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SSDL Newsletter

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Contents

From the Editor

The end of the year 2022 is at hand. Some of us take time during this season to review the previous year and plan for the coming year. As you relax enjoying the holidays this Newsletter may be a good companion. This issue of SSDL Newsletter (No 76) is dedicated to the report of the 20th Scientific Committee of the IAEA/WHO Network of Secondary Standards Dosimetry Laboratories (SSC-20). The meeting was held at the IAEA Headquarters in March 2022. The SSC-20 reviewed the activities reported by the Dosimetry and Medical Radiation Physics (DMRP) section for the biennium 2020 – 2021 and noted the actions following the SSC-19 recommendations. Particularly, the activities of the present and future programmes for biennium 2022–2023 and 2023–2024 were discussed and recommendations were made.

Seasons greetings and wishing you all a prosperous 2023.

The members of the Scientific Committee of the IAEA/WHO SSDL Network present in person at the 20th Scientific Committee meeting: (front row from left) Jan Seuntjens, David Followill (Chair), John Dickson, Mehenna Arib, (second row from left) David T Burns, Penelope Allisy (Rapporteur), and Maria-Ester Brandan. Zhang Jian attended the meeting virtually and he is missing from the photo.

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Services provided by the IAEA in DMRP Section

The IAEA's Dosimetry and Medical Radiation Physics Section focuses on services provided to Member States through the IAEA/WHO SSDL Network and on a system of dose quality audits. The measurement standards of Member States are calibrated, free of charge, at the IAEA's Dosimetry Laboratory. The audits are performed through the IAEA/WHO postal dose audit service for SSDLs and radiotherapy centres by using radiophotoluminescence and optically stimulated luminescence dosimeters (RPLDs and OSLDs).

The Dosimetry Laboratory's Quality Management System has been reviewed and accepted by the Joint Committee of the Regional Metrology Organizations and the BIPM (JCRB). Some of the IAEA Calibration and Measurement Capabilities (CMCs) are published in Appendix C of the BIPM key comparison database (KCDB).

The IAEA CMCs can be found at the following web site: https://www.bipm.org/kcdb/

The range of services offered by the IAEA's DMRP section are listed below.

Services	*Radiation quality*
**Calibration of ionization chambers (radiation therapy, brachytherapy*, radiation protection, and diagnostic radiology including mammography)	X rays and γ rays from ^{137}Cs and ^{60}Co beams ^{137}Cs, ^{60}Co, linac photon beams* and ^{192}Ir brachytherapy sources
**Comparison of ionization chamber calibrations coefficients (radiation therapy, radiation protection, and diagnostic radiology including mammography) for SSDLs	X rays and γ rays from ^{137}Cs and ^{60}Co beams
Dosimetry audits (RPLD) for external radiation therapy beams for SSDLs and hospitals	γ rays from ^{60}Co and high energy X ray beams
Dosimetry audits (OSLD) for radiation protection for SSDLs	γ rays from ^{137}Cs
Reference irradiations and blind dose checks for dosimetry audit networks (radiotherapy)	^{60}Co and high energy X ray and electron beams
Reference irradiations to dosimeters for radiation protection	X rays and γ rays from ^{137}Cs and ^{60}Co beams

* Calibration services are not included in the IAEA CMCs published in the BIPM KCDB.
** Technical procedures and protocols for calibrations and comparisons are available on our website https://ssdl.iaea.org/

Member States interested in these services should contact the IAEA/WHO SSDL Network Secretariat, for further details, at the address provided below. Additional information is also available at the web site: *https://ssdl.iaea.org*

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Note to SSDLs using IAEA calibration and audit services:

1. To ensure continuous improvement in IAEA calibration and audit services, SSDLs are encouraged to submit suggestions for improvements to the Dosimetry Contact Point.

2. Complaints on IAEA services can be addressed to the Dosimetry Contact Point.

3. Feedback can be provided using the form on our website: https://ssdl.iaea.org/

https://iris.iaea.org/public/survey?cdoc=DOL00100

Scientific Committee of the IAEA/WHO Network of Secondary Standards Dosimetry Laboratories

Report of the Twentieth Meeting of the SSDL Scientific Committee
IAEA, Vienna, 14 -18 March 2022

1 FOREWORD

The Scientific Committee of the IAEA/WHO network of Secondary Standards Dosimetry Laboratories (SSDLs) is a standing committee (SSC) within the framework of the International Atomic Energy Agency. It is tasked with conducting biennial reviews and evaluations of the Dosimetry and Medical Radiation Physics (DMRP) Sub-programme and reporting the results of the reviews to the Directors General of the IAEA and the WHO. The report of the nineteenth meeting of the SSC, which was held from 2 to 6 March 2022, was published in the SSDL Newsletter No. 72 in August 2020.

The twentieth meeting was held in Vienna at the Agency Headquarters from 14 to 18 March 2022. Opening remarks were made by Ms May Abdel-Wahab, Director of the Division of Human Health (NAHU), IAEA and Ms Debbie van der Merwe, Head of the Section of Dosimetry and Medical Radiation Physics who is Co-Secretary of the IAEA/WHO SSDL Network together with Ms Adriana Vélazquez Berumen, Diagnostic Imaging and Medical Devices, World Health Organization, Geneva, who was unfortunately unable to be present until the last day of the meeting and joined via web-based video transmission. The members of the SSC-20 are: Mehenna Arib, SSDL, King Faisal Specialist Hospital and Research Centre, Saudi Arabia, specialist in dosimetry at the SSDL level; Maria-Ester Brandan, Instituto de Física, National University of Mexico (UNAM) representing the International Commission on Radiation Units and Measurements (ICRU); David T Burns, representing the Bureau International des Poids et Mesures (BIPM); John Dickson, University College London Hospital, UK, specialist in nuclear medicine imaging physics; David Followill as Chair, retired from the MD Anderson Cancer Center, USA, specialist in dosimetry audits; Jan Seuntjens, McGill University Health Centre, Canada, specialist in reference dosimetry and radiotherapy physics and Zhang Jian, National Institute of Metrology (NIM), China, specialist in primary radiation dosimetry standards, who was unable to attend the meeting in person but participated through web-based audio and electronic transmission.

1.1 Introductions

Ms May Abdel-Wahab, Director of NAHU, IAEA welcomed the Committee stating how the significant advice of the committee is invaluable to the Agency. The Committee recommendations and comments are duly considered as the Division plans for the next biennium. She mentioned that the committee was initiated in 1985 for dosimetry and was expanded in 1988 to comment on the whole programme of the DMRP, which continues to be the case today as most relevant to the IAEA activities. She said that the Committee's report will be published in the SSDL Newsletter so that the whole community will know what has been recommended in the programme. Ms Abdel-Wahab noted that the WHO Joint-Secretary, Ms Adriana Vélazquez Berumen, would join the meeting at the end of the week and she commented on the nice balance of expertise on the Committee that also succeeded in being representative globally. She reported that the DMRP was one of the most active Sections of the Agency and mentioned that expansion had taken place in activities related to both radiology and nuclear medicine and also in the databases. The latter particularly regarding DIRAC and the education and training activities that had expanded. She asked that staff time and general resources be taken into consideration when evaluating activities and discussing recommendations. She explained that the Committee would be taken to the Dosimetry Laboratory on the Tuesday and that she would join us again for the debriefing session on Friday at which she was looking forward to hearing innovative and targeted guidance for the next biennium.

Mr David Followill expressed his pleasure at returning to Chair the meeting after 2 years of the global pandemic, knowing that for most members of the Committee this would have been the first travel undertaken since they left Vienna after the SSC-19 meeting 2 years previously. He stated that

the Committee would work hard during the week to make appropriate recommendations for the DMRP's work within the NAHU Division and for the SSDL network. It was satisfactory to learn that the SSC-20 report will be received with enthusiasm to assist in the planning for the Agency programme and budget for 2024 to 2025 and perhaps for future programmes.

In his capacity on taking the Chair, he invited each Committee member, including Jian Zhang from the PSDL in China, to present themselves for the benefit of the staff who were in attendance via video conferencing. Then the 19 staff present on screen introduced themselves in turn.

Ms Debbie van der Merwe, Section Head of DMRP outlined the agenda for the week, explaining some of the administrative details and how the staff would present their work ensuring safe, social-distancing and mask-wearing restrictions. The visit to the Dosimetry Laboratory on the Tuesday had been programmed to facilitate the presentations of the staff who worked there and would take place in a large meeting room with visits to the laboratories themselves. The agenda was duly adopted.

Ms van der Merwe requested that the SSC-20 prioritize their recommendations into high and medium as previously as this was helpful. Any additional comments on the programme would also be acknowledged and implemented where appropriate. She explained that, once the SSC-20 report had been submitted and approved by the Director General (DG), the programme would be finalized, and its implementation could start as appropriate. She expressed her thanks to David Followill who would Chair the meeting and to Penelope Allisy who would act as *Rapporteur*.

1.2 General discussion

1.2.1 Programme of the Meeting

The first item on the agenda was to review the actions following the SSC-19 recommendations. This was reported by Ms van der Merwe and was followed during the morning by an overview of the comprehensive report of the activities of the DMRP since the previous SSC meeting. The remainder of the first day of the meeting, DMRP staff members presented reports on their activities but the presentation on radiotherapy physics was delayed until Mr Seuntjens could join the Committee. On the second day, the SSC-20 was taken to Seibersdorf where further presentations were made by staff on the laboratory's scope of work and the SSC-20 was able to see the laboratories and work at first hand, including the linac with its robotic arm for the precise placement of the dosimetry water phantom for absorbed dose to water measurements. On the third day there was a session on the DMRP database activities and then presentations on the collaborative activities with other units, sections and departments including RPOP/NSRW, ARBR, NMDI and NSRW, a final session on the SSDL network developments. After that the SSC-20 met in closed session, deliberating on the accomplishments and direction of the DMRP's sub-programme, and developing a few specific follow-up recommendations for the present programme but particularly for the next biennial programme. Discussion continued on the draft recommendations and their prioritization on the fourth day. Some 29 draft recommendations were finalized on the final morning and then presented to the Deputy Director General – Nuclear Applications, Ms Najat Mokhtar and the Director of NAHU, Ms May Abdel-Wahab with Mr Jian Zhang, Ms Adriana Velazquez Berumen and the DMRP staff in attendance via video that afternoon. During the feedback, the Chairman of the SSC-20 thanked the DMRP staff on behalf of the whole committee, for the very full DMRP written report (submitted prior to the SSC-20 meeting), for their carefully prepared presentations and their patience with the committee's numerous interruptions with questions to which they had responded in full.

Ms Mokhtar responded that she liked the prioritisations of the recommendations and that succinct comments had been made. She commented that 10 years ago the Agency had not heard of Artificial Intelligence (AI) and Big Data, but they do now and need to keep ahead in this area. She was pleased that some dynamic and positive thinking had come forward with the insightful recommendations. She expressed the view that although some countries only have basic needs, it is important to move with technology, albeit with small steps, and to accompany every country, providing them with the support they needed.

Ms Velazquez Berumen from the WHO said that she totally supported all the recommendations related to diagnostic radiology in particular, recognizing that radiotherapy should not go ahead without prior diagnostic radiology. She particularly supported the DMRP databases, which are much used by the WHO and stated that the WHO had links from their website to all the DMRP publications. She finished by saying that she would like to congratulate the DMRP on their work output and programme.

Ms van der Merwe expressed the appreciation of the DMRP staff for the recommendations which they felt had captured the essence of their aspirations.

Mr Followill then closed the meeting.

1.2.2 Programme evaluation

In preparation for its report, the SSC-20 reviewed the activities reported by the DMRP for the 2020/21 biennium, noted the outcomes of some outstanding recommendations made by the SSC-17, SSC-18 and SSC-19 and discussed the present sub-programme activities for 2022/23. More importantly, the SSC also heard from the DMRP staff regarding their present activities and future aspirations and then made some prioritized recommendations for the 2024/25 programme. The SSC-20 evaluation was similar to that of previous SSCs and considered:

- The objectives of the sub-programme areas;
- The impact (benefit to the Member States);
- Opportunities to increase efficiency or reduce costs;
- The continuing relevance of Agency activities.

The 29 specific recommendations from the SSC-20 are identified throughout the text and are also listed, in just two priority categories of 14 high priority and 15 medium priority at the end of the report. Comments regarding specific aspects of the present and future DMRP sub-programme are made throughout the text and the more important comments on which action is expected are also listed at the end of the report.

2 INTRODUCTION

The SSC-20 expressed its thanks to the DMRP staff members for having prepared a comprehensive report covering the activities of the sub-programme on Dosimetry and Medical Radiation Physics during the biennium 2020/21. This report had been provided well in advance of the meeting, in electronic format, thus enabling the Committee to develop relevant recommendations in a timely manner.

The DMRP Section objective is to enhance the capability of Member States to implement radiation imaging and treatment modalities safely and effectively through optimized dosimetry and medical physics practice. To further this objective, the work of the Section is divided into three projects whose titles are:

- Project 2.2.4.1: Calibration and auditing services;
- Project 2.2.4.2: Developments in radiation dosimetry;
- Project 2.2.4.3: Clinical medical radiation physics for imaging and radiation therapy.

This report of the SSC-20 follows the format established by previous reports and begins with a general discussion of administrative items and collaborative ventures within the Agency. The three project areas are then discussed in turn. In general, the report mentions only those activities of the DMRP Section for which the SSC-20 has comments or recommendations at this time. **It should be noted that when a particular service provided by the DMRP is not mentioned specifically, the SSC-20 strongly endorses its continuation**. The SSC-20 is particularly pleased to see the continuing support and involvement of the DMRP in appropriate CRPs, and also the DMRP involvement in TC projects, noting that the Division of Human Health is currently involved in about 23.5% % of all the Agency TC projects. A list of acronyms is given in the Appendix.

3 REPORT

3.1 General Organizational Items and Major Facilities

The SSC-20 was pleased to learn about the recommendations still in progress made by previous SSCs. Only the proposed code of practice for the dosimetry of small composite fields in radiotherapy recommended by SSC-17 is still outstanding, with the other recommendations either completed or implemented as far as possible, some of which are still awaiting input from external bodies. The 24 recommendations for the previous biennium from SSC-18 have either been completed, are in progress or have been postponed to the following biennium partly due to the global pandemic restrictions. It was also noted with satisfaction that the 34 recommendations of the SSC-19 for the present biennium 2022/23 are well underway with several already completed and the others programmed to be implemented. An exception is the CRP recommended on radiation metrology and advanced dosimetry which has not yet been funded to the disappointment of the SSC-20. The many comments provide by SSC-19 were noted by the DMRP as helpful to the programme.

The SSC-20 expressed the view that the quality and volume of work produced by the DMRP is impressive and the Deputy Director General of Nuclear Applications, Ms Najat Mokhtar, and the Director of the NAHU, Ms May Abdel-Wahab, are thanked sincerely for the support they give to the DMRP programme and budget.

With regard to the organization of the SSC meeting by the Agency, the SSC-20 was very pleased to have all the documents in electronic format only. As social distancing

restrictions were still in place to ensure the safety of the DMRP staff and the SSC, most of the staff attended the meeting via video conferencing so there were never more than 4 staff in the rotunda meeting room with the SSC. This made questioning and comments more difficult to follow sometimes but the facilities provided by the Agency were much appreciated. The SSC-20 also appreciated the visit to the Agency Dosimetry Laboratory (DOL) at Seibersdorf with presentations and tours of the new linac facility, recognizing that this may not be possible for the next few years due to the planned refurbishment of the laboratory space.

The SSC-20 appreciated the more flexible style of presentations by the Section staff during the meeting but **proposes** that at least one slide that contains the main points to be discussed is displayed.

Publications

The SSC-20 applauds all of the efforts of the DMRP staff to develop and publish the work that they have completed. The timeliness of these publications plays an instrumental role in maintaining the safe and accurate delivery of radiation doses to patients in Member States. The generation of these documents must go through the Agency editorial process before being disseminated to the public. It is recognized that this process enhances the quality of the publications and is a required service.

In spite of recent fluctuations in the editorial system and the knowledge that the publications back-log is being addressed, the SSC-20 **suggests** the Agency considers a prioritization system in the editorial process according to the scientific relevance of publications that may impact the safety of patients and the harmonization of dosimetry in order to reduce the time between submission and release of the publication.

The SSC-20 notes that documents approved for publication are held in an openly-available repository prior to editing. To ensure that DMRP reports to be published are not misused or widely disseminated prior to final publication, SSC-20 **encourages** the Agency to implement a system so that access to pre-published versions of reports in the repository is controlled and recorded by the DMRP.

Databases

The SSC-20 is pleased to see the appointment of the Associate Database Officer, in part to support the IT Systems Engineer in the maintenance and development of the DMRP databases for DIRAC, IDEA, SSDL, DOLNET and DAN and **encourages** the continued support of this position.

The SSC-20 recognizes the numerous information technology developments in support of the DMRPs activities and services. It is extremely pleased with the development and use of the IRIS tool to increase efficiency and analysis of information that can be disseminated to Member States via publications. The SSC-20 is also aware that the current technology used to run the various DMRP databases (IDEA, DIRAC, SSDL, DOLNET, DAN) is over 10 years old. Consequently:

[R1] The SSC-20 **recommends** that a plan be developed to transition to a new database platform, for example a cloud-based solution, in order to allow the DMRP critical repositories of data (IDEA, DIRAC, SSDL, DOLNET, DAN) to be used effectively, securely and efficiently.

An IAEA DICOM repository containing anonymized patient data will provide an important resource for Member States to use for image analysis applications in the fields of diagnostic radiology, nuclear medicine, and radiation oncology. However, the collection and curation of such data must be done in an ethical manner that preserves the rights of the patient from whom the data originated. Consequently:

[R2] The SSC-20 recommends that the DMRP in collaboration with the ARBR and the NMDI formulates an ethics review process for the storage of anonymized and de-identified DICOM patient images for image analysis applications in diagnostic radiology, nuclear medicine and radiation oncology.

The SSC-20 recognises that although IRIS could be used to include DICOM images, the Agency should have only one, separate repository for DICOM files. Therefore:

[R3] The SSC-20 recommends that a medical image repository (e.g. a PACS) be established to collate image data of patients, phantoms, a glossary of artefacts and simulated data. This will produce an educational resource to support assessments of analysis software and artificial intelligence (AI).

[R4] The SSC-20 **recommends** that in a collaboration between the DMRP and the ARBR, a consultancy meeting is organized with a group of experts to discuss possible Agency action on the definition and use of operational ontologies and Big Data in radiation oncology. This would be a first step before extending to other modalities.

Other Collaborations

The SSC-20 supports the DMRP in its collaborations with other sections within the Division, within other Divisions of the Agency and with external organizations in support of its activities. The provision of expert consultation and all these collaborations are viewed by the SSC-20 to be an important part of the DMRP's programme.

The SSC-20 **recognizes** that a great deal of DMRP staff effort is dedicated to supporting TC projects, as well as DMRP projects. We would like to acknowledge this considerable effort and congratulate the DMRP staff on being able to support both endeavours.

The SSC-20 heard that the NSRW/RSTS is keen to establish a verification system for neutron detectors but needs somewhere to house a neutron source.

The SSC-20 **proposes** that a collaboration between the NSRW and the DMRP be established to allow the NSRW/RSTS to produce a detailed feasibility study and specification for their potential neutron irradiation facility as part of ReNuAl++, for consideration in a future project programme.

3.2 Project 2.2.4.1: Calibration and Auditing Services

This project aims to enhance the capability of Member States to achieve quality and consistency in radiation measurements linked to the international measurement system by ensuring the quality of the dosimetry chain through independent means of verification of the calibration of radiation beams used for treatment of cancer patients. The activities cover the dosimetry audit services and dosimetry calibration services including related developments.

The IAEA/WHO dosimetry audit programme helps hospitals in the Member States, either directly or through national audit networks, to have confidence in the radiation doses they are delivering to their patients that is crucial for proper patient treatment. All dosimetry audit services are considered as vital by the SSC-20 for the safety of patients world-wide.

The DMRP also audits the SSDLs to ensure that the calibrations that they provide to the radiotherapy hospitals are verified. Figure 1 shows the audits that were undertaken for 49 laboratories during the global pandemic. The Dosimetry Laboratory (DOL) was able to continue its work as it was classified as a vital service. This graph shows how important the service is because 3 results were outside the acceptance limits for an SSDL radiotherapy dosimetry absorbed dose but when followed up and the errors identified and corrected, the second set of results were then inside the acceptance limits.

The SSC-20 appreciates that Quality Assurance Audits for Radiation Oncology, QUATRO, have become established activities for Member States. However, due to the COVID pandemic and restrictions on travelling, no comprehensive audits were performed during 2020-2021.

The SSC-20 **proposes** that a promotional strategy be developed by the DMRP, ARBR and NMDI to restart all comprehensive quality assurance audits to the Member States.

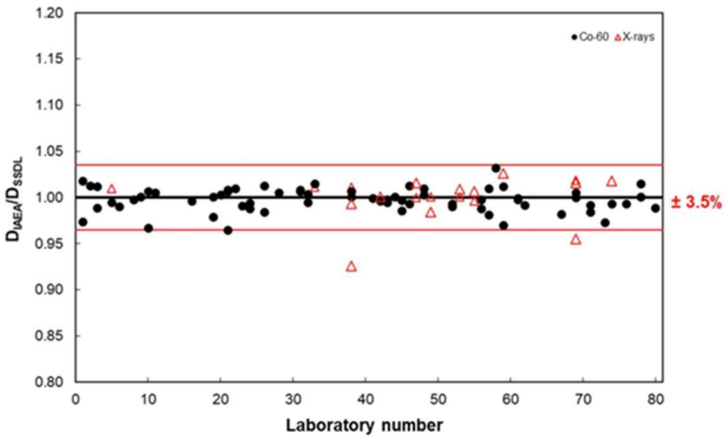


Figure 1. Results of the IAEA/WHO TLD audit batches during 2020 and 2021 for ^{60}Co and high-energy X ray therapy beams. Each result is he average of three dosimeters.

The SSC-20 is pleased to see that the DOL has begun to audit electron megavoltage beam outputs (See Figure 2). However, it was surprised to learn that a preliminary analysis of these audits indicates that up to one third of the delivered doses fall outside of the 5% criterion. Consequently:

[R5] The SSC-20 encourages the DOL to monitor the electron megavoltage beam audit results and follow up any discrepancies and, further, to plan/develop training/education courses if the deviation rate continues to be high.

In addition, in view of the added dangers to patients if electron doses are inaccurate, the SSC-20 **encourages** the DOL to assess the feasibility of characterizing a series of

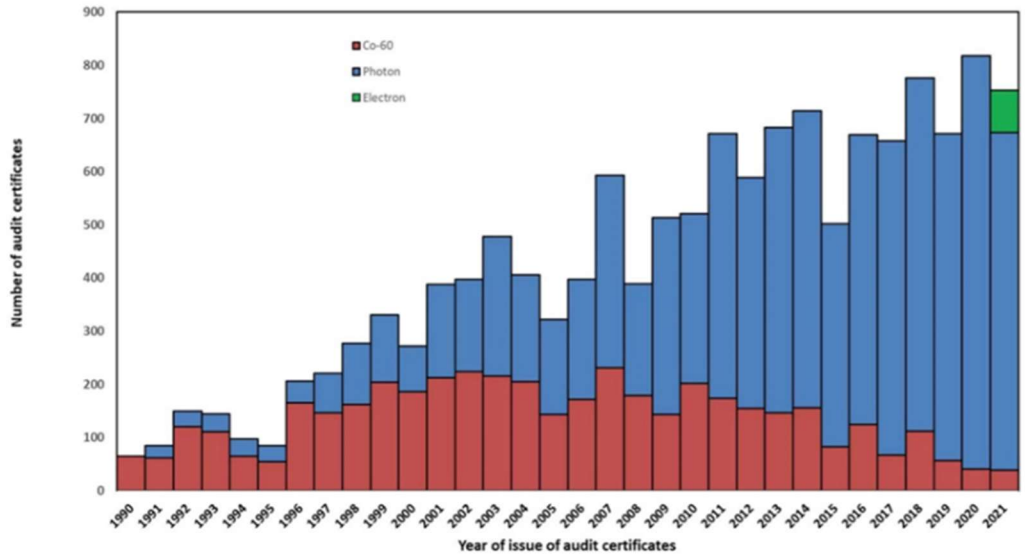


Figure 2. The annual number of IAEA/WHO postal dose audits for radiotherapy hospitals. Note the overall decrease in the number of ^{60}C units audited (red) and the start of the electron dosimetry audits (green) in 2021.

electron beam qualities to fulfil a possible need to offer megavoltage electron beam calibrations to SSDLs.

The SSC-20 is pleased to see the framework of metrics developed and reported for the use of the linac at the DOL and encourages continued reporting of the metrics.

The SSC-20 is pleased to see the progress that the DMRP has made in terms of electrometer calibration and is **satisfied** with the outcome in terms of an addition of an appendix to ionization chamber calibration certificates, the publication in the SSDL Newsletter 74 and that the method will be described and promoted at the upcoming SSDL Technical Meeting.

The SSC-20 notes that the ReNuAl ++ programme continues at the Seibersdorf laboratories. The DOL will benefit from an expanded new space that will allow it to perform its mission even more effectively. During that expansion/construction, key elements of the auditing service will have to be moved and set up in a new location.

The SSC-20 **encourages** the DOL to develop a plan to move its RPLD measurement laboratory to its new location and to recommission its dose measurement system such that the same accuracy and precision is obtained in the new laboratory as prior to the move, with minimal disruption in the auditing services provided.

The SSC-20 recognizes the added training value to the SSDL of the presence of SSDL staff at the IAEA during the calibration of their reference instruments, as well as the reduced likelihood of damage to their reference instruments when carried by hand. Acknowledging that this might only be possible under a TC project requested by the Member State:

The SSC-20 **proposes** that the DMRP encourages SSDL staff, whenever practicable, to carry by hand their ionization chambers for calibration at the DOL and to remain present during the calibration process.

The SSC-20 welcomes the introduction at the DOL of calibrations for SSDL reference instruments in megavoltage photon beams (see Figure 3) that are traceable to the BIPM. As there are different beam qualities at the DOL, at the BIPM and in the clinic, interpolation and/or extrapolation in terms of $TPR_{20,10}$ is required for both the DOL reference instruments and the instruments under calibration from the SSDL. In view of this:

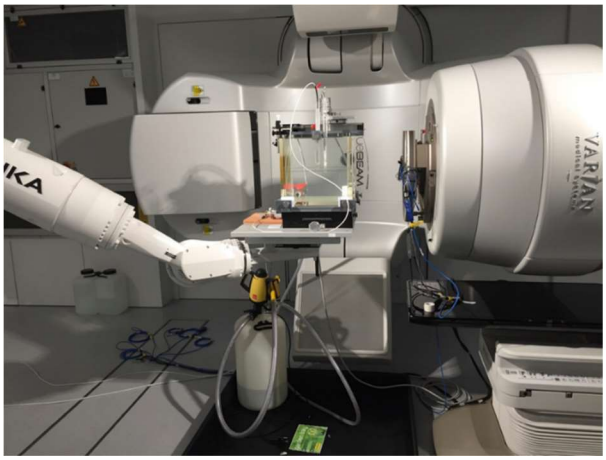


Figure 3. The water phantom in place for the calibration of an SSDL reference instrument in terms of absorbed dose to water for radiotherapy in the DOL linac beam.

[R6] The SSC-20 recommends that a small group of experts be consulted to inform the methodology for determining the appropriate factors for the calibration and interpretation of reference instrument results in different megavoltage photon beams.

Dosimetry audit networks (DAN) have been set up in several regions to conduct dosimetry audits, thus relieving some pressure on the DMRP. (See Figure 4). The SSC-19 recommended that the DMRP support these DAN by providing verification audits to give them confidence in their local auditing.

[R7] The SSC-20 noting the importance of the DAN to promulgate dosimetry consistency and the willingness of the DMRP to ensure the continuity and support for the DAN technical meetings, educational activities and comparisons of audit techniques, recommends that the DMRP continues in this work.

[R8] The SSC-20 **recommends** that a consultants' meeting be held to assess what aspects of radiotherapy might need new audits and to propose the type of audit tool to be developed (eg. Virtual audits or measurement-based audits).

The DOL can then use this information to propose a new CRP to develop and investigate the new audit methodology. The consultants' meeting would give guidance to the DOL on the need and auditing approaches that will allow it to expand its services to new radiotherapy dose delivery technologies to Member States in an efficient, accurate and cost-effective manner.

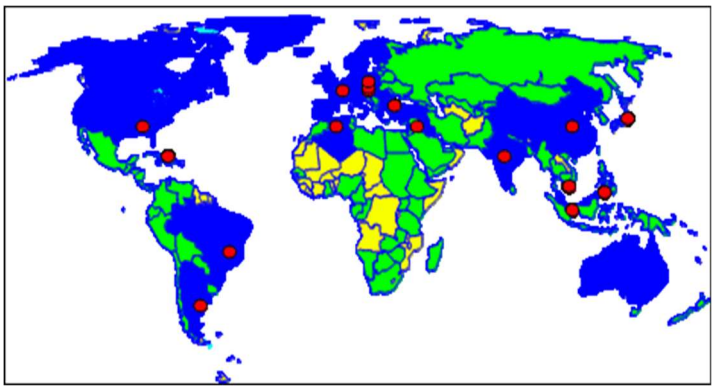


Figure 4. The red dots show countries with a DAN that cooperate with the IAEA. The green areas show countries that participate in the IAEA/WHO dosimetry audit service. The blue areas have a national or international audit system. The yellow countries have no radiotherapy or no known audit service.

3.3 Project 2.2.4.2 Developments in Radiation Dosimetry

The objective of this project is to contribute to international harmonization and consistency in radiation dosimetry by developing and updating guidance and codes of practice. Consequently, the activities focus on research and development in radiation dosimetry, including the development and updates of dosimetry Codes of Practice.

Dosimetry codes of practice are crucial to ensure that patients receive radiotherapy in a consistent and verifiable manner wherever they are in the world. The programme of the DMRP is fundamental in enabling these publications to be produced based on approved practices by consultants in the field. One such code of practice that was recommended by the SSC-17 concerns the use of small composite radiation fields that are combined for use in the newer treatment modalities. However, this is not yet wide-spread enough in practice to enable sufficient data to be forthcoming to produce a fully-fledged dosimetry code of practice. Consequently:

[R9] The SSC-20 recommends that the code of practice for the dosimetry of small composite fields for radiotherapy be shelved for the moment and the white paper only picked up again conclusive, harmonized data to support for a code of practice is available.

The SSC-19 had noted that the white paper on plan-class specific reference fields was being finalized. To progress this work:

[R10] The SSC-20 **recommends** that the DMRP finalize, peer-review and publish the paper on plan-class specific dosimetry.

When new Codes of Practice are published it is important to monitor their uptake by the international community to ensure that the code has resulted in better consistency of dosimetry. One method of undertaking this is to audit the dosimetry outcomes pre and post the publication. The new brachytherapy dosimetry Code of Practice is expected to be published in 2023. Once this is published:

[R11] The SSC-20 recommends that the CRP (E2.40.23) on the brachytherapy audit methodology tests the implementation of the new brachytherapy Code of Practice and includes at least 10 institutions.

The SSC-20 proposes that DMRP tracks the scientific developments on the calibration and clinical dosimetry of electronic brachytherapy sources, beta-emitting eye plaques and source model correction factors with a goal to formulate consensus guidelines for clinical reference dosimetry and traceability.

Well-type ionization chambers are often used to measure brachytherapy sources. However, the calibration factors are highly dependent on the geometry of the source to be measured as well as the atmospheric pressure. To reduce the dosimetry uncertainties associated with brachytherapy source measurements:

[R12] The SSC-20 **recommends** that a consultants' meeting is convened to give guidance on calibration factors for well-type ionization chambers used in brachytherapy, such as 'high altitude' (low air pressure) corrections and source geometry corrections.

The use of alpha-emitting radiopharmaceutical therapies is evolving in the nuclear medicine community, but the advantages from their use is still uncertain, and the international availability of such radionuclides is limited to a very small number of sites. Given that the implementation of alpha-emitting therapies is still at a very early stage, the SSC-20 **proposes** that a doctoral CRP on alpha-emitter dosimetry be postponed until the availability and efficacy of these treatments is more certain.

The Code of Practice in Diagnostic Radiology (TRS 457) was published with test results in 2011 and the SSC-20 believes this should be updated. A CRP is currently underway using different techniques to measure diagnostic doses and the results could be used in the update. Consequently:

[R13] The SSC-20 **recommends** that once the CRP (E2.40.24) on dosimetry in diagnostic radiology is completed, the results and findings of the CRP should be used to inform an update of the Code of Practice TRS 457.

One of the important roles of the Agency, the WHO and the DMRP is the support and extension of the SSDL Network and its oversight. The SSDLs provide a key resource towards the accurate delivery of radiation doses through their assignment of calibration coefficients traceable to primary radiation standards. In order to accomplish this crucial function, the measurement of radiation dose must follow all of the principles defined in the field of metrology. The sustainability of quality radiation measurements in an SSDL depends critically on the staff. Competency training helps to ensure the level of expertise in an SSDL and gives recognition to their worth. To progress this support for the SSDL Network:

[R14] The SSC-20 **recommends** that the DMRP works closely with ICTP and Trieste University to provide a post-graduate framework that results in the recognition of the role and work of radiation metrologists in assuring traceability of radiation measurements for the safety of patients. This would include formally-evaluated competency training at the DOL, the ENEA, BIPM or another PSDL.

The SSC-20 believes that a doctoral CRP is an efficient and justifiable activity that strengthens the local expertise in low to middle income Member States. It also promotes the establishment of long-lasting academic collaborations and furthers the objectives of the Agency to promote quality and safety in healthcare by educating and training scientists in Member States. The benefit of previous and ongoing doctoral CRPs for clinical medical physicists is evident in the number of peer-reviewed publications that have resulted from these efforts. This is also considered an excellent method of producing and promoting radiation metrologists who are crucial to ensuring valid dosimetry for radiotherapy traceable to international standards. Consequently:

[R15] The SSC-20 **recommends** that the next doctoral CRP (E2.40.26) in radiation metrology, with the expanded scope to include advanced dosimetry research, be prioritized after the current doctoral CRP (E2.40.22) is completed.

The SSDL Network Charter was originally drawn up and published in 1999, explaining the privileges, rights and duties of members in the Network. A second edition of the SSDL Network Charter was produced in 2018 (See Figure 5) to accommodate the changes and the developments in the field. A number of issues have arisen over the last 4 years that indicate the necessity for an update to the Charter. It has become clear that in some instances the obligations of the Network membership have not been clear. The SSC-20 feels that an update should reflect the present situation with respect to quality management in the most recent 2021 edition of ISO 17025, to include methods to ensure sustainability of services, to promote the use of the DOLNET for validated calibration services and to ensure the necessary downgrading of an SSDL member to provisional status if their responsibilities under the Charter are not being met after a warning period of 2 years. To achieve this update:

[R16] The SSC-20 **recommends** that a Consultants' meeting is used to update the IAEA/WHO SSDL Network Charter.

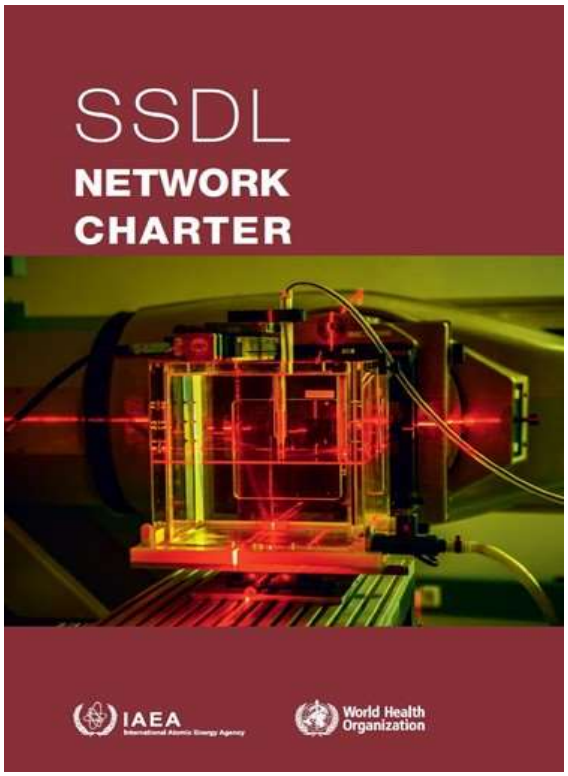


Figure 5. The IAEA/WHO SSDL Network Charter 2018.

Under the current SSDL Charter, SSDLs are obliged to provide an annual report to the IAEA with respect to their quality system and to list the calibration services that they provide under that system. However, the same requirement does not exist for PSDLs that are affiliated with the IAEA/WHO SSDL Network. This presents an inconsistency for the situation where the PSDL, for certain quantities, serves as an SSDL rather than as a PSDL. Noting that the nomenclature PSDL and SSDL is a simplification that does not in all cases adequately reflect the different status that a given laboratory might have in different domains:

[R17] The SSC-20 **recommends** that Affiliated members of the SSDL Network submit an annual report related to their primary standard(s), calibration services, QMS and any substantive changes since the previous year so as to maintain their Affiliated status.

3.4 Project 2.2.4.3: Clinical Medical Radiation Physics and Quality Assurance

The objective of this part of the programme is to achieve international harmonization in QA in radiation medicine by enhancing the quality in the practice of diagnosis and treatment using radiation in the Member States. The activities are to develop guidelines and training material for best practice in clinical medical radiation physics, including diagnostic radiology and nuclear medicine imaging physics as well as radiotherapy physics. In addition, the activities promote comprehensive audits and research in the clinical environment through CRPs.

The SSC-20 is pleased to see the progress that has been made in terms of the SSC-19 recommendations (R28 to R30) using expert groups to consider data science, image analysis and deep learning for guidance in AI. The SSC-20 **encourages** the DMRP to maintain the impetus on guidance related to AI.

Nuclear Medicine and Radiology physics continue to be important components of the work the DMRP undertakes for Member States. The provision of a SPECT/CT facility at Seibersdorf would facilitate training courses in quality control and image optimization of SPECT and CT, in addition to providing support for activities in both external beam and radiopharmaceutical therapy. The SSC-20 believes that such a facility would benefit the whole of the Human Health Division.

[R18] The SSC-20 continues to recommend the procurement of a SPECT/CT system under the ReNuAl ++ initiative, to support training in SPECT and CT technology and applications. This will also help support the adoption of radionuclide therapy applications in Member States.

In the last ten years there have been significant advances in imaging device design in SPECT and PET, both in terms of detector design with increasing use of CZT and SiPMs, and system configuration, with devices such as PET/MR and total body PET. Similarly, there have been significant developments in radiopharmaceutical therapies with the introduction of ^{177}Lu PRRT, ^{177}Lu PSMA, ^{225}Ac PSMA, and ^{223}Ra dichloride. As there have been all these developments. The Nuclear Medicine Physics Handbook is now considerably out of date. Consequently:

[R19] The SSC-20 **recommends** that both the Nuclear Medicine Physics and the Diagnostic Radiology Physics Handbooks and presentation materials be reviewed for update in the next few years to include more recent developments, with priority for Nuclear Medicine Physics in this next biennium 2024/25.

Dosimetry in Radiopharmaceutical therapy is becoming increasingly important to the nuclear medicine community in Member States, and valuable work has been done in this area as part of a recent Coordinated Research Project. It is

essential that the outcomes of such work are published and made available to Member States through scientific and IAEA publications to enhance practice in this field.

[R20] Following the Coordinated Research Project (CRP E2.30.05) on *Dosimetry in Molecular Radiotherapy for Personalised Patient Treatments*, the SSC-20 **recommends** publication of salient findings and outcomes from this CRP and dissemination of this information to Member States through training courses.

The area of radiopharmaceutical therapy continues to see huge growth, extending beyond the thyroid into other cancer types. One application in the field that is becoming more established, and likely to see growing international availability, is ^{177}Lu-peptide receptor radionuclide therapies (PRRT).

[R21] With the upcoming publication on *Dosimetry for Radiopharmaceutical Therapy* and the ongoing work on the case study report on resources, processes and dosimetry for thyroid therapy, the SSC-20 **recommends** that the next case study report should focus on the same aspects for ^{177}Lu-peptide receptor radionuclide therapy (PRRT).

The SSC-20 notes the desire of many countries to request assistance from the Agency in setting up radiotherapy for their population but **emphasises** the need for a sustainable infrastructure of appropriate diagnostic facilities prior to radiotherapy programme support, particularly in low-income countries. To support these countries in particular:

[R22] The SSC-20 recommends that the DMRP together with the NMDI, NSRW and the WHO generate a guidance document on setting up a diagnostic radiology programme, considering clinical, medical physics, radiation protection and safety aspects.

[R23] The SSC-20 **recommends** that the DMRP produces new, or monitors the need for updated, guidance documents on QC/QA and optimization of equipment and procedures using X ray imaging in radiology.

The *Radiation Oncology Physics: a handbook for teachers and students* is a critical resource of educational material for medical physicists and trainees in Member States. This handbook has not been updated in many years, yet many advancements in radiotherapy medical physics have occurred.

[R24] The SSC-20 recommends that the Radiation Oncology Physics handbook is prioritized to be updated together with appropriate new educational presentation material.

The Technical Report Series No. 430 on computerized planning systems was generated in 2008 and new developments in treatment planning, dose calculation algorithms, small field beam modelling and the required quality assurance have been developed that need to be incorporated in an update to the report. Consequently:

[R25] The SSC-20 recommends that a consultants' meeting be prioritized to update "The Commissioning and Quality Assurance of Computerized Planning Systems for Radiation Treatment of Cancer." Technical Reports Series No. 430.

As Member States develop the capability to perform image-guided 3D conformal and intensity modulated radiotherapy (IGRT), a natural progression towards delivering accurate conformal radiation doses to moving targets in patients is to manage target motion. However, guidelines to do this are needed, so:

[R26] The SSC-20 **recommends** that the DMRP develops guidelines for managing target motion during radiotherapy treatments.

Training and continuing professional development is vital for those working in the clinical field of medical radiation physics and the DMRP programme rightly stresses this aspect of their work, which the SSC-20 is keen to support. (See Figure 6).

[R27] The SSC-20 recommends that the DMRP continues with the development and promotion of professional guidance being conducted by the Training Officer for the education, training and recognition pertaining to clinical medical physicists, to enhance and sustain the safe and accurate medical use of radiation in the Member States.

[R28] The series of tutorial videos, slide sets, etc. to support the dissemination of Agency publications is appropriate and the SSC-20 recommends that they should be expanded with the same structured approach, which includes quality assurance of the material to ensure their suitability and alignment with IAEA guidance.

Figure 6. The Human Health Campus website showing the link through to the e-learning modules.

The ongoing development of CLP4NET high quality self-paced e-learning modules based on Agency training courses and published on the IAEA Learning Management System (CLP4NET) provides freely accessible continuing education resources to Member States that may not otherwise be available in some settings. In view of the value of this resource:

[R29] The SSC-20 recommends the DMRP continues to develop their e-learning courses for CLP4NET and monitors and evaluates their use.

4 SSC-20 Recommendations (Indicated as High or Medium Priority)

4.1 High Priority Recommendations

4.1.1 General organizational recommendations

[R2] The SSC-20 recommends that the DMRP in collaboration with the ARBR and the NMDI formulates an ethics review process for the storage of anonymized and de-identified DICOM patient images for image analysis applications in diagnostic radiology, nuclear medicine, and radiation oncology.

[R3] The SSC-20 recommends that a medical image repository (e.g. a PACS) be established to collate image data of patients, phantoms, a glossary of artefacts and simulated data.

4.1.2 Project 2.2.4.1: Calibration and Auditing Services

[R5] The SSC-20 encourages the DOL to monitor the electron megavoltage beam audit results and follow up any discrepancies and, further, to plan/develop training/education courses if the deviation rate continues to be high.

[R6] The SSC-20 recommends that a small group of experts be consulted to inform the methodology for determining the appropriate factors for the calibration and interpretation of reference instrument results in different megavoltage photon beams.

[R7] The SSC-20 noting the importance of the DAN to promulgate dosimetry consistency and the willingness of the DMRP to ensure the continuity and support for the DAN technical meetings, educational activities, and comparisons of audit techniques, recommends that the DMRP continues in this work.

4.1.3 Project 2.2.4.2 Developments in Radiation Dosimetry

[R9] The SSC-20 recommends that the code of practice for the dosimetry of small composite fields for radiotherapy be shelved for the moment and the white paper only picked up again when conclusive, harmonized data to support a code of practice is available.

[R11] The SSC-20 recommends that the CRP (E2.40.23) on the brachytherapy audit methodology tests the implementation of the new brachytherapy Code of Practice and includes at least 10 institutions.

4.1.4 Project 2.2.4.3: Clinical Medical Radiation Physics and Quality Assurance

[R18] The SSC-20 continues to recommend the procurement of a SPECT/CT system under the ReNuAl ++ initiative, to support training in SPECT and CT technology and applications.

[R22] The SSC-20 recommends that the DMRP together with the NMDI, NSRW and the WHO generate a guidance document on setting up a diagnostic radiology programme, considering clinical, medical physics, radiation protection and safety aspects.

[R24] The SSC-20 recommends that the Radiation Oncology Physics handbook is prioritized to be updated together with appropriate new educational presentation material.

[R25] The SSC-20 recommends that a consultants' meeting be prioritized to update "The Commissioning and Quality Assurance of Computerized Planning Systems for Radiation Treatment of Cancer." Technical Reports Series No. 430.

[R27] The SSC-20 recommends that the DMRP continues with the development and promotion of professional guidance being conducted by the Training Officer for the education, training and recognition pertaining to clinical medical physicists, to enhance and sustain the safe and accurate medical use of radiation in the Member States.

[R28] The series of tutorial videos, slide sets, etc. to support the dissemination of Agency publications is appropriate and the SSC-20 recommends that they should be expanded with the same structured approach, which includes quality assurance of the material to ensure their suitability and alignment with IAEA guidance.

[R29] The SSC-20 recommends the DMRP continues to develop their e-learning courses for CLP4NET and monitors and evaluates their use.

4.2 Medium Priority Recommendations

4.2.1 General organizational recommendations

[R1] The SSC-20 **recommends** that a plan be developed to transition to a new database platform, for example a cloud-based solution, in order to allow the DMRP critical repositories of data (IDEA, DIRAC, SSDL, DOLNET, DAN) to be used effectively, securely and efficiently.

[R4] The SSC-20 **recommends** that in a collaboration between the DMRP and the ARBR, a consultancy meeting is organized with a group of experts to discuss possible Agency action on the definition and use of operational ontologies and Big Data in radiation oncology. This would be a first step before extending to other modalities.

4.2.2 Project 2.2.4.1 Calibration and Auditing Services

[R8] The SSC-20 **recommends** that a consultants' meeting be held to assess what aspects of radiotherapy might need new audits and to propose the type of audit tool to be developed (e.g. Virtual audits or measurement-based audits).

4.2.3 Project 2.2.4.2 Developments in Radiation Dosimetry

[R10] The SSC-20 **recommends** that the DMRP finalize, peer-review and publish the paper on plan-class specific dosimetry.

[R12] The SSC-20 **recommends** that a consultants' meeting is convened to give guidance on calibration factors for well-type ionization chambers used in brachytherapy, such as 'high altitude' (low air pressure) corrections and source geometry corrections.

[R13] The SSC-20 **recommends** that once the CRP (E2.40.24) on dosimetry in diagnostic radiology is completed, the results and findings of the CRP should be used to inform an update of the Code of Practice TRS 457.

[R14] The SSC-20 **recommends** that the DMRP works closely with ICTP and Trieste University to provide a post-graduate framework that results in the recognition of the role and work of radiation metrologists in assuring traceability of radiation measurements for the safety of patients. This would include formally-evaluated competency training at the DOL, the ENEA, BIPM or another PSDL.

[R15] The SSC-20 **recommends** that the next doctoral CRP (E2.40.26) in radiation metrology, with the expanded scope

to include advanced dosimetry research, be prioritized after the current doctoral CRP (E2.40.22) is completed.

[R16] The SSC-20 **recommends** that a Consultants' meeting is used to update the IAEA/WHO SSDL Network Charter.

[R17] The SSC-20 **recommends** that Affiliated members of the SSDL Network submit an annual report related to their primary standard(s), calibration services, QMS and any substantive changes since the previous year so as to maintain their Affiliated status.

4.2.4 Project 2.2.4.3: Clinical Medical Radiation Physics and Quality Assurance

[R19] The SSC-20 **recommends** that both the Nuclear Medicine Physics and the Diagnostic Radiology Physics Handbooks and presentation materials be reviewed for update in the next few years to include more recent developments, with priority for Nuclear Medicine Physics in this next biennium 2024/25.

[R20] Following the Coordinated Research Project (CRP E2.30.05) on *Dosimetry in Molecular Radiotherapy for Personalised Patient Treatments*, the SSC-20 **recommends** publication of salient findings and outcomes from this CRP and dissemination of this information to Member States through training courses.

[R21] With the upcoming publication on *Dosimetry for Radiopharmaceutical Therapy* and the ongoing work on the case study report on resources, processes and dosimetry for thyroid therapy, the SSC-20 **recommends** that the next case study report should focus on the same aspects for ^{177}Lu-peptide receptor radionuclide therapy (PRRT).

[R23] The SSC-20 **recommends** that the DMRP produces new, or monitors the need for updated, guidance documents on QC/QA and optimization of equipment and procedures using X ray imaging in radiology.

[R26] The SSC-20 **recommends** that the DMRP develops guidelines for managing target motion during radiotherapy treatments.

5 SSC-20 Comments

5.1 General organizational comments

- The SSC-20 appreciated the more flexible style of presentations by the Section staff during the meeting but **proposes** that at least one slide that contains the main points to be discussed is displayed.
- In spite of recent fluctuations in the editorial system and the knowledge that the publications back-log is being addressed, the SSC-20 **suggests** the Agency considers a prioritization system in the editorial process according to the scientific relevance of publications that may impact the safety of patients and the harmonization of dosimetry in order to reduce the time between submission and release of the publication.
- To ensure that DMRP reports to be published are not misused or widely disseminated prior to final publication, SSC-20 **encourages** the Agency to implement a system so that access to pre-published versions of reports in the repository is controlled and recorded by the DMRP.
- The SSC-20 **recognizes** that a great deal of DMRP staff effort is dedicated to supporting TC projects, as well as DMRP projects. We would like to acknowledge this considerable effort and congratulate the DMRP staff on being able to support both endeavours.
- The SSC-20 **proposes** that a collaboration between the NSRW and the DMRP be established to allow the NSRW/RSTS to produce a detailed feasibility study and specification for their potential neutron irradiation facility as part of ReNuAl++, for consideration in a future project programme.

5.2 Project 2.2.4.1: Calibration and Auditing Services

- The SSC-20 **proposes** that a promotional strategy be developed by the DMRP, ARBR and NMDI to restart all comprehensive quality assurance audits to the Member States.
- In view of the added dangers to patients if electron doses are inaccurate, the SSC-20 **encourages** the DOL to assess the feasibility of characterizing a series of electron beam qualities to fulfil a possible need to offer megavoltage electron beam calibrations to SSDLs.
- The SSC-20 is pleased to see the framework of metrics developed and reported for the use of the linac at the DOL and **encourages** continued reporting of the metrics.

- The SSC-20 is pleased to see the progress that the DMRP has made in terms of electrometer calibration and is **satisfied** with the outcome in terms of an addition of an appendix to ionization chamber calibration certificates, the publication in the SSDL Newsletter 74 and that the method will be described and promoted at the upcoming SSDL Technical Meeting.

- The SSC-20 **encourages** the DOL to develop a plan to move its RPLD measurement laboratory to its new location and to recommission its dose measurement system such that the same accuracy and precision is obtained in the new laboratory as prior to the move, with minimal disruption in the auditing services provided.

- The SSC-20 proposes that the DMRP encourages SSDL staff, whenever practicable, to carry by hand their ionization chambers for calibration at the DOL and to remain present during the calibration process.

5.3 Project 2.2.4.2 Developments in Radiation Dosimetry

- The SSC-20 **proposes** that DMRP tracks the scientific developments on the calibration and clinical dosimetry of electronic brachytherapy sources, beta-emitting eye plaques and source model correction factors with a goal to formulate consensus guidelines for clinical reference dosimetry and traceability.

- Given that the implementation of alpha-emitting therapies is still at a very early stage, the SSC-20 **proposes** that a doctoral CRP on alpha-emitter dosimetry be postponed until the availability and efficacy of these treatments is more certain.

5.4 Project 2.2.4.3: Clinical Medical Radiation Physics and Quality Assurance

- The SSC-20 encourages the DMRP to maintain the impetus on guidance related to AI.

- The SSC-20 notes the desire of many countries to request assistance from the Agency in setting up radiotherapy for their population but **emphasises** the need for a sustainable infrastructure of appropriate diagnostic facilities prior to radiotherapy programme support, particularly in low-income countries.

Acronyms used in the SSC Reports

AI	Artificial Intelligence
ARBR	Applied Radiation Biology and Radiotherapy Section (of IAEA)
BIPM	Bureau International des Poids et Mesures
CIPM	International Committee for Weights and Measures
CLP4NET	Cyber Learning Platform for Network Education and Training
CMC	Calibration and Measurement Capability
CoP	Code of Practice
CPD	Continuing professional development
CRP	Coordinated Research Project (of IAEA)
CT	Computed Tomography
CZT	Cadmium Zinc Telluride
DAN	Dosimetry Audit Network
DG	Director General (of IAEA)
DICOM	Digital Imaging and Communication in Medicine
DIRAC	Directory of Radiotherapy Centres
DMRP	Dosimetry and Medical Radiation Physics Section (of IAEA)
DOL	Dosimetry Laboratory (of IAEA)
DOLNET	Dosimetry Laboratories Network (Register)
ENEA	Ente per le Nuove Tecnologie L'Energia e L'Ambiente
HDR	High dose rate (brachytherapy)
IAEA	International Atomic Energy Agency
ICTP	The Abdus Salam International Centre for Theoretical Physics
ICRU	International Commission on Radiation Units and Measurements
IDEA	International Dose External Audits
IGRT	Image-Guided Radiation Therapy
ILO	International Labour Organization
IMPCB	International Medical Physics Certification Board
IMRT	Intensity Modulated Radiation Therapy
IRIS	IRIS Software Group Ltd
IT	Information Technology
KCDB	BIPM key Comparison Database
MRI	Magnetic Resonance Imaging
NAHU	Division of Human Health (of IAEA)
NMDI	Nuclear Medicine and Diagnostic Imaging (of IAEA)
NSRW	Radiation, Transport and Waste Safety (of IAEA)
PACS	Picture Archiving and Communications System
PET	Positron Emission Tomography
PSDL	Primary Standard Dosimetry Laboratory
PSMA	Prostate-Specific Membrane Antigen
PRRT	Peptide Receptor Radionuclide Therapy
QA	Quality Assurance
QC	Quality Control
QMS	Quality Management System

QUAADRIL	Quality Assurance Audit for Diagnostic Radiology Improvement and Learning
QUADOL	Quality Audit for Dosimetry Laboratories
QUANUM	Quality Assurance in Nuclear Medicine
QUATRO	Quality Assurance Team for Radiation Oncology
QS	Quality System
RBE	Radio-Biological Effect
RMO	Regional Metrology Organization
RPLD	Radio-Photoluminescence Dosimeter
RPOP	Radiation Protection of Patients (of IAEA)
RPT	Radio-Pharmaceutical Therapy
RSTS	Radiation Safety Technical Services (of IAEA)
SBRT	Stereotactic Body Radiation Therapy,
SHANE	Shoulder, Head and Neck (phantom)
SiPM	Silicon Photo-Multipliers
SPECT	Single Photon Emission Computed Tomography
SRS	Stereotactic Radiosurgery
SSC	SSDL Scientific Committee
SSDL	Secondary Standards Dosimetry Laboratory
TC	Department of Technical Cooperation (of IAEA)
TLD	Thermoluminescent dosimeter, or thermoluminescence dosimetry
WHO	World Health Organization

Courses, Meetings and Consultancies in 2023

Please note that due COVID-19 crisis many events have been postponed and the dates are still to be decided (TBD). In some cases, new dates have been proposed but there might still be some further changes.

TC Courses and Workshops related to DMRP activities

- RAS6102: Regional Training Course on Quality Assurance and Dosimetry for Junior Medical Physicists, Amman, Jordan, 11 – 15 January 2023
- RAF6058: Workshop on Quality Control Programme in Africa: Analysis of Results and Way Forward, Vienna, Austria 16 – 20 January 2023
- RAF6058: Training Course on Dosimetry using Monte Carlo Techniques, Accra, Ghana, 16 – 20 January 2023
- RLA 6091: Regional Training Course on Quality Assurance and Dosimetry in Mammography Including Tomosynthesis and Contrast Enhanced Mammography, Curitiba, Brazil, 5 – 10 February 2023
- RLA9091: Regional Training Course on Calibration of Radiation Protection Equipment Using Neutron Sources in Secondary Standard Dosimetry Laboratory (SSDL), Rio de Janeiro, Brazil, 20 – 24 March 2023
- RER 6040: Image Guided Radiotherapy for Cervical Cancer: Focus on Brachytherapy, Belgrade, Serbia, 27 – 31 March 2023
- RAS6101: Regional Training Course on Roles Responsibility, Education &Training of Medical Physicist and Certification for Clinically Qualified Medical Physicist, Krabi, Thailand, 27-31 March 2023
- RLA9091: Regional Training Course on Brachytherapy Calibrations and Measurements Including SSDL and Medical Physicist, Lima, Peru, 08 – 12 May 2023
- RAF6058: Regional Training Course on Image Quality and Radiation Dose Management in Radiology for English Speaking Countries, Pretoria, South Africa 15 – 19 May 2023
- RAS6101: Regional Training Course on Quality Management and Quality Assurance in Medical Imaging for Medical Physicists, Bangkok, Thailand, 22 – 26 May 2023
- RLA 6091: Regional Training Course on Quality Assurance and Dosimetry in Dental and Cone Beam CT, Havana, Cuba, July 2023
- RAF6058: Regional Training Course on Image Quality and Radiation Dose Management in Radiology for French Speaking Countries, Pretoria, South Africa, 6 – 10 September 2023

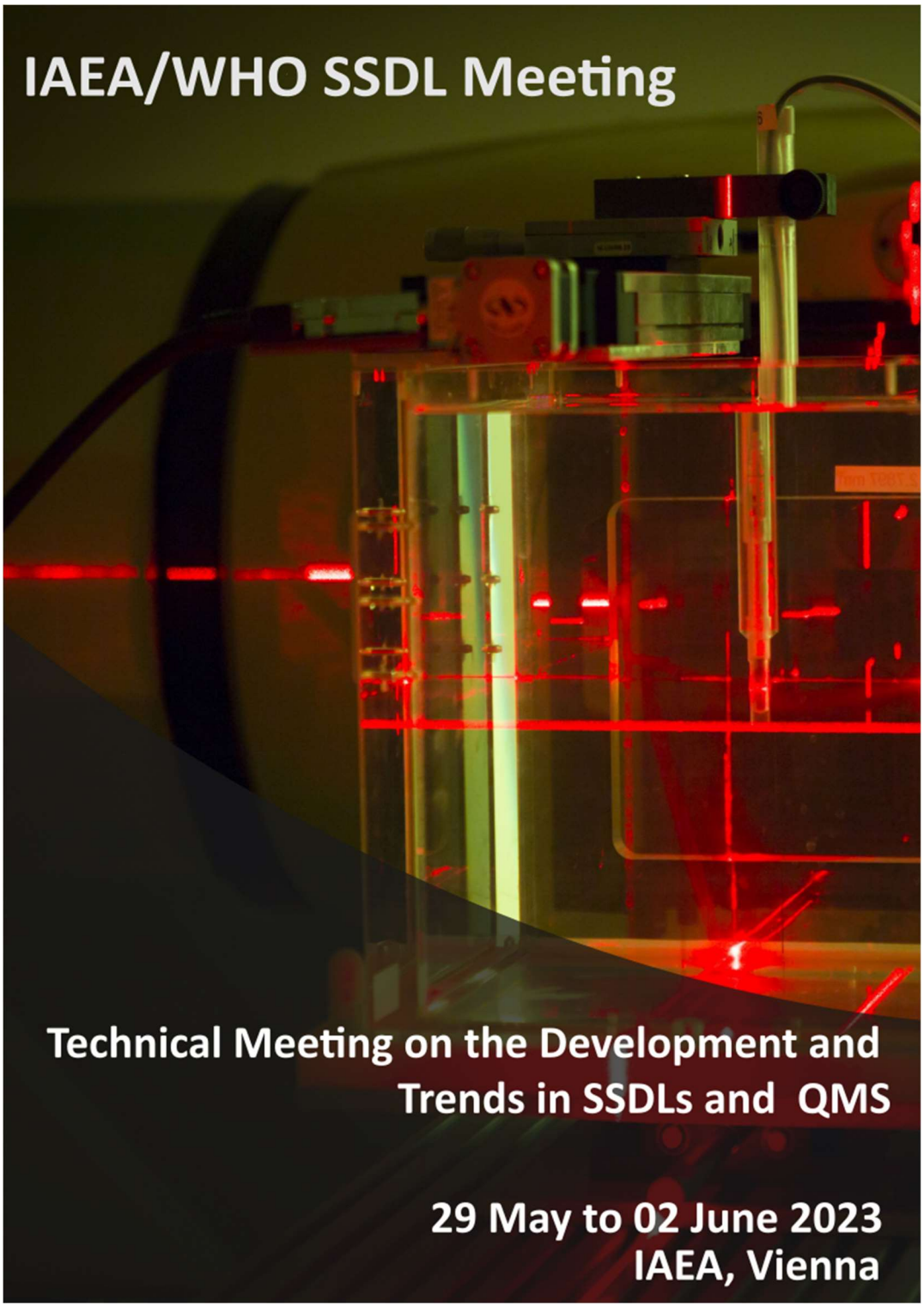
Training courses and ESTRO Courses

- ESTRO Course on Dosimetry Audit, London, United Kingdom, 17 – 21 April 2023
- E2-TR-1805156 Joint IAEA and Argonne National Laboratory Training Activity on Comprehensive Clinical Audits in Diagnostic Radiology under the Quality Assurance Audit for Diagnostic Radiology Improvement and Learning (QUAADRIL) Tool, Argonne, United States of America, 24 – 28 April 2023

DMRP Meetings and Consultancies

- Consultancy Meeting on Film Dosimetry, Vienna, Austria, 20 – 24 February 2023
- Consultancy Meeting on Guidance Related to Quality Assurance and Optimization in Fluoroscopically-Guided Interventional Radiology, Vienna, Austria, 17 – 21 April 2023
- Consultancy Meeting on Developing Guidelines on Quality Assurance for Digital X ray Breast Imaging Modalities, Vienna, Austria, 22 – 26 May 2023

- Technical Meeting on Developments and Trends in Secondary Standards Dosimetry Laboratories and Quality Management Systems, Vienna, Austria, 29 May – 2 June 2023
- First Research Coordination Meeting on Audit System for Radiopharmaceutical Therapy (RPT), Vienna, Austria, 3rd Quarter 2023
- Second Research Coordination Meeting on Evaluation of the Dosimetry Needs and Practices for the Update of the Code of Practice for Dosimetry in Diagnostic Radiology (TRS-457), Vienna, Austria, 3rd Quarter 2023
- Consultancy Meeting to Advise on the Co-ordinated Research Project for the Evaluation on the Requirements for Medical Physicists Working in Radiopharmaceutical Therapies (RPT), Vienna, Austria, 2 – 6 October 2023
- Consultancy Meeting on Dose Management Systems, Vienna, Austria, 6 – 10 November 2023


IAEA/WHO SSDL Meeting
Technical Meeting on the Development and Trends in SSDLs and QMS
29 May to 02 June 2023
IAEA, Vienna

Upcoming IAEA publications relevant to the SSDL's

- IAEA Technical Reports Series No. 398 (Rev. 1) - Absorbed Dose Determination in External Beam Radiotherapy, An International Code of Practice for Dosimetry Based on Standards of Absorbed Dose to Water
- IAEA Technical Reports Series No. 492 - Dosimetry in Brachytherapy, An International Code of Practice for Secondary Standards Dosimetry Laboratories and Hospitals
- IAEA Human Health Series No. 44 - Establishment of a Secondary Standards Dosimetry Laboratory
- Education of Radiation Metrologists for Secondary Standards Dosimetry Laboratories

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