

- a. I think it is Kelp.
33. “Please give the recordings of advanced gamma spectrometry workshop of 2021.”
- a. We are working on a long term technical solution to make recordings of our online trainings available to watch online. It will be communicated together with the availability of the recording of this webinar.
34. “I would like to ask - perhaps to Bojan (?) - if he is aware of a method where one could generate or download more input files to EFFTRAN for the true coincidence correction. Some radio-pharmaceuticals used in hospital etc. are not present in EFFTRAN. The manual process to generate .txt files for EFFTRAN are quite laborous.”
- a. Since we are environmental laboratory, we deal only with radionuclides available in the EFFTRAN database. We have not tried to make new entries.
35. “A new reference material was released recently, IAEA-465 Baltic sea sediment. Surprisingly Sr-90 is not reported for this ref material, why does this happen?”
- a. For an answer to this question, please contact RML, Monaco.

## **Day 2: 4 December 2024**

1. “What software is being used for the deconvolution? (to deconvolute Pb210 and Eu152)”
  - a. For the deconvolution of overlapping peaks, the interactive peak-fit analysis integrated into GENIE2K software was used. Good energy calibration and adequate library is necessary for proper deconvolution.
2. “What was the recommended or optimal counting time of the water sample and two solid samples for gamma spec?”
  - a. Counting time should be determined in accordance with the counting efficiency (detector, quantity of the sample, geometry, sample activity, etc) for each sample and radionuclide present in the sample.
3. “Which type of gamma detector have you used for this deconvolution Eu152/Pb210 ? which efficiency and how long have you count?”
  - a. We used planar HPGe, BE5030. Measurement times were from 100 ks to 300 ks.
4. “Can the deconvolution be applied also in the case of Ra-226 and U-235 (line 186. 4 and 185.7 keV, respectively)?”
  - a. Yes, but special care should be taken due to possible instability of the background. Subtraction of counts for the contribution of overlapping peak is also applicable.

5. “Could you please inform us about the date you spiked sample 1 with Pb-210 and Po-210 and what was the activity concentration of these radionuclides that time?”
  - a. The sample was spiked at the end of March 2024 with the standard solution for Ra-226. The solution had daughter products of Pb-210 and Po-210. At the time of spiking the activity of Pb-210 was around 10.3 Bq/l. Po-210 had almost the same activity since they almost reached equilibrium. Since both radionuclides are supported by Ra-226 they ingrowing by the time and if you perform decay correction back to the reference date activity will be lower. To perform proper decay correction, you must use Bateman Equations for the system of three radionuclides taking into consideration exhalation rate of Radon. Since the stock solution was sealed in a glass ampoule for many years Radon stayed in the solution before spiking. We have provided the training last year regarding decay corrections in case of two and three radionuclides in the system, especially for Ra226/Pb210/Po210 system.
  
6. “What was the kev resolution per channel for the detector running the 210Pb/152Eu deconvolution?”
  - a. 0.25 keV/ch.
  
7. “How was TCS in case of Na-22 estimated?”
  - a. For calculation of the TCS corrections we used EFFTRAN software. Confirmation was done by LabSocs.
  
8. “What’s the density and composition for this sediment?”
  - a. Density of the sediment sample was 1.15 g/cm<sup>3</sup>. Self-attenuation was performed by transmission experiment, not with XRF elemental analysis.
  
9. “In samples with high Th-232 series contribution during estimation of Th-234 (U series) using 63 keV apart from subtraction of Th-232 gamma 63.811 (0.259% gamma abundance), do we need subtract x-ray contribution too? As this region has number of interference can you clarify what all interference needed to be considered?”
  - a. Subtraction and deconvolution process were explained in detail during workshop.
  
10. “So which better way using gamma? With 45% efficiency detector and the preparation procedure for Ra 226 through Pb and Bi”
  - a. Determination of Ra-226 by gamma spectrometry can be performed by three approaches. First, through activity of Ra-226 progenies – Bi-214 and Pb-214 after reaching the radioactive equilibrium. Second, subtraction of the U-235 contribution to the 186 keV line. And third, by deconvolution of the 186 keV line.
  
11. “For Pb-210 determination, is it possible to use a point source to determine the attenuation of the sample, and apply on the gamma spec results?”
  - a. Yes, we referred to it previously as “transmission experiment.”

12. "Suggestions how to determinate Pb-210, if the energy and efficiency calibration start from Am-241?"
  - a. With efficiency calibration you form the efficiency curve and below 60 keV (Am-241) you have just extrapolation, so for Pb-210 using this curve could be questionable. Better way would be to do a MC simulation (to use MC based software) for energy region not covered by experimental efficiency calibration.
  
13. "I have one request to keep the test results in the EVALUATION REPORT tab of test portal as it will be handy for participants to access the results. Since 2023, the results are not available on the portal and also results before 2020 are not available. Please incorporate my suggestions as they will be helpful in accessing valuable PT data as and when required."
  - a. This was very good feature, but it was depending on the method of the report generation which was unfortunately less and less working for participants. So now we have a very robust mechanism to produce reports but lost the path to distribute. Next year we are working on a self-service solution again with our IT department and then we would add the missing years into the new solution.
  
14. "A colleague has found the perturbation that affects the Pa-234m line. It is not the 1000.68 keV line of Ac-228 with a very low probability of 0.0054%. It is a sum line with the Ac-228 main line 911 keV and the X-ray line  $XK\alpha_2$  89.954keV (2.5%) producing an interference at 1000.95 keV. Also a second sum line with 911 keV and the X-ray line  $XK\alpha_1$  93.351 keV(4.1%) is generated, which occurs at 1004.6 keV. If this 1004.6 keV line is found, it can be used to correct the 1001 keV line. This also explains why the interference is more pronounced in better detectors than in detectors with lower efficiency in the lower energy ranges. In your Spectrum we can also see the 1004 keV Peak."
  - a. We also thought about random summing, there is a question if those activities are high enough. Regarding the line at 1004 keV we also recognize that it could be some of the summing lines since this line could not be found in nuclear data base. It is good point, and we will investigate it further, and provide the feedback in the coming trainings.
  
15. "What about Bi-214, Pb-214, and Ra-226 in sediment? I think S-shape curve shows underestimation by most participants. Any reason for the underestimation?"
  - a. Possible reasons could be different, e.g. radon leakage (not appropriately sealed container), TCS correction, if Ra-226 was determined directly via 186 keV line quality of deconvolution can influence, instability of background.
  
16. "Are EFFTRAN and ETNA applicable to well-detectors?"
  - a. As far as we know, those software cannot be applied for well type detectors.
  
17. "Can you explain further why shorter count time helps? it seems conter-intuitive. I would imagine that a shorter count time would result in an increase of the uncertainty."

- a. Shorter counting time will prevent presence of the gamma lines with lower intensities, the spectrum would be less complex. The best would be to save the spectrum on e.g. 50000s, 100000s, 150000s (or with the smaller step) and see the difference in spectrum complexity. Strong lines, usually used for activity determination will be there and those overlapping or contributing them will be less "visible."
18. "A general question, if in the document you send along with the samples, it is stated gamma spectrometry as requested analysis, or that we should focus on gamma emitters, but, that in some cases a radionuclide is both a gamma and an alpha emitter, is it allowed to analyze the radionuclide by alpha spectrometry instead? Thank you!"
- a. In the instruction gamma emitting radionuclides were asked in solid samples. Gamma spectrometry was not requested analysis. Methods that you used for the analysis of this kind of samples could have been used.
19. "Please suggest reference to find the coincidence summing % probability of different energies for specific radionuclide which we need to take into account for estimating the coincidence correction."
- a. TCS corrections needs to be calculated for each detector, for a specific geometry of measurement and sample composition.
20. "The ICP-MS Measurements are very useful for us. We are interested in Uranium-isotopes, Pu-239 and Sr-90."
- a. Thank you for the suggestion - noted and we will see what we can include. Thank you again.
21. "I was wondering why you have used NIST SRM 4321C (wich is certified for uranium activity concentration and not for mass fraction and not for isotope composition) as a reference instead of a uranium isotope reference material, like IRMM-184?"
- a. NIST SRM 4321 C is certified for activity concentrations (massic activities) of individual uranium isotopes. ([4321C.pdf](#)) It was prepared gravimetrically from NIST 960 (now available as NBL CRM 112A (uranium metal)), which is certified for uranium isotope mass fractions, from which massic activities were calculated. The certificate of NIST SRM 4321C states the mass fraction of uranium as an 'uncertified' value, provided with an associated uncertainty, allowing to sanity-check recalculated mass fractions using data available on the certificate (half-lives used).  
IRMM-184 is a uranium nitrate solution CRM, certified for isotope amount ratios, isotope amount fractions and isotope mass fractions relative to total uranium. However, the certificate does not provide a certified value for the mass fraction of uranium (or its individual isotopes) per gram solution. Therefore, while it is perfectly suitable for calibration of uranium isotope amount ratio measurements, it cannot be used as a calibration standard in reverse isotope dilution ICP-MS.



22. "Would the total U mentioned in presentation be the sum of measured individual isotopes by ICPMS?"
- a. Yes. The mass fraction of total uranium can be obtained as the sum of the mass fraction of U-235 and U-238 here. The mass fraction of U-234 is insignificant compared to U-235 and U-238 considering associated uncertainties.
23. "Regarding the Po-210 in Sample 1: did you try to stabilize the Po-element (difficult, I know)? We had significant wall adsorption issues in our sample containers. Thank you!"
- a. Yes, we are aware about the issue, and we increased acidity of the sample compared to the previous years. Unfortunately, we cannot increase acidity further due to shipment requirements. We mentioned this in a few trainings regarding the Po-210 determination organised in the past. It is on the PT participants to be aware of the issue and to wash the walls of the bottle since this could happen during the sampling.
24. "Regarding the gamma spectrometry analysis on NORM samples (sample 03 and 04), we observed that the activity of Ac-228 calculated at 105 keV and 129 keV is lower than the activity calculated with the main emissions. We didn't use these lines for assessing the activity, but we would like to know if you have any clue about it. For example, for the sediment sample we obtained: Ac-228 (with main lines): 314 Bq/kg, Ac-228 (105 keV): 280 Bq/kg, Ac-228 (129 keV): 280 Bq/kg. The peaks have a good shape and an area about 2000 and 3000 counts. We have already applied corrections for TCS and material composition. Thank you!"
- a. Those two lines are with lower energy than the main one usually used for Ac-228 determination and most probably with stronger self-attenuation effect.
25. "We have already considered it and we are quite confident about our self attenuation corrections for this sample because we got good results for Pb-210 and Th-234. Do you have other possible explanations? I have just checked on the Genie Report that the coincidence correction factor was 1 at 105 keV, so no TCS correction for x-rays was applied. At 129 keV we have a coincidence correction factor of 0,871. We probably correct the activity only for gamma TCS. Do you think this can explain our issues? In addition, the spectrum was acquired with a standard coaxial P-type HPGe, NOT a planar. Do you think TCS correction for x-rays is relevant also in our case? Thanks again!"
- a. Did perform peak interferences correction for Th-234 and what was your Bias for Pb-210 and Th-234. It is not easy to answer, more information is needed. Did you apply TCS correction for the 105 keV X-ray? If so, what software did you use? TCS corrections could be the reason for the 105 keV. TCS correction is relevant - not just for planar detectors.
26. "Dear Mirion participants, do I miss something (maybe changed in newer versions of ISOCS), do you use ISOCS for laboratory samples or LabSOCS??? I thought only LabSOCS is ready to work for laboratory samples and ISOCS is optimum only for in situ (large, complex, distant geometries). Is this changed in the version of ISOCS you used for this PT? What is your version?"

- a. We use LabSOCS for laboratory samples. We tend to use LabSOCS and ISOCS interchangeably as its really the same technology, the main difference being the sample templates (lab vs large items for in-situ analysis). Mirion
27. “Please, remind me: was Ra-226 in both Samples 3 and 4 all natural, or a certain amount of it was spiked?”
- a. Samples of sediment and bauxite were not spiked.
28. “I have detector procured from Mirion Technologies with detector characterization done received in CD with .PAR extension but I am having gamma spectroscopy software Interwinner with Winner track software for mathematical modeling which does not recognize Mirion technology characterization file. This compatibility issue should not be there as every as detector and spectroscopy software may not be always from same company. Can you suggest to me how to resolve this?”
- a. Answered during the live discussion by Mirion.
29. “You measured Sediment and Bauxite for 5 and 7 days respectively, how did you choose the 5 & 7 days?”
- a. Samples were measured until the good statistics was achieved, i.e. till statistical uncertainty of the peak in the spectra was satisfactory. For our measurement we aimed at uncertainties up to few percent.
30. “How could the activity of a sample placed in a half-filled container be calculated? Thank’s very much!”
- a. If you have efficiency curve for the full geometry, for the calculation of the activity of the sample measured in a half-filled geometry, transfer of efficiency should be done.
31. “The uncertainty of the efficiency for Ra-226 by 186 keV has relatively high uncertainty in ISOCS/Labsocs, Is there any possibility to reduce this?”
- a. The higher uncertainty in determination of Ra-226 via 186 keV peak is due to uncertainty added in the uncertainty budget due to deconvolution.

### **Day 3: 5 December 2024**

1. “Can we use the sample 3 and 4 from PT-2024 as CRMs for calibration purpose?”
  - a. Samples 3 and 4 are not the Certified Reference Materials (CRMs). As a PT samples with known activity concentration, they could be used as a control sample in method validation or other quality control activities.
2. “Radiochemistry of Ra-226 should also be included in future webinar.”
  - a. Thank you for your suggestion, it will be considered for the future webinars.

3. "In theoretical formula for  $x$  is it better to take mid height of sample or total sample height."
  - a. Attenuation should be considered for the total sample height.
4. "What size of collimator is recommended?"
  - a. The collimator should be as narrow as possible.
5. "What example of collimator that can be use?"
  - a. As a collimator any kind of firm hollow tube with the thicker walls could be used. Choice of collimator needs to be done properly so the reproducibility of the measurements could be retained.
6. "How about the dead layer? Do they grow with time? How can we estimate the dead layer?"
  - a. The dead layer is always hard to estimate, it changes (increasing in thickness) with time. For example, you can estimate it with the "known" detection efficiency for a certain geometry of measurement and known matrix, changing the value of dead layer thickness till you optimize the results.
7. "Does EFFTRAN work with well-detectors?"
  - a. EFFTRAN software does not support calculations for well-type detectors. For that purpose LabSOCS, or other software like MC based GESPECOR, or ANGLE can be used.
8. "Is it possible to insert the uncertainties of the inout parameter of the detector in EFFTRAN?"
  - a. Part of EFTRAN where you can define your detector does not have the possibility to enter the uncertainties of input data.
9. "Does Coincidence Summing program consider only the coinc effect, not including self-abs effect?"
  - a. It depends on the software used. For example, in EFFTRAN self-attenuation correction is included in efficiency transfer. True coincidence summing correction needs to be performed separately. For using LabSOCS - Coincidence summing in Genie considers self-absorption as defined in the geometry file.
10. "Could you please give information about detector characterization? how is it done and to what extend be used in attenuation correction?"
  - a. Characterisation of detector is done for each detector. It can be provided by the manufacturer. The characterization is done by matching a Monte-Carlo model to measurements and then calculating the full energy peak efficiencies from 10 - 7000 keV from the end cap to 500 m. The characterization together with LabSOCS can be used for self-attenuation when the material composition is known by the same way as was described in the presentation.

11. "Is mass attenuation coefficient energy dependant? if it is, the create composition might be correct for one energy but not work for other. Is that right?"
  - a. Mass attenuation coefficient is energy dependent and that's why software will need to be used. With the transmission experiment you determine attenuation coefficient for one specific energy. Then, software will calculate for other energies once it has elemental composition. Software will change it accordingly for different energies but just needs to have starting point. It was mentioned during Theoretical determination of attenuation coefficient, where you have to do this for every energy for each sample. If you have a software to do it for you, it is easier.
  
12. "Why do we compare the mass attenuation coefficient in X-COM with "Total attenuation without coherent scattering"? If a photon interacts with coherent scattering, it will not lose energy, but it can change direction and don't reach the detector. Could you explain why we should not consider coherent scattering?"
  - a. The reason is because we assume perpendicular transmission to a sample surface and that's why we use collimator in the experiment to compare under the same conditions as in software.
  
13. "It was mentioned yesterday that the bauxite composition was not readily known. Does IAEA consider providing the elemental composition to laboratories instead rather than to let laboratories determine it themselves? Afterall, the test should be on identification and quantification of isotopes I was referring to proficiency test and the provision of elemental composition only by the agency. Thank you."
  - a. Bauxite certified reference material will be released in 2025 and elemental composition will be available on-line in the Certification report. Beside the accurate identification of radionuclides present in the sample, calculation of specific activity is of crucial importance. Efficiency and correction application strongly depends on matrix composition and analytical laboratory needs to have procedures to overcome the issue of unknown sample composition. PT is designed to assess the proficiency of the laboratory to obtain reliable analytical results for samples measured routinely.
  
14. "From the detector characterization document, which parameter is not accurate (for example the parameter is got by estimation, not by measurement)?"
  - a. This is the question for the manufacturer or other entity which provides characterisation sheet for the specific detector.
  
15. "I just wanted to comment about the "collimation" process. You can separate the sample+source from the detector (at least 3 times de diameter of the detector diameter) to achieve a "natural collimation process."
  - a. Thank you for sharing this useful information.
  
16. "Do you guys have He-4 neutron detectors?"

- a. No. Other Laboratories in IAEA with a need to measure neutrons are equipped with this kind of detectors.
  
17. “I would be interested in the elemental composition of the sediment sample that was used for the calculation of the self-attenuation correction. So we could compare our results with the matrix we have used.”
  - a. Sediment reference material will be released in 2025 and, besides assigned activity concentration values, elemental composition of sediment will be available, as well.
  
18. “Are there any upcoming training programs or workshops specifically focused on the use of mass spectroscopy for measuring Sr-90 or Ra-226? If so, could you provide details, or online availability?”
  - a. Thank you for your suggestion. We will consider the interest in these topics when planning future trainings.
  
19. “Has this cotton/canvas material been characterized for the natural U background content?”
  - a. We did XRF analysis to see what is inside in terms of elemental composition, but we have not performed Uranium by alpha spec. It is good proposal, and we will consider doing it. Thank you!
  
20. “Question to NPL: do you plan to integrate a solid ash (incinerator) sample in a PTE in the future? Where can we find more information if the lab wants to participate in the PTs with NPL? do we reach out to Peter directly or are there details that will be on the NPL website?”
  - a. Please contact [pte@npl.co.uk](mailto:pte@npl.co.uk) , also the NPL website provides a lot of details <https://www.npl.co.uk/products-services/radioactivity/environmental-pte>
  - b. My email is [peter.ivanov@npl.co.uk](mailto:peter.ivanov@npl.co.uk) and I'm always happy to help and point to the right contact
  
21. “3D PTE samples sound exciting. Is there any plan to introduce heterogenous activity distributions?”
  - a. 3D printing technique is under development, we are focused on obtaining homogeneous sample. Your question is very interesting, and this is a part of development plan.
  
22. “How you characterize the surface sample thickness for the EFFTRAN?. Because I believe its not having the whole thickness of the loaded paper.”
  - a. Thickness can be determined by measurements tool like a calliper. To avoid the need for thickness estimation, filter sample should be measured down-facing to the detector. In that case self-attenuation in the canvas material does not occur.

**Thank you for participating in the 2024 Worldwide Proficiency Test Exercise Webinar.**